

## NIA Project Registration and PEA Document

### Date of Submission

Sep 2018

### Project Reference Number

NIA\_SGN0132

## Project Registration

### Project Title

Industrial and Commercial Carbon Capture

### Project Reference Number

NIA\_SGN0132

### Project Licensee(s)

SGN

### Project Start

October 2018

### Project Duration

2 years and 5 months

### Nominated Project Contact(s)

Phil Bradwell, Innovation Project Manager

### Project Budget

£259,950.00

## Summary

The aim of this project is to develop a concept design for large commercial and small industrial users that not only captures carbon to reduce overall emissions, but also adds value to the user through repurposing captured carbon into either a useful mineral product or conversion to “renewable” methane using methanation.

This project will aim to build upon existing knowledge of carbon capture and utilisation technology, focusing on I&C users.

### Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

## Problem Being Solved

The scale of the decarbonisation of energy problem is very large and meeting the target of 80% reduction in carbon emissions by 2050 is a big challenge. The hardest area to address is domestic heating and transport, however significant overall reductions are possible if the Industrial and Commercial (I&C) sector is considered. For instance, the top 200 gas users in SGN's network account for 15% of the total network flow.

It is possible to demonstrate a substantial carbon emission saving if any of the users within the I&C sector adopts decarbonisation. Carbon Capture techniques are available for large industrial users but there is a barrier associated with the disposal and storage of the CO<sub>2</sub>.

## Method(s)

This project will identify and develop realistic systems to integrate carbon capture methodologies on small industrial and large commercial installations. The project aims to address:

- The impact on the existing process through addition of carbon capture technology to ensure that efficiency and operability of the existing process is not compromised.
- Utilisation of captured carbon through mineralisation or methanation to add value to the CO<sub>2</sub> by repurposing it to form a building

material or fuel.

## Scope

The aim of this project is to develop a concept design for large commercial and small industrial users that not only captures carbon to reduce overall emissions, but also adds value to the user through repurposing captured carbon into either a useful mineral product or conversion to “renewable” methane using methanation.

This project will aim to build upon existing knowledge of carbon capture and utilisation technology, focusing on I&C users.

## Objective(s)

The objectives of this project are to:

- Carry out an assessment of carbon capture technologies for small industrial and large commercial gas applications, evaluating the impacts of retro-fit and the potential quality and scale of the carbon dioxide stream produced.
- Carry out a quality review of captured carbon dioxide for use in mineralisation and methanation.
- Review design options for methanation and mineralisation systems, and estimating the overall efficiency of these processes.
- Understand the quality of the mineralised product and options for reuse of this material.
- Carry out an assessment of the gas quality from the methanation process to ensure suitability and compliance with grid entry requirements.
- Quantify the potential carbon emission reduction benefit resulting from any practical future installations of the target systems.
- Carry out an assessment of the potential capital and operating costs for these installations, to determine a cost per tonne of carbon abated.

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

n/a

## Success Criteria

The following success criteria for the project include the completion of:

- Technology assessment on carbon capture methods from small industrial and large commercial systems.
- Assessment of hydrogen availability and production.
- Evaluation of solid material that could be used as a base for mineralisation.
- Assessment into the gas quality impacts and requirements.
- Assessment on the collection and handling of captured carbon.
- Assessment of the gas grid entry requirements.
- Study to be undertaken on the mineralisation end uses.
- A techno-economic study to review the capex and opex options.
- A final DNV GL report, consolidating the information in the Technical Notes.
- A presentation of findings to the SGN team.

## Project Partners and External Funding

DNV GL

## Potential for New Learning

The project is expected to develop the following new learning for Network Licensees:

- Develop better understanding of repurposing captured carbon.
- Assessment of carbon capture technologies.
- Quantify the potential carbon emission.

## Scale of Project

This project involves a conceptual study on carbon capture for large commercial and small industrial users. This also looks to consider the requirements for carbon repurposing either as a useful mineral solid or recycled to produce methane.

The outcome from this project will be a “proof of concept” and pre-FEED-like study that could be the basis for forming a follow-on field trial demonstration project.

## Technology Readiness at Start

## Technology Readiness at End

TRL2 Invention and Research

TRL3 Proof of Concept

### **Geographical Area**

This project will be focused on SGN's network, but the outputs and methods can be shared with all the GDNs.

### **Revenue Allowed for the RIIO Settlement**

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

### **Indicative Total NIA Project Expenditure**

The total project expenditure is £259,950, 90% (£233,955) of which will be recovered via the NIA funding mechanism in line with the funding conditions.

## 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)

This project is at a low TRL and it is therefore not possible to provide an accurate estimate of the potential saving to customers at this stage.

The overall concept of carbon capture and repurposing for large commercial and small industrial users is estimated to have a substantial saving, both financial and environmental.

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

N/A

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

The potential outcomes of this project are applicable to all networks, where Network Licensees are aiming to reduce carbon emissions.

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

N/A

### 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 learning gained from this project aims to inform Network Licensees of the potential carbon capture benefits relating to large commercial and small industrial users.

### 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, LCNE, 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 review has been made of all other Network Licensees and no other similar projects have been carried out.

### 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

Capturing and repurposing carbon on an I&C level is a new area of research being investigated. With increased focus on reducing carbon emission, research on innovative technology to help reduce carbon emissions is being carried out.

### 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 aims to address long term issues of reducing carbon emissions. This project is also looking at innovative technology and applying it to large commercial and small industrial users.

**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 NIA project has a low TRL and involves carrying out a conceptual study. This project is applicable to all the GDN's where the learning can be shared between the networks.

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

☒ Yes