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NIA Project Registration and PEA Document

Date of Submission

Oct 2018

Project Reference Number

NIA_CAD0061

Project Registration

Project Title

Optinet

Project Reference Number

NIA_CAD0061

Project Licensee(s)

Cadent

Project Start

October 2018

Project Duration

5 years and 6 months

Nominated Project Contact(s)

Helen Fitzgerald. Lorna Millington.

Project Budget

£6,585,263.00

Summary

Project to consider the viable options for providing capacity for Biomethane connections. This includes smart pressure control, compression and assessment of storage and reinforcement. The network optimisation information will be evaluated concluding in a report summarising the conclusions.

Third Party Collaborators

Passiv UK

Nominated Contact Email Address(es)

Innovation@cadentgas.com

Problem Being Solved

The growth of distributed gas generation, principally in the form of biomethane production brings with it many challenges – both technical and economic. The network capacity is being constrained in low demand periods and new biomethane connections may not be able to connect into the network or may be constrained off during the low demand periods. The Honiton to Swindon medium pressure network has been selected as the demonstration network for this project. It was chosen due to it approaching a critical mass of biomethane enquiries in the area, if a solution is not provided a number would have to be declined capacity.

The impacts of the new types of exit connections onto the distribution systems have to be considered in parallel to the challenges of entry. Electricity peaking plants that ramp up quickly, and operate over the peak energy periods are connecting onto the distribution networks in large numbers. This sudden demand on the distribution networks could cause the pressure in the network to drop and rise in an unpredictable manner as they are called on to balance renewable energy.

Combining the impact of both green gas entry and power generation supply places unprecedented pressure on the network which has

not been experienced before. Balancing these requirements and adapting to constant changes on the network is only achievable by deploying an optimised network solution.

Method(s)

The project will review a number of solutions to create capacity in the network to allow additional biomethane plants or other distributed gas generation to connect and flow even in the lowest demand periods. This will maximise the opportunity to decarbonise the gas network & support the energy system transition. The solutions being investigated in this project are primarily as follows:

- Smart pressure control of the network
- Compression from the network to a higher pressure tier
- Storage solutions

The project will be delivered through the following high level methodology. Characterisation, design & test of the selected area for the trial – The East Midlands HP and IP system around Doncaster.

1. Selection of appropriate network optimisation solutions (smart pressure control, compression and assessment of storage / other options)
2. Mobilisation (procurement and installation of equipment and services)
3. Network optimisation trials
4. Analysis, close down & reporting

Scope

The project has been broken down into the following discrete phases.

Phase 1

Define locations for the equipment installation and carry out early stage design

Select location within East Midlands for the compression and smart pressure control.

Analyse and define sites for smart pressure control installation within WWU area relating to the original project scope.

Analyse and define the sites within the East Midlands to install smart pressure control.

Carry out front end design for the compressor site selection

Consideration of alternative storage options

Deliverables – network locations chosen, and early stage design completed, alternative storage options assessment

Phase 2a

Installation of the smart pressure control within both WWU and Cadent networks.

Development of the control philosophy

Commission and begin trials

Deliverables – development of a control logic and its interchangeable between networks

Phase 2b

Installation of the compressor

Detailed design

Procurement and installation of the compressor

Update of the control philosophy

Deliverables – updated control logic and the operational compressor

Phase 3

Trial

Deliverables – output of the learning achieved and recommendations for any further adaptations to the trial, closedown & final reporting

Objective(s)

The project hopes to demonstrate the ability to implement solutions that enable the wider connection of green and distributed gases into the network. This will provide a cost efficient, reliable and low carbon supply whilst adapting changing requirements of new demands such as the increase in peaking power generation or gas for transport.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Successful installation, testing and demonstration of smart pressure controls and compressor. Extended period of testing and demonstration of the effectiveness of the proposed solutions. A detailed report on each of the proposed solutions, appropriately characterising the results to enable a hierarchy of implementation for the proposed solutions that can inform future investment decisions across GB.

Project Partners and External Funding

This project will be led by Cadent with Passiv Systems, in collaboration with WWU.

Potential for New Learning

This project is the first of its kind in GB implementing not only smart pressure control on a medium pressure network and Intermediate pressure. Also a full scale compressor also on the intermediate pressure and running these solutions to address actual demand constraints on a network and provide a solution to allow more biomethane injection. This is a first of its kind solution and the learning will be applicable across all GB GDNs.

Scale of Project

This project is done at the relevant scale which is onsite trials of the equipment to prove their value to the gas networks.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

A location within the Cadent network will be chosen to trial the equipment.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

Indicative external & internal costs

WWU External: £350,213

Cadent External: £4,588,734

WWU Internal: £116,738

Cadent Internal: £1,529,578

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)

Enabling green gas to be injected into the gas distribution networks is the cheapest way of decarbonising heat, power (from the connected power generation and enabling renewable electricity generation from peakers) and transport with the increased demand for biomethane for HGVs. Ultimately decarbonising the gas networks have been estimated to save the £100bn's vs other decarbonisation strategies to meet the objectives of the climate change act.

Please provide a calculation of the expected benefits the Solution

Assuming a full roll out of smart pressure controls to 11 sites following and implementing the learning from a successful trial through this project (method cost), replacing manual pressure changes at these sites 3 times a year (base cost), the cost saving over the 20 year (minimum) life of the AD plants would be £253370.08 - £114,959.63 = £138,410.45.

Detailed cost savings from the implementation of the compressor will only be available once the project has started.

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

Suitable for use in all license areas

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

The cost of the supply and installation of the loggers is estimated to be £19,074

The cost of purchasing a compressor for the network is estimated to be between £600,000 and £1,000,000.

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 problems addressed within the project are relevant to all networks and the solution could be rolled out to all GDN's to free up network capacity and allow further biomethane connections across the UK. The project outcomes may demonstrate a network specific result that are limited to some, but not all networks within the GDN's.

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, 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.

The ENA portal has been interrogated and no projects were found that were similar. The project has been discussed with other networks and no concerns were 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

We want to demonstrate the benefits of an optimised network solution for the first time in the UK. The increase in distributed gas generation has led to pressures on the gas network which previously not been experienced leading to necessary changes in how we operate these networks to accept distributed gas.

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 will investigate and provide a hierarchy of control for future network investment to support a greener network.

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 pioneering project will investigate several solutions and determine the viability of implementing such solutions in the field. The NIA funding is available for networks to use to undertake high risk projects where the outcomes are unknown.

This project has been approved by a senior member of staff

Yes