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NIA Project Registration and PEA Document

Date of Submission

Sep 2013

Project Reference Number

NIA_NGN_034

Project Registration

Project Title

Renewable Technology Used for Pre-Heating Feasibility Study

Project Reference Number

NIA_NGN_034

Project Licensee(s)

Northern Gas Networks

Project Start

June 2012

Project Duration

0 years and 10 months

Nominated Project Contact(s)

Dan Sadler (Head of Head of Energy Futures)

Project Budget

£60,000.00

Summary

Across the UK pre-heating is currently undertaken by aging, inefficient water bath heaters, or where such equipment has been replaced, with boilers which work on similar principles. There has been minimal technological development or assessment of alternative pre-heating equipment and associated operating systems in the UK over the last twenty years.

The existing systems used for pre-heating gas generally rely on outdated technology. Water bath heaters are the best example of an outdated technology and as such, when these are replaced modern gas fired boilers and plate heat exchangers are installed. However, even this solution does not consider the possible use of renewable technologies such as biomass, ground source heat pumps, solar heating to name a few.

Third Party Collaborators

Aqua Consultants

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

Across the UK pre-heating is currently undertaken by aging, inefficient water bath heaters, or where such equipment has been replaced, with boilers which work on similar principles. There has been minimal technological development or assessment of alternative pre-heating equipment and associated operating systems in the UK over the last twenty years.

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pumps, solar heating to name a few.

Method(s)

To produce a feasibility report into alternative forms of pre-heating to Northern Gas Network's (NGN's) Offtakes / Pressure Reduction Installations (PRI's). To provide a detailed analysis of renewable technologies this could be suitable for use across NGN's network to pre-heat gas.

Investigate the feasibility of using current available alternative and / or renewable technologies in addition to exploring the benefits of the current designs when considering a water bath heater replacement scheme. Undertake site assessments and a desktop review to look into other utility services in the immediate surrounding area, any unique opportunities will be identified by site where the possibility exists to either work in co-operation with water utility companies and / or electricity companies.

Scope

The feasibility study will cover as a minimum the following areas and will be based on an analysis of a 'large', 'medium' and 'small' site:

1. Biomass Boilers
2. Combined Heat and Power
3. Anaerobic Digestion
4. Ground source heat pumps
5. Existing boiler efficiency improvements

For each element the feasibility study will cover the following criteria:

1. Physical constraints – can the option be progressed based on our site characteristics
2. Options for installation and suppliers (ESCO etc)
3. Financial impact - CAPEX
4. Total cost of Operation Vs traditional boiler packages
5. Regulatory incentive mechanism opportunities

In addition to the above the feasibility will map all current sites identifying the most suitable for the respective technology. Specifically the study will also consider the location of all sewerage works and sub stations and the proximity to our gas sites.

Finally the study will also cover a cost benefit analysis comparing the installation of metering for our gas heaters Vs the current calculation for gas shrinkage from our leakage calculation.

Objective(s)

To provide a detailed analysis of renewable technologies this could be suitable for use across NGN's network to pre-heat gas.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

A successful feasibility study will contain specific details of renewable technology for use by engineers across the network to select the equipment required to pre-heat gas. The report will ensure that engineers know which technology is capable of pre-heating a typical site and the benefits that any feasible renewable technology will provide in terms of carbon saved per annum.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

- Desktop Review - Obtain a list from NGN detailing sites where water bath heater / boiler upgrades are planned under RIIO. (Anticipated 32off water bath heaters and 26no boiler upgrades) Assess the area around each gas site. le Cross reference locations with electrical sub-stations, sewage works, existing / planned district heating systems Check areas for restrictions such as Air Quality Management Areas (Biomass)
- Design Information Review - Obtain from NGN the information required to size and design new modular gas fired boiler installations
- Alternative Technologies - Provide technical details of the alternative technologies. Obtain input from specialist manufacturers into the applicability of alternative technologies to a typical site. Including but not limited to; CHP, Biomass, anaerobic digestion, heat pumps (ground source / air source)
- Government Incentives / Regulator Incentives - Provide information on the possible incentives of using alternative renewable technologies. This will include financial incentives and environmental incentives in terms of carbon footprint
- Review of costs and lead times - Provide cost analysis of each available technology and each available procurement route
- Summary of limitations - Conclusions and recommendations Draw conclusions and recommendations specific to the sites highlighted for development under RIIO

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

Desktop research and NGN existing equipment covering NGN Footprint

Revenue Allowed for the RIIO Settlement

Nil

Indicative Total NIA Project Expenditure

- £6,351 NIA Funding Requirement
- £53,968 IFI Funding (12-13)

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)

The introduction of new technologies will provide a cost benefit to the network operators that can be passed on to the customers.

The cost benefits will be derived from savings made from:

1. Reductions in network gas usage for pre-heating
2. Reduced operational costs - Boiler house sites are complex and require expensive service agreements
3. Reduced site visits - Water bath heaters are coming to the end of their lives and require extensive maintenance
4. Introduction of new technologies at a commercial value based on on site assessment rather than vendor driven data

Please provide a calculation of the expected benefits the Solution

Not required research project.

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

Currently pre-heating across all networks, including NGN, is currently based on a mixture of :

- Water bath heaters
- Modular gas fired boilers
- Electric heaters

The analysis undertaken as part of this study will inform NGN and all other networks on the suitability, viability, costs and benefits of a range of low carbon solutions to preheating. This will then be used to inform the sector on how best to approach new and emerging technologies for preheating. It will also produce a methodology on how to measure system efficiency for all preheating solution both existing and new.

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

This will not have a direct cost comparison for costs across the UK. It will however provide guidance to where inefficient heating systems are currently being used, for example on sites where pre-heating is provided by water bath heaters, the study will detail the most energy efficient way to upgrade these systems. The study will consider the use of renewable technologies and will factor the benefits of using renewable energy into the overall reduction of the carbon footprint of the network. These factors can be used by all GDN's to inform future strategies.

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

A draft report will be issued in October 2012 for comment by NGN prior to their anticipated renewable energy conference planned for March 2013. It is anticipated that the final report will be issued to NGN in March 2013. A presentation will be given to NGN to detail the findings of the report.

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

Customer opinion is in favour of industry tackling climate change and in particular energy companies. The benefits will accrue entirely to the gas transportation system. We mentioned that we will address technologic solution to reduce leakage and impact of our operations on the environment.

- 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.

n/a

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

n/a

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

n/a

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

n/a

This project has been approved by a senior member of staff

Yes