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 2024

Project Reference Number

NIA_NGN_454

Project Registration

Project Title

Heat Networks - Optimising Stranded Assets

Project Reference Number

NIA_NGN_454

Project Licensee(s)

Northern Gas Networks

Project Start

September 2024

Project Duration

0 years and 6 months

Nominated Project Contact(s)

lkirkwood@northerngas.co.uk

Project Budget

£167,313.00

Summary

GDNs have committed to replace all ‘at risk’ iron pipes with polyethylene (PE) by 2032. This initiative has and will continue to be a significant investment of customer money. To avoid the stranding of these assets and further investment of customer money, GDNs are seeking alternative ways to operate and evolve their current gas networks to suit future requirements. It is considered that a PE network could be suited for use in heat networks such as district heating, leading to benefits for existing customers.

The output from this project will be a feasibility study that produces a report and dissemination piece. This study will inform GDNs, heat network providers, councils and local area planners about regulatory requirements, commercial viability, any technical or operational challenges.

Third Party Collaborators

Gas Networks Ireland

Energy Innovation Centre

DNV

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

As the UK transitions towards net zero, the UK Government has introduced a ban preventing the installation of natural gas and oil heating systems in new build homes. The intention is for this ban to take effect in 2025, with further bans scheduled to apply to existing

homes by 2035. As a high percentage of homes are heated using natural gas, this legislation will create a period of uncertainty for Gas Distribution Networks (GDNs).

GDNs have committed to replace all 'at risk' iron pipes with polyethylene (PE) by 2032. This initiative has and will continue to be a significant investment of customer money. To avoid the stranding of these assets and further investment of customer money, the GDNs are seeking alternative ways to operate and evolve its current gas network to suit future requirements. It is considered that a PE network could be suited for use in heat networks such as, district heating, leading to benefits for existing customers.

The GDNs need to understand if repurposing the PE gas network for a heat network is feasible as an alternative use of the gas network.

Method(s)

DNV is proposing a desktop study to consider the feasibility of repurposing gas mains for heat networks, an innovative solution to address potentially otherwise stranded assets. This has not been previously considered by the GDNs, but if successful would provide an alternative use for the gas network should decommissioning be required as part of the energy transition. The study will explore the following in order to assess the feasibility:

Practicalities of converting PE gas pipes into a heat network such as:

- Material suitability,
- Gas pipe fittings and non-pipe components (valves etc.),
- Heat transfer conditions,
- Capacity and operation evaluation,
- Impact of required street-works.

Regulationand standards for converting PE gas pipes into a heat network such as:

- Regulatory barriers including issues or changes needed. These will include licencing and permitting required for construction and operation to broader changes required to the GDNs licences.
- Legislative direction including the Energy Act 2023, including Ofgem becoming the heat network regulator, barriers to market growth e.g. ensuring heat network developers can access powers equivalent to gas / electricity utilities such as to excavate roadways.
- Environmental regulations, e.g. water, emissions, visual impact, noise, odours, biodiversity impact.
- Guidance such as that produced by the Heat Trust.

Commercial impactof converting PE gas pipes into a heat network such as:

- Return on assets,

Cost-benefit analysis, including social value.

Scope

Stage 1 - Heat supply, demand and networks description:

DNV will conduct a technology review, detailing the key processes and mechanisms required in heat networks. The review will cover heat supply, demand and network strategies.

Stage gate: presentation and chapter of the final report.

Stage 2- Technical feasibility assessment:

DNV will assess the suitability of current gas network pipeline infrastructure for use in heat network distribution. The focus will be on PE pipelines of 4 barg and below, although brief consideration of high pressure pipelines will be made.

Stage gate: presentation and chapter of the final report.

Stage 3 - Non-technical feasibility assessment:

DNV will assess other factors (such as regulations, standards and commercial), in excess of the technical practicalities that could impact the feasibility.

Stage gate and go/no go decision for stage 4: presentation and chapter of the final report.

Stage 4 - Case studies:

DNV will develop two case studies to illustrate the network capability and water-pipe-ground heat transfer characteristics when repurposing existing PE gas infrastructure for a heat network. This will include network analysis using DNV's Synergi Liquid software, which includes a hydraulic modelling module for heat networks. This study will require a suitable Synergi Gas network model to be supplied by each GDN. Each case study will include a cost-benefit analysis..

Stage gate: presentation and final report.

Objective(s)

Stage 1 Heat supply, demand and networks description

Develop heat demand archetypes - 3-5 archetypes developed and agreed using learning generated from the desktop study and DNV knowhow

Describe heat supply options (e.g. industry surplus heat, geothermal, solar, biomass, biomethane and combined heat and power) - Learning generated and reported based on desktop study and DNV know how

Describe heat network infrastructure - Learning generated and reported based on desktop study and DNV know how

Stage 2 Suitability Assessment

Identify technical barriers that could impact the conversion of PE gas networks to heat networks - Information will be gathered from up to 10 specialist interviews with stakeholders

Identify possible solutions to overcome barriers - Learning generated and reported based on desktop study and DNV know how

Assess customer suitability (generically as per the archetypes defined in Stage 1) for a heat network - Narrative will be developed around the simplicity of exchange, level of disruption for customers, degree of monitoring equipment/infrastructure that can be reused, and high-level cost savings

Identify advantages of repurposing gas mains - Learning generated and reported based on desktop study and DNV know how

Stage 3 Further feasibility considerations

Identify regulatory, standards barriers and required developments to repurposing - Learning generated and reported based on desktop study and DNV knowhow, including internal and external stakeholder engagement, utilising opportunities during suitability assessment.

Identify commercial impact of repurposing gas mains - Learning generated and reported based on desktop study and DNV knowhow

Stage 4 Case studies

Develop two plausible case studies - One case study developed for an agreed location in each of NGN's and GNI's licence areas.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

Heat networks would provide an alternative consumer choice compared to electrification of heat- The project report will provide an assessment of the feasibility of re-purposing the gas network for district heating, which has the potential to provide customers with a more diverse and secure energy supply.

Success Criteria

Minimum success criteria (Must and should)-

Develop learning of heat networks and heat supply / demand options - Description of the learnings made based on desktop study and DNV knowhow

Assess the technical feasibility of repurposing gas infrastructure into district heating - A feasibility assessment delivered based on the learnings of DNV's desktop study

Assess regulatory and other barriers to repurposing gas infrastructure into heat networks- Description of the learnings made based on desktop study and DNV know how

Desirable criteria (Could)-

Identify at least two plausible locations for PE gas infrastructure to repurposed into a heat network - One case study produced for an agreed location in each of NGN's and GNI's licence areas.

Project Partners and External Funding

Northern Gas Networks NIA contribution - £110,000.00

Gas Networks Ireland contribution- £83,656.50 (excluding internal costs)

Potential for New Learning

This project will primarily develop new learnings around the feasibility of repurposing gas infrastructure into district heating networks, including technical and regulatory aspects. It will also develop an understanding for the commercial feasibility of taking this on and the benefits that may arise for the UK consumers.

Scale of Project

The project looks to complete a desktop feasibility assessment of the UK and Irelands current gas infrastructure. There will be no live network trials.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL2 Invention and Research

Geographical Area

The project will cover the geographical region of NGN and Gas Networks Ireland but will be replicable across the UK & Ireland.

Revenue Allowed for the RIIO Settlement

£110,000.00

Indicative Total NIA Project Expenditure

Total NIA- £110,000.00

External Costs- £92,023.00

Internal Costs- £17,977.00

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:

In the future energy scenarios, there is a potential outcome with widespreas electrification that the demand for naturanl gas may diminish. This could lead to the decomissioning and stranding of natural gas assets, leaving the opportunity to reuse the infrastructure. The project report will provide an assessment of the feasibility of repurposing the gas network for district heating, which has the potential to support the transition away from traditional energy sources.

How the Project has potential to benefit consumer in vulnerable situations:

The project report will provide an assessment of the feasibility of repurposing the gas network for district heating, which has the potential to provide customers with a more diverse and secure energy supply in the future.

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)

N/A

Please provide a calculation of the expected benefits the Solution

N/A

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

This project will be covering the geographical area for NGN and GNI, with the project going into further detail on two areas as case studies. These will be representative of common scenarios across GB, learnings will be replicable.

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

This project is a low TRL piece of work, further phases would be required to provide any form of roll out cost.

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

Learnings from the project will be disseminated through final projet reports, as well as at network events. The information gained from the project will be relevant to heat network providers, gas distribution networks and local area energy planners.

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

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.

There is no project that has previously looked as repurposing gas assets for the use in heat networks in GB or Ireland.

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

While the roll out of heat networks has become common place in the UK, it has never looked at utilising exsisting infrasturcture at a network level. As such the feasibility of all aspects of repurposing the gas network for deployment of heat networks will need to be assessed.

This research project is novel as there is no known GDN systems that are currently utilising exisiting infrastructure for heat network applications.

Relevant Foreground IPR

The project and the resultant outcomes/deliverables will conform to the default treatment of IPR as set out under the agreed NIA Governance (where the default requirements address two types of IPR: Background IPR and Foreground IPR).

Data Access Details

For all data access requests, please follow the guidance set out in Northern Gas Networks Innovation Data Sharing Policy. https://www.northerngasnetworks.co.uk/ngn-you/the-future/our-funding/

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

The projects low TRL and no other previous applications advancing to a suitable level makes this project beyond the scope of Northern Gas Networks business as usual activities. As GDNs move closer to the potential death of gas scenario and/or the potential for repurposing of assets to aid the roll out for heat networks.

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 is highly innovative and future-facing that supports Northern Gas Networks in supporting a market that has not yet emerged and still has a number of risks to overcome to develop into a mass market proposition.

This project has been approved by a senior member of staff

☑ Yes