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NIA Project Registration and PEA Document

Date of Submission

Aug 2020

Project Reference Number

NIA_NGN_282

Project Registration

Project Title

Gas Venting Research

Project Reference Number

NIA_NGN_282

Project Licensee(s)

Northern Gas Networks

Project Start

August 2020

Project Duration

1 year and 8 months

Nominated Project Contact(s)

Hannah Jewison

Project Budget

£77,388.00

Summary

For UK gas distribution networks, gas venting remains a necessary part of normal operations, for maintenance and safety purposes which can be either manual or automatic. Gas venting results in unburned natural gas being released into atmosphere. This has an environmental impact as the main constituent of natural gas, methane, has approximately 28 times the global warming potential of carbon dioxide (based on the IPCC Fifth Assessment Report (AR5) over a 100-year period).

Depending on the source of venting, varying quantities of gas will be released and there is limited understanding of the environmental impact this causes. Additionally, vented gas results in shrinkage, defined as the volume of gas that is lost from the network which cannot be accounted for. GDNs have an obligation under Special Condition 1F.14 to improve the Shrinkage and Leakage Model (SLM) by improving the accuracy and calculation of Shrinkage Gas reporting.

Currently, there are varying methods to different degrees of sophistication, to quantify and forecast the extent and impact of venting.

Third Party Collaborators

Energy Innovation Centre

ROSEN

Nominated Contact Email Address(es)

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Problem Being Solved

For UK gas distribution networks, gas venting remains a necessary part of normal operations, for maintenance and safety purposes which can be either manual or automatic. Gas venting results in unburned natural gas being released into atmosphere. This has an environmental impact as the main constituent of natural gas, methane, has approximately 28 times the global warming potential of carbon dioxide (based on the IPCC Fifth Assessment Report (AR5) over a 100-year period).

Depending on the source of venting, varying quantities of gas will be released and there is limited understanding of the environmental impact this causes. Additionally, vented gas results in shrinkage, defined as the volume of gas that is lost from the network which cannot be accounted for. GDNs have an obligation under Special Condition 1F.14 to improve the Shrinkage and Leakage Model (SLM) by improving the accuracy and calculation of Shrinkage Gas reporting.

Currently, there are varying methods to different degrees of sophistication, to quantify and forecast the extent and impact of venting. A project is needed to assist networks to understand the quantity of gas that is released to atmosphere and to identify safe, environmentally friendly alternative processes that could be adopted.

Method(s)

The project will be carried out in stages, initially identifying the various sources of vented gas, the frequency of venting events and the volume of gas being vented. Using this information, alongside analysis of the environmental and financial impacts of the current processes and reviewing previous projects, will set a baseline for prospective solutions to be benchmarked against.

The technology search will identify potential solutions to reduce gas venting to atmosphere and provide insight into the practicability, the environmental and the economic benefit of any solutions. Any other applicable innovation projects from within the gas industry will be considered, as well as those from other industries. A feasibility assessment will be undertaken for the most applicable solutions and will consider the following:

- Suitability to address problem
- Technology feasibility for use as BAU
- Technical performance
- Current, and potential, TRL
- A benefits assessment will then consider technologies against the following:
 - Environmental benefit
 - Financial benefit,
 - Identification of any “quick wins” (including transfer of good practice, relating to equipment, technology, policy and procedure, between project partners)

This information will be detailed in a report containing the particulars of the relevant solutions and the results of the feasibility and benefit assessment, allowing solutions to be ranked. For promising solutions, recommendations of how to build upon the current TRL to allow implementation will be outlined.

Scope

The approach for the project is made up of 3 stages as followed:

Stage 1 -

- Review current natural gas venting processes to identify sources from operations and equipment installed on the network.
- Estimate the volume of natural gas that is vented from the various sources.
- Literature review (including previous gas industry projects and their learning points, i.e. what has/has not worked in the past).

Stage 2-

- A worldwide technology search will be undertaken to identify environmentally friendly technologies and processes that could help reduce the amount of gas vented to atmosphere.
- Emerging and established technologies and processes will be considered. ROSEN will liaise with third party organisations and potential suppliers to gather relevant data.
- The feasibility of each solution will be assessed and information documented, including technology readiness level (TRL) and recommendations regarding development steps that may be required.
- Policy and procedure surrounding the technologies and required development to BAU will also be discussed.

Stage 3 –

- A technology benefits assessment will be performed and recommendations provided in a technical report (including technical benefit, financial aspects and “quick wins”)
- Understanding the various sources, the frequency, and the magnitude of gas released will provide an insight into the practicability, the environmental benefit and the economic benefit of potential solutions identified in the technology review.
- The report will highlight and rank the most appropriate solutions.

Objective(s)

Following the 3 stage approach to the project, the objectives of each stage are:

Stage 1 objectives

Identify and detail current venting processes and equipment which release gas. Include literature review of previous projects and identify the lessons learnt.

Provide an assessment of the frequency at which gas is released (considering variation through periods of high and low demand).

Provide a detailed understanding of the volume of gas being vented annually from equipment and operations.

Provide an assessment of the environmental impact of current venting processes.

Stage 2 objective

Identify safe, environmentally friendly alternative processes and technologies that could be adopted by the networks.

Stage 3 objective

Quantify the benefits associated with the options identified and highlight the most appropriate.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Success of the project will be to quantify the volume of gas released each year through manual and automatic venting.

To identify if there are safe, environmentally friendly, feasible (technically, economically and socially) alternative processes that could be adopted.

To identify if there are appropriate technologies that could be adopted and if so, include recommendations on potential solutions to take forward.

Project Partners and External Funding

Northern Gas Networks

Wales and West Utilities

EIC

Rosen

Potential for New Learning

The learning primarily from this project will be a deeper understanding of current venting practices and procedures and the impacts of these. Additional to this, network licensees will have a good insight into the technology and developments available to minimize the environmental impact from venting.

Scale of Project

Delivered as detailed, the project will bring significant advances in knowledge relating to the current extent of venting activities, enabling us to quantify environmental impact more accurately. It also enables us to identify ways to mitigate this, which will bring clear environmental benefits, but also societal ones in relation to reduced emissions and less contribution to the climate crisis.

Carried out in any other way, including a lessened scope would significantly reduce the benefit received from the project. Identifying these impacts, but not understanding how to mitigate would be less useful and bring less societal/environmental benefit.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

This project will be based within the Northern Gas Network & Wales & West utilities Network.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

External funding = £58,833

Internal cost:

NGN £8750

WWU = £9,805

Total Cost = £77,388

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 an early stepping-stone towards the ability to suitably quantify gas venting and potentially improve the shrinkage and leakage models (SLM).

A more accurate reflection of venting and shrinkage quantities followed by actions to reduce said venting and shrinkage quantities; means that there is potential for gas consumers to benefit from a decrease in gas transportation costs as less gas is emitted from the networks to the environment. Ultimately we are leading to a reduced impact on the environment and networks contributions to green house gas emissions that lead to further global warming. This is in line with the networks RIIO 2 commitments as well as being a key customer engagement driver.

Please provide a calculation of the expected benefits the Solution

This is a low TRL research project. The findings will detail expected benefits.

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

At this stage, it is not possible to discuss roll-out due to the low TRL, however it is anticipated that the methods would be fully replicable across the entire UK gas network.

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

Part of the project is to identify if there are appropriate technologies and if so include recommendations on potential solutions to take forward. This will help networks determine roll out costs.

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

This project has potential to identify ways to significantly reduce the environmental impact of venting. Should the solution be a change to policy/procedure it is possible that all network areas could apply this with little cost.

This would be on top of a better understanding of the current practices in place and enable a more informed decision on the best course of action going forward to minimize impacts and quantify cost benefit analysis on solutions available.

The project will result in learning that can be applied by all Relevant Network Licensees where assessing the emission impacts from different venting sources.

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

Net zero & the energy transition

- 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.

A thorough check has been completed and no similar projects identified on the smarter networks portal.

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

This project looks to assess and evaluate the current impact of gas venting and seeks to identify a new way of working. The first stage of this project involves identifying previous attempts to reduce venting (or reduce its impact) and then to go beyond that to identify suitable, workable solutions. Venting is a technique that we have applied successfully across many years as a vital part of operating our networks safely. However, as the environmental agenda becomes more and more important, and we make our Net Zero commitments, we need to understand if there is an environmentally beneficial way to continue operating our network without this process (or with reduced venting). This requires specialist knowledge and a broad view of all the processes we carry out. Due to 2050 net zero targets we're now seeking to understand the environmental impact of all of our operations, hence undertaking this project now.

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

The scale of the issues at hand is unknown and therefore there is a high level of uncertainty associated with the project which would be beyond the network licensees' risk appetites. This piece of work is to better understand the opportunities for improvement and alternative methods.

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

The high level of risk associated to a low TRL research project is beyond the current risk appetites of networks, the NIA will allow us to complete this project to better inform future decisions and opportunities for improvement and innovation in this area of operations. Also, the use of NIA funding means learning will be shared with all networks. As the practices to be assessed are undertaken by all gas networks, this in turn benefits customers throughout the UK by giving robust information to allow networks to minimise environmental impact through these practices.

This project has been approved by a senior member of staff

Yes