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

Sep 2018

Project Reference Number

NIA_NGGT0134

Project Registration

Project Title

Mobile Condensate Tanks

Project Reference Number

NIA_NGGT0134

Project Licensee(s)

National Gas Transmission PLC

Project Start

September 2018

Project Duration

2 years and 7 months

Nominated Project Contact(s)

Mathew Currell

Project Budget

£409,007.00

Summary

To review the condensate tank facilities on the existing NG sites ,and to deliver mobile collection units that will replace the function of the existing 16 condensate tanks at the compressor and Terminal sites.

Third Party Collaborators

Premtech Ltd

WEFCO (Gainsborough) Ltd

FT Pipeline Systems

Human Reliability Associates Limited

Nominated Contact Email Address(es)

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Problem Being Solved

On several National Grid compressor sites there are condensate tanks for storing the condensate (liquid extracted from the gas) captured by the scrubbers (in-line plant used to remove liquids from the gas). It has been observed over the past twenty-five years that these sites do not collect significant amounts of condensate, and on some sites no condensate has been collected at all. Following on from a detailed survey in 2017, it has been identified that the majority of the tanks are now approaching the end of their design life and would either need to be replaced or removed, and it is necessary that a scalable solution for condensate removal be developed.

Currently, the transfer of condensate from the scrubbers (rated to 75 bar pressure) into the condensate tank (rated to 2 bar pressure) is a hazardous operation due to the potential break-through of high pressure gas into the condensate tank which could ultimately result in

a loss of containment. This process also carries unnecessary operational risk due to lack of condensate being collected and resulting in two technicians having to carry out an unfamiliar manual process when required.

These tanks increase the number of hazardous areas on site, which in turn raises the risk profile of these sites and equates to more required inspections under PSSR (Pressure System Safety Regulations).

This project aims to considerably reduce the number of condensate tanks installed on the NTS, by the use of a mobile condensate tank system which will be deployed if and when condensate is collected in the scrubbers.

Method(s)

Stage 1: Discovery Stage
The first stage of the project is an exploratory and review stage to understand how existing condensate tanks are currently being utilised and to assess the viability of the project. This stage includes, but not limited to:

- Looking at existing site records looking for similarities and differences with the arrangement of the existing condensate tank facilities.
- Surveys will be undertaken on a selection of up to 5 sites to further understand any issues or challenges that site operatives currently encounter.
- A Basis of Design Document (BoDD) will be developed to outline the design parameters and functional specification of the proposed solution.
- The project team will also review applicable legislation, regulations, and standards associated with the safe storage and transportation of condensate.
- A techwatch will be undertaken to investigate technologies that are currently available and learning from these will be captured for developing the feasibility designs.
- Feasibility designs will then be generated and subjected to a Challenge and Review / Optioneering meeting with relevant stakeholders.

The cost of this stage is £64,000.
The 'Discovery Stage' will act as the initial stage gate for the project before commencing Stages 2 and 3.

Stage 2: Detailed Design
This stage of the project would be to create the design for the mobile condensate tank solution, which would incorporate the following:

- Agreement of the Basis of Design Document (BoDD).
- Development of equipment datasheets and specifications.
- The detail design will be developed for the mobile condensate tank solution – including aspects such as required safety related devices and the trailer design.
- Identification of a suitable trial site for the proposed solution.
- Stakeholder engagement to carry out several Formal Process Safety Assessments (FPSAs) such as a HAZID, a HAZOP and a Safe Working Design Study (SWDS) to ensure that the developed solution captures all necessary safety functionality and provisions.
- The detailed designs will then be T/PM/G/35 approved and appraised to allow construction issue drawings to be generated for the fabrication of the design solution.
- Identify a suitable testing strategy for the design solution.

The cost of this stage is expected to be around £83,000 – which will be confirmed at the end of Stage 1.

Stage 3: Fabrication and Trial of Design Solution
This stage involves the manufacture of the selected design solution and involves the following:

- Premtech will initially provide technical design support to the equipment vendors during the manufacture of the mobile solution.
- A testing strategy will be developed for trialling the mobile solution on an existing site, which was selected as part of stage 2.
- Once the mobile solution has been manufactured and tested (integrity tests), it will then be trialled on site. The trial / testing strategy will be developed to demonstrate that the mobile solution operates as required.
- Training will also be provided to operators on the new equipment.

The cost of this stage is expected to be around £52,500 – which will be confirmed at the end of Stage 1.

Following successful testing of the mobile solution, updates to National Grid standards and procedures will be made and new training material will be produced.

Change Control – September 2020:
Since the last change control, the design and philosophy of how the solution will operate has evolved, some of which are a result of the outcomes of the safety workshop. The testing methodology of the solution has also altered from initial plans, which makes it more user friendly, efficient and inherently safer - though this comes at an additional cost.
COVID-19 has had an impact on certain supply chains, making the sourcing of required components more challenging, and expensive,

than initially expected at the last change control.
This change control seeks to request additional funds of £46,711 in order to deliver a fully effective, compliant and successful mobile condensate collection solution. The additional funds would be used to cover, but not limited to, the following:
A venting coalescer filter system (and service parts)
Dedicated vent stack
A pressure rated visual level gauge
Clean oil for testing purposes
Additional blanks and fittings to enable the testing to be carried out
Splitting of test vessel
Nitrogen banks
Associated labour costs
A time extension is also required for this project. The project needs to be extended until March 2021 – with deliverables reforecast accordingly.

Scope

National Grid currently captures natural gas condensate and compressor oils that are occasionally present in the NTS. The condensate is captured by the scrubbers (which contain a level gauge) and then transferred to a condensate tank by a manual operation as necessary. Currently, most compressor stations have a permanent condensate tank installed to allow for condensate to be collected and stored before it is taken away for safe disposal. These tanks are classed as pressure vessels with various associated equipment that requires regular safety inspections and routine maintenance.

It has been observed that the compressor stations and terminals on the NTS with condensate tanks do not collect significant amounts; some of which have collected little to no significant condensate over the last 25 years. This equipment increases the number of hazardous areas on site and by extension requires maintenance staff to be knowledgeable of condensate collection at each site. The current two-person manual removal of condensate from the scrubber to the storage tanks is a hazardous activity, requires significant amounts of manual handling and requires technicians to follow special operating procedures.

The project will investigate the feasibility of designing and fabricating two mobile condensate storage tanks that can be stored at a central National Grid location and then be transported to a required site if and when the scrubbers need emptying and then returned back to the central location.

The two mobile storage tanks would be designed and rated to 95bar, allowing the transfer of the condensate from the scrubber to the mobile solution at full line pressure. This would negate the requirement for the use of pressure reduction plant which makes the process inherently safer, especially as the operator carrying out the new operation will be fully skilled and trained specifically for this process.

Objective(s)

This project aims to prove the suitability of mobile condensate tanks as a replacement to fixed assets and provide a more holistic approach to condensate management across the NTS.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

To demonstrate that a mobile condensate tank solution works successfully as a replacement to a fixed condensate tank on a National Grid sites.

The project will be reviewed after the Discovery Stage to ensure the mobile condensate option is the most effective solution before proceeding.

Project Partners and External Funding

Project Partner – Premtech
External Funding – (nil)

Potential for New Learning

The mobile condensate tank solution could offer wide ranging opportunities for the safe management of liquids for all the network operators. It potentially provides a continuity of approach.

Scale of Project

Following the initial desktop review, surveys will be undertaken on a selection of up to five National Grid sites to further understand any issues or challenges that site operatives currently encounter. If we proceed to the fabrication stage of the project, the chosen solution will be trialled on a live National Grid site.

Technology Readiness at Start

Technology Readiness at End

TRL5 Pilot Scale	TRL8 Active Commissioning

Geographical Area

Various National Grid sites.

Revenue Allowed for the RIIO Settlement

None (to be confirmed RIIO Delivery)

Indicative Total NIA Project Expenditure

£409007

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)

Following the detailed survey of 2017, it has been identified that within the next three years at least three condensate tanks will need to be replaced.

Total savings over 3 years:
£650,550

Note – This is based on the short-term requirement of having to replace three tanks in three years. If this solution is adopted as business as usual, each tank that would require replacement equates to a £200k saving per tank.

Please provide a calculation of the expected benefits the Solution

There are 16 condensate tanks currently on the NTS.

Cost of replacement tanks = £250,000
Cost of decommissioning a tank = £50,000
Cost of development of mobile solution = £249,450

Note - Cost of training operators in the new process is already included in Phase 3.

Therefore:
(Decommissioning cost of 3 x old tanks + Replacement cost of 3 x new tanks) - cost of development of mobile solution = Total Saving

So:
(£750,000 + £150,000) – (£249,450) = £650,550

Total savings over 3 years (within RIIOT1 timeframe):
£650,550

Maintenance of condensate tank fleet = £27,000 per annum.

It also needs to be taken in to account that all the current condensate tanks are now of a significant age. The cost of replacing every single one (including the decommissioning cost of the condemned tanks) could be close to £4,800,000.

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

All transmission owners.

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

The cost to roll out this method to all relevant NG sites across the country is site specific.

The main cost involved would be the decommissioning of the existing storage tanks at £50k a time. However, the decommissioning of the tanks is not required for this new solution to be rolled out as the new process would make the existing tanks redundant and they can be decommissioned as and when required in the future.

If this solution became classed as best available technology, all new builds would not require on-site condensate storage tanks.

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 solution can then be used as a model for best practice with our UK gas network operators.

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

The main challenges this project addresses are:

- Cost avoidance – Reduction in maintenance/inspection costs and a more cost-effective solution for new condensate management.
- Health, Safety and Regulatory – Reduction of hazardous areas on site that have to comply with Pressure System Safety Regulations (PSSR) as well as improving the safety aspect of the process for the technicians.

☑ 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.

This method of using mobile condensate tanks has not been used within the UK gas industry and therefore no duplication will occur.

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

Alternate condensate management techniques have not been implemented on gas sites before. We are still using systems that haven't changed since they were installed, some of which was 40 years ago. The development of a flexible and mobile solution capable of the direct transfer of high pressure condensate without the need for pressure reduction plant has considerable safety and operational benefits; this programme will demonstrate if this unique and novel approach can be realised.

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

To make an effective business investment decision, the business will always look to utilise best available technologies. In cases where no suitable alternative exists, like-for-like asset/technologies are the only viable option. There are currently no alternate condensate management techniques available. This programme aims to develop an innovative, cost-effective and inherently safer condensate management technique; this falls outside of normal business investment criteria. The use of the NIA framework will mitigate the financial risk to the business of this development and will ensure the results are available to all stakeholders.

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 development of the mobile condensate tank programme poses many technical and operational risks such as the technical implications of the mobile tank design and the operational challenges involved in the transfer of high pressure condensate. To address these challenges, innovation funding allows numerous avenues to be explored to provide the safest and most cost-effective solution. The NIA framework ensures the dissemination of the latest developments in condensate management techniques across all network operators.

This project has been approved by a senior member of staff

☑ Yes