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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

Jan 2014

Project Reference

NIA_NGGT0033

Project Registration

Project Title

Hot Tap Buried Sample Probe

Project Reference

NIA_NGGT0033

Project Licensee(s)

National Grid Gas Transmission

Project Start

July 2013

Project Duration

2 years and 7 months

Nominated Project Contact(s)

Roger Wood (box.GT.innovation@nationalgrid.com)

Project Budget

£610,000.00

Summary

The initial conceptual discussions have identified that utilising alternative construction methods could result in lower levels of investment and also reduced construction complexity when compared to similar projects using traditional construction techniques.

The initial conceptual designs need further development to ensure prototypes developed are suitable to all NTS CVSPs. With that in mind the project will consist of an initial feasibility and conceptual study to ascertain and mitigate existing project risks and ensure the prototypes undergo a formal process of safety assessment (FPSA) and a formal appraisal process to encompass all 37 CVSPs. A combination of a new probe design and construction techniques that take into account human factors have been identified by this project. Three prototype designs require evaluation under this proposal:

- A fixed VE probe that will include Pressure Reduction Unit (PRU) separation – a regularly maintained device - from the top of the probe to an accessible location eliminating the need to install a maintenance platform and the need for the operator to work at heights.

- A retractable VE probe that is to be used above ground and will also include a PRU separation from the probe and relocation to an adjacent location in proximity of the pipeline. This design configuration will also require a ball valve isolation arrangement to ensure that the probe branch can be isolated during pipeline inspection.

- The below ground design solution will include a mitre valve isolation gearbox arrangement with an extension above ground; the PRU will be separated from probe. The probe retractable device and the PRU will be extended above ground and protected against 3rd party interference using reinforced plastic.

National Grid proposes that the prototypes are trialled at Churchover Multi Junction and Churchover Tee due to the site unique sample point requirements with all the proposed probe designs being required. This unique combination would also reduce construction costs with less mobilisation cost impact.

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

New gas analysers are being installed across the National Transmission System (NTS) to replace obsolete analysers and improve the accuracy of the calorific value (CV) sample value calculation. These analysers require more efficient sample systems that require smaller vented gas volumes, and significantly improved analyser response times. In order to meet this requirement new low volume gas sample probes are being installed.

However, traditionally the existing gas sample points within the NTS are installed with plug valves or small isolation points but these are unable to accommodate the new low volume probes, because they require a 2" full bore Ball valve clearance with Double Block and Bleed isolation. This necessitates installations with above ground platforms and below ground access to meet maintenance and replacement requirements. This project looks to trial an alternative design to eliminate the need for working at heights and within confined spaces and which will therefore reduce maintenance costs and reduce human factor risk.

Method(s)

Feasibility Stage

- Site investigation to include trial holes, scrapings and definition of hot tap location.
- Liaison with manufacturers and suppliers to further develop the concept.
- Development and detailing of the concept of the calorific value sample points (CVSPs) arrangement installation in a report format, to include outline arrangement drawings, Process Flow Diagrams (PFDs) and 3D isometric views.

Conceptual Stage

Develop and include a Best Available Technology (BAT) assessment. Design of CVSP's installation to:

1. Develop and include reliability assessments.
2. Include a generic HAZOP study to address process safety requirements fully in accordance with T/SP/HAZ/7.
3. Challenge and Review meeting with appropriate stakeholders.
4. Design package and appraisal in accordance with T/SP/G/35.

Delivery Phase

- To include material procurement and non routine operation compilation.
- Mechanical & Civil works delivery to include mobilisation site works - Necessary restrictions obligated by National Grid System Operations on carrying out Hot Work during the winter period resulted in significant delays. Approval has now been given to commence the Hot Work within a working environment, from April 2014.
- VE technology probe installation to include lifting works and commissioning.

Details of Change to Project Delivery

As described above the project was in three phases, Feasibility, Conceptual design and Implementation phases. There have been issues requiring additional work in all three phases as detailed below;-

Feasibility

The feasibility study phase included excavating pilot holes and taking material samples (scrapings) to identify suitable sections of the below ground pipe-work for the installation of the Hot Tap connections.

The team had begun the main works phase when it discovered that in certain locations the pipe geometry was non-standard: the pipe weld seam was at 12:00 o'clock position for extended distance. When the trial holes were dug, the team were concentrating on pipe depth so valve stems could be ordered and did the scrapings to enable welding procedures to be produced. The location of the seam weld was not initially identified. Unfortunately, this meant the civil team was geared up to do the main job not just the trial hole and

hence the larger contractor costs incurred. They were able to complete 3 of the 4 hot taps but 1 couldn't be done.

It is not possible to hot tap onto a weld, initially this led to the requirement for larger excavations and extended site time and re-visits for main civil works contractor. However it was established that on the trial site this non standard pipe geometry extended out side the site boundary triggering a requirement for a modified design. These factors have resulted in a cost increase and extension to the allowed time for this phase.

Conceptual

As a result of the issues identified (pipe geometry) in the feasibility section, a revised design was approved which involved a welded split Tee with an offset vertical connection. This resulted in a cost increase and extension to the allowed time for this phase.

Delivery

The implementation at Churchover Tee F2 Hot Tap connection will now have to include exploration of design options with manufacturers, designers and PMC, a further G35 approved design, additional components (Split Tee and Offset mounted valve/Probe) and will require a re mobilization to site of the Hot Tap and civils teams with a projected completion of this work by 30th June 2015.

Scope

The initial conceptual discussions have identified that utilising alternative construction methods could result in lower levels of investment and also reduced construction complexity when compared to similar projects using traditional construction techniques.

The initial conceptual designs need further development to ensure prototypes developed are suitable to all NTS CVSPs. With that in mind the project will consist of an initial feasibility and conceptual study to ascertain and mitigate existing project risks and ensure the prototypes undergo a formal process of safety assessment (FPSA) and a formal appraisal process to encompass all 37 CVSPs. A combination of a new probe design and construction techniques that take into account human factors have been identified by this project. Three prototype designs require evaluation under this proposal:

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Objective(s)

The project aims to deliver successfully a field demonstration of a combination of three new probe designs and construction techniques.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The installation of new low volume sample probes incorporating the improved design solution at the trial site.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project method ensures that prototypes are trialed on site at an above ground installation (multijunction/tee) due to the site's unique sample point requirements with all the proposed probe designs being required. This unique combination would also reduce the trial construction costs with reduced mobilisation cost impact.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The solutions will be applicable for the range of calorific value sample points (CVSPs) across the NTS.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

610000

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)

Installation Costs

The proposed arrangements will enable installation of the probes with minimal disruption to the network, leading to reduced probe installation time and effort.

The estimated installation costs reduction for above ground installations at Churchover Junction is in the region of £45,750. The estimated installation cost reduction for below ground installation at Churchover Tee is in the region of £77,800. Savings are estimated to be in the region of £310k total, across 37 calorific value sample points on the NTS.

Operating Costs

The new VE probes together with the FWACV analyser will provide the required CV measurement with reduced maintenance cost and emission carbon footprint.

The elimination of works at heights and confined spaces will also benefit maintenance costs and reduce human factor risk.

The proposed arrangement will also be designed and constructed using current technical knowledge and will utilise modern materials to optimise asset life further reducing replacement cost and effort and increasing safety, human factors and network reliability.

Other Benefits

- Commonality of design, leading to reduced design/appraisal (G17/G35), installation and operating costs.
- Reduced Health Safety and environmental risks associated with traditional on site activities.
- Reduced carbon footprint with minimal use of concrete.

Please provide a calculation of the expected benefits the Solution

Expected financial benefits have been estimated as follows:

- Base cost of existing arrangements across 37 sample points - £480k

- Method Cost utilizing novel arrangement across 37 sample points - £169k

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

The method will be applied to 37 calorific value sample points on the NTS.

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

£170k for 37 sites.

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

n/a

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 project fits within the Gas Quality under the Reliability theme.

☑ 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