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

Jun 2024

Project Reference Number

NIA2_SGN0052

Project Registration

Project Title

BISEP Live trial with LTS Futures (Phase 2)

Project Reference Number

NIA2_SGN0052

Project Licensee(s)

SGN

Project Start

June 2024

Project Duration

1 year and 2 months

Nominated Project Contact(s)

James Heywood

Project Budget

£928,177.00

Summary

Flow-stop tooling is regularly used for major projects and emergency works across the LTS and NTS gas networks. The capabilities of the BISEP tool in 100% hydrogen were previously demonstrated during phase one albeit with some challenges that needed overcoming. This project will provide validation of installation of a grouted tee, hot tapping operations and flow stopping technology on a live field trial, linked with LTS Futures. When successfully completed, a proven double block and bleed leak tight line stopping technology suitable for 100% hydrogen will be available to the UK Gas Networks and the learning gained from this project can be applied to Network Licensees and their operations to facilitate a safe transition to hydrogen from natural gas.

Preceding Projects

NIA2_SGN0036 - BISEP - H2 Testing with LTS Futures (Phase 1)

Third Party Collaborators

STATS UK

Pipeline Integrity Engineers Ltd

Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

Problem Being Solved

The purpose of the overall SGN LTS Futures project being undertaken by SGN with funding from Ofgem is to provide the critical evidence required to convert the LTS to 100% hydrogen. The project will provide critical insight into any identified issues and illustrate solutions for the commissioning or conversion to 100% hydrogen for the gas transmission network. Specific flow stop tooling is used

regularly for major project and emergency works which will need to be assessed for its suitability for operations within 100% Hydrogen. As hydrogen can be more volatile than natural gas it will be critical to have a leak tight line stopping technology available.

STATS BISEP® offers an industry-leading technology solution for temporary line plugging. As proved in phase 1, it provides a fail-safe double block and bleed isolation deployed through a single full bore hot tap, without the need for additional hot tapped bleed or vent points. The BISEP® offers significant safety advantages over traditional line stop technologies, with the hydraulically activated dual seals providing leak-tight isolation of live, pressurised pipelines.

This high integrity isolation is provided by a spherical dual seal plug which is hydraulically deployed into the pipeline from a pressure competent launcher, through a dual seal isolation valve. The seals are hydraulically compressed resulting in radial expansion against the pipe bore. During isolation barrier proving, each seal is tested independently with full pipeline pressure in the direction of the expected pressure differential, proving both seals of the double block isolation are leak tight. Following successful seal proving, the vented annulus void is then closed and monitored confirming isolation integrity throughout the isolation period.

This phase will look to demonstrate the BISEP in a live field trial situation, as such requiring integration into current operating policies and procedures, specifically in and around SCO.

Method(s)

The objectives for Phase 2 are to complete 100% hydrogen validation for installation of a grouted tee, hot tapping operations and flow stopping technology within the LTS Futures live trial. To achieve the above deliverables the project is divided into work packages and the time sequencing and interaction between the work packages are shown in detail below.

1.1 WP1 – Swarf Demonstration

Demonstration that the STATS modification to the BISEP tool has the capabilities to remove swarf following horizontal and vertical drilling operations into a representative test spool. Swarf dispersal will be undertaken through both welded and grouted tee's, vertical and horizontal. The horizontal tee is the required orientation for the LTS Futures trial and subsequently operational performance for this tee will provide the operational assurance.

1.2 WP 2 – Factory Acceptance Test – Witness and Review

STATS will internally function test the BISEP equipment prior to mobilisation to site. A review programme and approval with SGN and PIE to witness all operations and complete audit report. The documents to be review as part of the FAT include:

- ITP and conformance / test certificates
- Vendor design documentation
- Roles and responsibilities
- Vendor operating instructions and functional test requirements
- Calibration certification
- Pre/post surface inspection reports to identify any pipe wall damage during functional testing
- Review pre / post inspection�� results (internal and external surface)
- Sealing capability
- Onsite checklist before commencement of Field deployment

1.3 WP3 -Test site deployment observations

STATS will fabricate/construct a test fixture at STATS yard prior to mobilisation to Spadeadam. Hot tapping and flow stopping in the industry is predominantly deployed vertically. Therefore, STATS will undertake both horizontal and vertical testing at Spadeadam to prove the technology for the Granton to Grangemouth pipeline/LTS Futures Project but also crucially for the gas industry.

- 18x18” grouted tee for horizontal tap and BISEP installation and completion plug
- The test pipe will be 12m long, with each fitting ~3m from either end.
- The test pipe can be rotated by 90o to deploy the BISEP horizontally or vertically.
- Hot tapping would be proven horizontal through grouted tee.
- BISEP would be proven through the grouted tee in both horizontal and vertical orientation.
- Completion plug would be installed horizontally.
- Swarf dispersal through grouted tee in both vertical and horizontal positions.
- During test site deployment
- Complete field deployment log

- After test site deployment
- Post-deployment performance review in line with defined success criteria
- This will follow the same technical assurance requirements defined for the trials completed at Spadeadam completed in 2023. This includes longer hold times tightness testing of the equipment to ensure containment of hydrogen. This was already completed for the BISEP tool, however the hot tapping works were completed by PMC, as such STATS need to repeat this exercise.
- Recommendations for future modification of procedural outputs should success criteria not be met. If this is the case, repeat deployment will need to be completed to provide sufficient technical assurance to progress to WP 4.
- All safety and performance assessment will be reviewed and analysed by PIE as the TSP.

1.4 Work Package 4 – Live pipeline deployment observations

To deliver integration to the LTS Futures trial, extensive additional works need to be completed outside of the STATS deliverables. This includes general ground works, preparation of the site and pipeline as well as supporting gas safe control of operations (SCO). All of these aspects are being delivered under the NIA funding to ensure separation from the LTS Futures. The project team will have overall control of the site, managing the onsite activities through a ground works contractor. Some SGN operational maintenance support maybe required to CP the NRO operations, however this is dependent on a number of factors.

The onsite activities manged through SCO will be written in coordination with the LTS Futures team, in line with current network SCO practices. The additional hydrogen technical assurance and safety requirements will be defined by the LTS Futures team in line with their project deliverables.

In advance of live trial deployment:

- SCO paperwork including NRO and permits
- Secure excavation activities
- Onsite Complete system checks
- Issue Online Deployment log, to record all activities and observations

During live site deployment

- Complete field deployment log

After live trial site:

· Post-deployment review report recommending future use of technology and procedure requirements

Scope

The ongoing LTS Futures program of work has provided an opportunity to demonstrate the BISEP® deployment on a 100% Hydrogen pipeline. Validation will be completed of the installation of a grouted tee, hot tapping operations and flow stopping technology. This funding will deliver the second of 2 phases and produce additional deliverables to the Local Transmission System (LTS) Futures live trial. These work are broken down into 4 packs and were defined as part of the road map set out in Phase 1. The overall deliverable for each work pack consists of:

· Demonstration of a new swarf removal tool developed by STATS, a development which was the result of the issues that were encountered with swarf interfering with the sealing face(s) during the first trial.

· A factory acceptance test demonstrating a function test of the BISEP equipment prior to mobilisation to site, including the integration of the swarf removal tool. This will be done at STATS HQ in Aberdeen.

· STATS will fabricate/construct a test fixture at STATS yard for the test site deployment observations being completed at Spadeadam.

· STATS will conduct a live drilling demonstration via a third-party grouted tee and then deployment and flow stopping using the STATS BISEP tool.

Once all system checks have been witnessed and completed, the tool will finally be deployed during the live trial of LTS Futures.

Objective(s)

The objective is to demonstrate the operation and deployment of a BISEP® flow stopping tool under live field trial conditions, proving that the tool works to a satisfactory level as deemed by SGN. Therefore, and thereafter having a high integrity line stopping technology approved for use in 100% hydrogen.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

A successful deployment at the LTS field trial will provide an additional piece of evidence to support the role out of hydrogen as a form of energy distribution. The outcomes of the project will not adversely affect vulnerable customers but feeds into a wider piece of work to decarbonise the gas network. The BISEP® offers significant safety advantages over traditional line stop technologies, with the hydraulically activated dual seals providing leak-tight isolation of live, pressurised pipelines. Other projects will explore how vulnerable customers will not be left behind on this journey.

Success Criteria

Achieve a satisfactory test with the BISEP® flow stopping tool, such that SGN/nominated representatives are satisfied with the performance of the BISEP® and it is deemed safe to work downstream of the isolation, with STATS technicians in control of the pressure. Deliverables from each work pack defined in the scope will be independently assessed by the project's technical service partner. Performance will be defined in line with current operational parameters with a safety parameter added, ensuring technical assessment is consistent.

Project Partners and External Funding

STATS UK Ltd
Pipeline Integrity Engineers Ltd

Potential for New Learning

The project will provide unique and referenceable information for Network licensees and industry on flow-stopping tooling on transmission pipelines with 100% hydrogen. The learning gained from the project can be applied to Network Licensees and their network operations to facilitate safe transition to hydrogen from natural gas.

Scale of Project

Flow stopping technology is required for pipeline diversions, repairs and to isolate defective valves so they can be safely repaired or replaced, crucially without disrupting supply to customers. The BISEP® tool can be used on any of these scopes. It is also enabling scopes that cannot be completed with the existing technology on the market as it can be deployed on sloped pipe, parallel to ground,

and into tight spaces.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL9 Operations

Geographical Area

The testing will take place at Spadeadam and on the Granton to Grangemouth Pipeline.

Revenue Allowed for the RIIO Settlement

£ 928,177

Indicative Total NIA Project Expenditure

Internal: £696,133.00

External: £232,044.33

Total: £ 928,177.33

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:

Once complete a flow stopping technology (BISEP®) is available for use in Hydrogen pipelines, this technology will be essential for conducting work on pipelines without having to shut them down.

Cost benefit analysis exercises were completed by NGN and Wales and West in 2021 for the use of the BISEP® verses other transmission rated flow stoppling technology and it was found to offer overall savings, this is because less fittings and materials, welding, inspection, excavation and therefore time are required to undertake a BISEP® project. It also limits the risk in terms of intervention onto a live pipeline.

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)

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

On any pipeline flow stopping project, where the stopple would usually be used, the BISEP® can be used. And the BISEP® can be used in many locations where other transmission rated flow stopping technology cannot. This is typically either within an AGI, midline or in a built-up area. Typically for pipeline sectional replacements, valve changeouts or pipeline diversions.

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

N/A

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

The project will provide unique and referenceable information for Network licensees and Industry on flow-stopping tooling on transmission pipelines with 100% hydrogen. The learning gained from the project can be applied to Network Licensees and their network operations to facilitate safe transition to hydrogen from natural gas. The final project report is expected in December 2023.

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.

This project will build on previous work in this area and has been discussed with the other networks to ensure there is no duplication of work. The findings from the project will be shared with all key stakeholders.

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

The project will provide critical insight into any identified issues and illustrate solutions for the commissioning or conversion to 100% hydrogen for the gas transmission network. Specific flow-stop tooling is used regularly for major project and emergency works which will need to be assessed for its suitability within 100% Hydrogen.

Relevant Foreground IPR

Background IPR: Trial Procedure and Operating (OPS) Procedure

Foreground IPR: Technical Report sharing operational performance and learnings within 100% Hydrogen environment.

Data Access Details

Any consumer data gathered throughout this project will be anonymised and will be compliant with General Data Protection Regulations (GDPR) and the UK Data Protection Act. Any compliant data can be made available for review upon request

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

This project isn't being funded as business as usual because it is deemed an essential part of the 100% hydrogen trials process which is a key step towards conversion of the existing gas network to 100% hydrogen.

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 conversion of the GB gas network to 100% hydrogen is key on the road towards net zero. A reliable supply and the assurance of safe operations for workers and the public are crucial to support the viability of the hydrogen transition. The NIA framework can support works that ensure results that play an essential part in the roll-out of hydrogen.

This project has been approved by a senior member of staff

☑ Yes