national gas transmission

SIF Alpha Project Registration

Date of Submission

Oct 2022

Project Reference Number

10036954

Project Registration

Project Title

HyNTS Protection

Project Reference Number

10036954

Project Licensee(s)

National Gas Transmission PLC

Project Start

Aug 2022

Project Duration

6 Months

Nominated Project Contact(s)

box.gt.innovation@nationalgrid.com

Project Budget

£531,041.00

Funding Mechanism

SIF Alpha - Round 1

SIF Funding

£443,195.00

Strategy Theme

Net zero and the energy system transition

Challenge Area

Heat

Project Summary

This project aims to develop technologies to enable the existing gas transmission network to supply hydrogen as a low-carbon energy source to heat customers with the most rapid deployment. The project directly addresses the need to work with partners on how deployment of low-carbon heating solutions can be better coordinated to minimise gas network constraints at lowest economic cost.

The ability to coat network components will increase lifetime and enable operation of network at parameters optimised for the transmission of hydrogen.

The National Transmission System (NTS) in the UK supplies gas to distribution networks whom in turn supply gas to 23 million homes in the UK as their primary heat energy source. The network varies in age, condition and material composition which leads to variation in its suitability for hydrogen. Some NTS materials may be prone to hydrogen damage thereby reducing the asset lifetime and/or necessitating the adoption of sub-optimal operating parameters. Barrier coatings on the internal surface of the asset can mitigate this by drastically reducing hydrogen uptake. In enabling more of the existing NTS network to be utilised for transporting hydrogen, a fuel with a third the energy content of methane, we are providing resilience and storage, rather than relying on transient production.

This project led by National Grid Gas Plc (GT&M) will build on the outcomes of the Hydrogen Barrier Coatings for Gas Network Assets

SIF Discovery Project. Discovery identified high potential candidate hydrogen barrier coating materials and several process options for surface preparation and deposition but with a key challenge of deploying the coatings inside the online assets.

The Alpha project will look to develop innovative solutions to deposit barrier coatings onto prioritised gas network assets such as line pipe and welds as well as above-ground assets. In-situ deposition techniques involving pipeline inspection gauges (PIGs) and robotics will be investigated alongside a review of the opportunities and associated costs with undertaking the coating process offline. A cost-benefit analysis of these re-purposing technologies will be considered alongside replacement with new "hydrogen-ready" assets.

The project partners are experts in the field of pipelines (GT&M), metallic coatings (Ultima Forma Ltd) and pipeline operations (ROSEN). As operator of the NTS, GT&M will provide the user requirements for all technologies developed as well as providing material samples and assets to trial. Building on their work within the Discovery phase, Ultima Forma will use their knowledge of coating materials and techniques to determine the most suitable technologies for individual asset use cases. ROSEN will join the project as experts in in-line robotic technologies and will lead activities on in-situ coating deposition.

The re-purposing of existing pipelines for hydrogen transmission is of interest worldwide, furthermore, this technology has benefits for all hydrogen storage vessels and could be applied to several applications above and beyond onshore pipeline application. In-situ barrier coating technologies may also have additional applications, for example, CO2 transport for carbon capture, utilisation and storage (CCUS) and chemical industries, potentially reducing costs, installation time and disruption, and environmental impacts of installing new pipeline.

The customers of the technologies developed in this project are primarily gas networks that look to inject hydrogen into metallic pipelines that are impacted by hydrogen embrittlement, however, this could be expanded to any user of susceptible materials in a hydrogen environment. The users of the technology will be in two parts: the coating manufacturer and application owner, at present our project partners Ultima Forma and ROSEN cover these roles respectively. We have developed a knowledge of both the customers and users requirements of the system through Discovery and will continue this in the Alpha phase.

Project Description

The National Transmission System (NTS) is a network of high-pressure natural gas pipelines, that supply gas to about forty power stations, large industrial users and gas distribution companies that supply commercial and domestic users. The natural gas is transported from the terminals situated on the coast to the end user. Around 23 million homes are heated by natural gas today, supplied through the NTS.

In order to achieve the UK's Net Zero targets by 2050, the gas networks will play an important part through the delivery of net zero gases such as hydrogen. These gases have different properties to natural gas and therefore have different effects on the pipeline assets and systems. In 2026, BEIS are looking to define the heat strategy and conclude the role of hydrogen in heat in the UK, and work is underway as part of the hydrogen grid research and development working group, to define the asset capability. Understanding the effects of hydrogen embrittlement and its impact on the NTS assets is a focus area. This project looks at active prevention of hydrogen embrittlement through the use of coatings, to increase the lifetime of the assets in a hydrogen environment and reduce the cost to the consumer in maintenance and replacement.

This project will build on the outcomes of the Hydrogen Barrier Coatings for Gas Network Assets SIF Discovery Project during which an assessment of suitable hydrogen barrier coating materials and deposition techniques to apply on gas network assets was undertaken.

The project will undertake detailed feasibility studies into the deposition of barrier coatings onto identified gas network assets such as line pipe and welds as well as above ground assets. In-situ deposition techniques involving pipeline inspection gauges, robotics or gas dispersed systems will be investigated alongside a review the opportunities and associated costs with undertaking the coating process offline. A cost-benefit analysis of these re-purposing technologies will be considered alongside replacement with new "hydrogen-ready" assets.

The partners in the project are experts in coating technologies and pipeline operations.

The output of the Alpha phase will be; validation of barrier coating materials; determination of coating deposition requirements; component level coating trials; in-situ coating process design and feasibility; and detailed business case assessment. The outputs will feed into a Beta phase proposal which will demonstrate deployment of the technologies at scale.

Preceding Projects

10022648 - Hydrogen Barrier Coatings for Gas Network Assets

Third Party Collaborators

ROSEN

Ultima Forma

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Project Approaches And Desired Outcomes

Innovation Justification

The National Transmission System (NTS) consists of 7654km of buried pipes and values below ground and auxiliary and service units above ground. All of these components have been designed for natural gas transportation and some are potentially vulnerable to failure from hydrogen embrittlement. This project supports the re-purposing of these assets to distribute hydrogen by protecting them from hydrogen permeation and therefore extending their lifetime and avoiding failure, focusing on the most vulnerable components first but considering the network as a whole.

Hydrogen damage of assets is a risk that requires mitigation for safe transmission of hydrogen. Current practices involve operation at lower pressures than currently utilised for natural gas transmission, however, such strategies drastically reduce the operational efficiency of the network compromising its ability to deliver the required energy to end-users. To overcome this energy deficit, new pipeline might need to be installed at significant cost to the consumer. The application of coatings to significantly reduce hydrogen permeation and thus damage, could enable safe operation at optimal gas pressures and velocities.

Our solution is to apply a thin metallic coating to the inside surface of the existing NTS assets, using a material that is not susceptible to hydrogen embrittlement. There are currently no commercially available in-situ coating deposition technologies for transmission network assets and presents a challenge when considering the lack of ability to access underground assets with many km between above ground installations. This project therefore represents a novel approach to the re-purposing of pipeline for hydrogen transmission that potentially has applications wider than the UK.

Discovery identified candidate coating materials, processes and at-risk gas network assets; however, significant technical challenges remain relating to the deposition of such coatings on existing assets. The Alpha phase will investigate in detail the coating requirements which will enable coating material selection and detailed development of suitable deposition technologies. A test programme of hydrogen permeability measurements and durability testing will provide data to determine the level of protection from hydrogen and indicate the steps required to maintain this protection through the networks lifetime. As well as validating coating performance the Alpha phase will focus on designing a process for economically feasible in-situ deposition.

If this project is not undertaken the ability to re-purpose the existing NTS for hydrogen could be compromised. This would have a knock-on effect for the large-scale, rapid deployment of hydrogen as new transmission pipelines would need to be built at significant cost to the consumer. Additionally, the long timeframes associated with the installation of new pipeline would impact the rate at which the UK can decarbonise, extending the duration of reliance on natural gas, making it more difficult to achieve the UK's committed net zero obligations.

In Discovery the key drivers for the installation of new assets were identified along with the key cost drivers for re-purposing of existing assets via the use of barrier coatings. The Alpha phase will expand on this work to ensure the re-purposing solutions deliver value for the consumer. There are expected environmental benefits to re-purposing rather than installing new equipment, including reduced CO2 impacts from manufacture and installation of new equipment, plus minimal impact to the countryside and local communities as a result of utilising existing assets. Consequently, there is a strong business driver to find solutions to re-purpose as many of the existing assets as possible.

This activity cannot be funded through business as usual as it is solely related to future hydrogen transmission. Furthermore, this project addresses significant technical barriers and as such would be deemed a high-risk, high-reward project which are best supported through Strategic Innovation Funding.

Benefits

The scale of hydrogen demand in the UK is ever growing with a move from the Net Zero Strategies (Oct 21) target of 5 GW of green and blue hydrogen by 2030 to the most recent Energy Security Strategy (Apr 22) target of 10 GW of green and blue hydrogen by 2030 across industry, transport, power and potentially heat. In order to meet this target we must connect producers and users of hydrogen to enable a fast transition from natural gas to hydrogen. Re-purposing assets is the most efficient method of doing this both in time and cost.

Direct project benefits:

Economic: Elimination of hydrogen permeation into the asset material, therefore eliminating the effect of hydrogen on the asset materials and extending the lifetime of the assets
Economic: Reduction in the asset replacement required prior to injection of hydrogen

End User & Economic: Extension of asset lifetime and reduction maintenance intervention
Consumer: Reduction in consumer costs through the transition and into Net Zero
Government: Developing UK capability, skills and competencies for net zero solutions, providing significant opportunity for export
Government: UK technology solutions development increasing the value of UK industry, encouraging inward investment into the UK hydrogen economy
Other hydrogen enabling benefits;

Environmental: Utilising existing gas assets with hydrogen for domestic users prevents the installation of new significant investment systems and time delays for net zero
Safety: Prevents having to transport hydrogen above ground, eliminating the likelihood of transportation accidents
Environmental: Enabling hydrogen to be distributed through the gas pipeline network will allow the market for industrial and residential products that run off hydrogen to be both feasible and enter the market at a competitive price because the cost of transition to blended gases running in the network will be minimised.
Environmental: The CO2 saving is substantial if the hydrogen is produced by renewable energy (green hydrogen), further reducing the countries reliance on fossil fuels and pulling demand for more renewables.
Consumer: Enables a supply of hydrogen to domestic users and with upgrades to existing gas boilers, maintains the market for use of gas networks and existing central heating systems - reducing costs for consumers
Resilience: The ability to link many producers and users together across the country enables resilience against a variable production source and provides storage for the UKs energy
Benefits will be measured through the reduction in hydrogen permeability and therefore hydrogen embrittlement in our pipelines leading to a lifetime and safety case where assets no longer require replacement. Our calculations seen in the appendices consider the cost to re-purpose a system vs the cost for a new installation. Through the Alpha phase we will also measure the total cost of doing nothing vs coatings vs new pipelines to provide insight into the optimum option.

The following potential Alpha impacts were identified in Discovery, these impacts will be considered against the solutions to ensure success of the project:

A number of candidate metal barrier coatings are available which would protect assets from hydrogen
Specific asset features could be more susceptible to hydrogen (welded joints). Feasibility of targeted coatings which would also save cost and improve feasibility will be considered in Alpha.
The surface conditions of existing in-service assets vary widely due to the length of service and maintenance regimes. We therefore identified different surface preparation methods to ready the area for a barrier coating.
A variety of assets exist on the network. Reviewing these assets on site the project team were able to identify which ones would be possible to protect and which ones would need an alternative solution, further consideration to be made in Alpha.

Risks And Issues

wo Project Management and Commercial risks and four Technical risks were deemed highest overall prior to mitigation, these are shown below:

Project Management and Commercial

P.2

Risk: Legal contracting not agreed in time for project start.
Mitigation: Legal teams already engaged to generate draft contract for review.
P.5

Risk: Demonstration facility for Beta (e.g. FutureGrid) not capable/available.
Mitigation: 1) Clear plan for Beta phase demonstration. 2) Aligning prerequisite activities at FutureGrid. 3) Potential alternative facilities at ROSEN.
Technical

T.4

Risk: Expertise in the design and manufacture of cold-spraying equipment not held within consortium could impact quality of process design.
Mitigation: 1) Alpha phase will determine optimal deposition methods per asset type. If cold-spraying is selected then additional partners would be added in Beta phase application. 2) Option to engage alternative suppliers as consultants during Alpha phase if required as enabler for process design work package tasks
T.5

Risk: Coating performance not maintained over lifetime of asset. E.g. due to damage from gas flow (erosion), in-line inspection tools (abrasive wear); pressure variation (fatigue).Mitigation: 1) Screening tests on coating durability to be conducted in Alpha phase to characterise performance. Coating properties can be modified to improve performance if required. 2) Importance of surface preparation prior to coating deposition understood and robust methods will be developed during Alpha phase.
T.7

Risk: Coating technology not able to provide continuous barrier on all asset types and geometries/features.
Mitigation: 1) Coating deposition technologies being investigated in Alpha phase have been chosen due to their ability to form continuous barriers. 2) Surface preparation methods to ensure difficult geometries/features can be coated have been identified (e.g. epoxy pre-coat)

T.8

Risk: Large distances between access points provides significant challenges to in-pipe deposition technologies, for example providing power and materials for coating processes.
Mitigation: 1) Deposition technologies selected in Discovery phase due to their low energy and material requirements (e.g. electrodeposition and cold-spray). 2) Leading in-pipe technology company ROSEN added to consortium to develop required technologies.
There is recent uncertainty in the UK and EU gas markets as a consequence of the war in Ukraine and Russian supply. This may influence political decisions and ultimately could provide an improvement to the business case should the UK and EU wish to accelerate the transition to hydrogen.

Activities within the business case and implementation work package will directly address any current or potential future legal or regulatory risks related to the deployment of the technologies developed. If any risks or issues identified cannot be addressed within the Alpha phase these will be resolved during the Beta phase.

Risks will be reviewed and addressed regularly throughout the project during project progress meetings. Any new risks identified or significant changes to existing risks, will be flagged during weekly project meetings.

Any risks and issues which could impact external stakeholders will be communicated via appropriate channels. For example, should there be any risks to project delivery these will be raised straight away with the project Monitoring Officer.

For work with subcontractors it will be the obligation of the contracting party to protect Intellectual Property (IP) within the procurement terms and conductions, so no IP leaks out from the SIF consortium.

Project Plans And Milestones

Project Plans And Milestones

Discovery investigated the feasibility of applying hydrogen barrier coatings to National Grid Gas Plc (GT&M) assets to repurpose them for hydrogen. Candidate materials systems and application technologies were identified that could be applied to the priority use cases categorized by GT&M. The Alpha phase will build on these ideas to develop practical coating systems, including surface preparation, coating application methods together with evaluation of the processing and durability of the coatings. Coupon testing will be up-scaled to trials on selected assets that are representative key use cases identified in the Discovery phase. Feasibility studies will be conducted to determine the in-situ processes that will need to applied at-scale in the Beta Phase. To achieve these aims Ultima Forma Ltd (UFL) will scale-up its resource in manufacturing and project management for the Alpha phase. ROSEN will join as a new project partner with extensive expertise in pipe-line inspection and monitoring. Both GT&M and ROSEN will draw on a range of subject matter experts (SMEs) within their organisations to ensure that technical developments are feasible at network scale and that they are effective in targeting the most vulnerable parts of the network.

The detailed project plan (Gantt chart, flow chart and RASIC, see appendices) is divided into 5 interrelated work packages (WP*), requiring the consortium to work closely together throughout the programme to ensure project deliverables (D*) are achieved against key milestones (MS*).

WP1 led by UFL will develop the complete coating system and their application methods, based on representative pipeline materials supplied by GT&M. GT&M and ROSEN will support this activity throughout with input from SMEs in coating requirements and test materials (GT&M) and technology feasibility, including quality assurance (QA) and in-service inspection procedures (ROSEN in WP2). Testing for hydrogen permeability and durability of coatings will be subcontracted to specialist laboratories. Outputs of WP1 are D1: test data of coating performance that feed WP4.
WP2 led by ROSEN will deliver D2: State-of-the-art report on in-pipe technologies and D3: Report on mainline pipe spool process solutions, that inform the technical developments in WP3.
WP3 led by UFL will demonstrate the feasibility of application of the processes developed in WPs1&2 to representative GT&M assets. These will be drawn from the priority use cases identified in the Discovery phase and may include: filters, ball valve, non-return valve, above ground pipework, below ground pipework, girth welds. MS1 will be manufacture readiness for application of the coating technologies to these GT&M assets. MS2 will be achieved on successful application of coatings to selected case studies.
WP4 led by GT&M will consider the economic case for adaption of the gas transmission network for hydrogen, based on the outputs of Discovery and the findings from WPs1-3 whilst ensuring all legal and regulatory requirements are met. A business case will be written for re-purposing the network though the use of barrier coatings compared to the installation of new pipe networks. MS3 will be the completion of an implementation plan for roll-out to NG transmission network assets.
WP5 Project management will be led by UFL, with input from all partners. The consortium will hold weekly project meetings to co-ordinate the technical WPs and ensure smooth information flow between the partners and WPs. Once a month this meeting will be extended to include project administration, including a review of finances, risks and reporting. Additionally, formal design review meetings will be held at appropriate time points in the project. A SharePoint will be created for document sharing between the project partners, similar to that used in the Discovery Phase.
Payment schedule is as per plan: UFL = Monthly. ROS = Deliverable.

Regulatory Barriers (Not scored)

There are no regulatory barriers that prevent the delivery of the project through Alpha or Beta. These phases will enable the delivery of knowledge and systems for future application on our hydrogen investment activities such as Project Union. Uncertainty in the RIIO-2 funding mechanisms requirements and timelines could lead to projects not progressing in the assumed funding route or timescales proposed, however, discussions are ongoing to ensure we are approaching the activities in the correct manner with Ofgem and BEIS to reduce this risk.

Our network supplies natural gas to industrial, power and heat applications today and has a fantastic opportunity to support transport applications with net zero gases. The National Transmissions Systems (NTS) first application of hydrogen in the UK will be through Project Union, repurposing 2400km of pipeline to enable interconnectivity between the industrial clusters and strategic UK locations such as St Fergus and Bacton. Through this work we have commissioned a project with Frontier Economics to consider the options for regulation of 100% hydrogen networks.

There are several policy and regulatory systems in review around the introduction of hydrogen considering both 100% hydrogen and blended hydrogen. Primary and secondary legislation will need to be updated to enable blends of hydrogen within the network and allow for the development of a 100% hydrogen NTS. Alongside this, rules will need to be agreed, such as the uniform network code

(UNC) and Gas Safety Management Regulation (GSMR) to incorporate hydrogen blending and if required adapted for hydrogen transportation.

Engagement with our stakeholders and customers in the deployment of hydrogen and the timelines associated is vital to the success of future hydrogen deployment to ensure Network exit and entry agreements (NEXA/NEA) are aligned to the network approach in the vicinity of these customers. We have already begun these discussions with the majority of our key stakeholders through Project Union, these interactions have been very positive with an agreement that a hydrogen backbone in the UK is a requirement.

The policy landscape is already beginning to enable the deployment of hydrogen and through the continuation of the policies on hydrogen in industry, transport and power we will be enabled to deploy the findings of the SIF projects. The announcement of the industrial cluster decarbonization plans has been key to our hydrogen backbone proposal and with further progress of the later track clusters and introduction of further clusters we can support further decarbonization in the UK. Business model and regulatory regimes alongside these policies will ensure the robust and accelerated transition of the hydrogen infrastructure in the UK.

Consideration of interconnectors with Europe and their route to hydrogen deployment in their systems has already begun with the European hydrogen backbone proposal incorporating the NTS. Europe have accelerated their transition to having a blend of hydrogen in the network to 5% by 2024, in order to maintain interconnection with our counterparts we must be enabled to blend gas into our gas networks, protecting customers that cannot accept this with deblending technologies.

We continue to support Government and Ofgem in gathering the evidence required to deliver policy and regulation that will enable the energy transition through working groups such as Hydrogen Grid Research and Development (HGR&D) and Gas Goes Green (GGG). Evidence of our networks capability to support the transition is beginning the be reviewed by the HSE and development of approaches to blending both commercial and technical are underway through these collaborative working groups.

Business As Usual

One major output of the Alpha phase will be to determine the business case for re-purposing the national transmission system (NTS) assets via the barrier coating methodologies defined versus installation of new assets. The business case will include consideration of the use of barrier coating technologies for new pipeline installations thereby enabling the utilisation of higher strength steel grades, at higher pressures with their associated cost and environmental benefits over lower strength materials. A focus on the economic impact, the environmental and social impacts of re-purposing versus new installations will also be considered. To support this business case an assessment of the risk of hydrogen damage to the existing NTS will be conducted. This will be used to justify the adoption of these barrier coating technologies and further validated in the Beta phase.

Consideration of the implementation and roll out of the developed technologies is included within the project scope. This activity, led by National Grid Gas Plc (GT&M), will comprise a prioritisation of at-risk assets aligning with latest hydrogen deployment strategies (e.g. Project Union) to determine a high-level implementation plan which will be further refined during the Beta phase.

The Alpha phase work package deliverables will be used to determine the requirements for scale-up of the technologies as per the implementation plan. The Beta phase will focus on ensuring these requirements can be met to enable successful roll-out of the technologies, demonstrating the system in application to enable easy transfer to live NTS assets. A key step in ensuring easy roll out into business as usual is through the development of G35/G19 safety assessments and associated business policies and procedures. These will be developed as part of the Beta phase once the technology solution is fully developed. The project team consisting of key subject matter experts will be responsible for the implementation of the technology being key knowledge holders and owners of the business case.

GT&Ms first application of hydrogen on the NTS will be via Project Union the hydrogen backbone connecting industrial clusters and terminals to provide resilience to the UKs hydrogen energy sources. The project has launched in May and construction will commence in 2026 completing in 2032. This project is aligned to the Project Union strategy and sanctioned by senior management as a key project for the transition, funding of the solution will be as part of hydrogen NTS investment project.

The solution we are looking to develop through this project could provide value to the wider gas networks across the UK; many of whom own metallic pipelines and systems similar to that on the NTS; and the global gas networks whom will have similar challenges to those seen in the UK. The project will share its findings with the UK gas networks via several dissemination paths such as the gas innovation governance group, hydrogen grid research and development, the smarter networks portal and The Summit. The technology is an opportunity for the UK to export knowledge and expertise to global markets and will be considered through commercialisation.

ROSENs wide experience in pipeline operations including inline inspection will also be important to appraising barrier coating compatibility with inspection, maintenance and repair activities as part of the overall pipeline integrity management system. ROSEN is also well positioned to identify and develop future services to roll out the technologies developed in the Beta phase throughout the wider UK and global gas pipeline infrastructures. The technologies developed in this project are also potentially transferrable to other oil and gas pipeline coating applications as well as the water, chemical transport or carbon capture, utilisation and storage (CCUS) industries.

Commercials

Commercialisation

The development of this method for protecting our gas network assets in the UK will enable a more cost effective and accelerated transition ensuring a robust future for the system. In developing the solution with Rosen and Ultima Forma (UFL) these expert companies will provide valuable insight into their current technologies and determine a combined approach for applying this to a pipeline application. In the consumer supporting the development of the system we would look to determine contractual terms that enabled the SIF governance (royalties etc...) to be met in any deployment of the system. In deploying a system to the gas network we would always consider a competitive tending approach although at present there are no commercially available solutions.

The repurposing of assets for hydrogen whilst maintaining and/or extending their lifetime is a key benefit for the consumer as we transition to net zero. Utilising assets that have a current residual value of £6.5b is clearly the best solution vs constructing new pipelines, this project ensures these assets value is extended past 2050 and continues to provide jobs and value to the UK.

The customers for this solution are GT&M and global gas networks looking to introduce hydrogen into either existing or new pipelines, who require assets lifetime to be maintained under future hydrogen operation.

Ultima Forma patented technology is an enabling technology for hydrogen barriers providing a value proposition of hydrogen protection for National Transmission System (NTS) assets at a significantly reduced cost and time than replacement meaning the hydrogen industry and respective emissions benefits can be delivered faster. Ultima Forma's business models vary depending on the application. For large scale application into NTS assets, UFL would collaborate and license technology either to the network or to an installer of the barrier coating (e.g. ROSEN). For upgrading existing assets or installing barrier coatings to new assets, either manufacturing supply, technology licensing or partnerships are all possible. UFL has further applications for hydrogen storage liners which may also find applications.

UKRI has put forward Ultima Forma into the Free Electrons programme, which links technology Small Medium Enterprises to energy primes and investors globally. Separately UFL is in discussion with potential investors including the SIF commercial team who aim to use SIF to link de-risked investment opportunities with energy investors.

The development of in-pipe coating application and inspection solutions is central to the viability of hydrogen barrier technology for repurposing of existing pipeline assets. As a market leader, ROSEN has a 40 year history of developing and commercialising pipeline cleaning and in-line inspection services on a global scale meaning that ROSEN is well placed to support the realisation of this opportunity.

The project consortium are also well placed to provide this solution to global markets as ROSEN already host a comprehensive customer list across the world and in proving the system opportunity in the UK could easily commercialise this system.

As displayed through the application this is a high risk high gain project that could provide real value to the UKs gas consumers.

Intellectual Property Rights (Not scored)

For SIF projects, each Project Partner shall own all Foreground IPR that it independently creates as part of the Project, or where it is created jointly then it shall be owned in shares that are in proportion to the work done in its creation. The exact allocation of Foreground IPR ownership will be determined during the contractual negotiations with the Project Partners on the agreement for the project.

Also if the party appoints a sub-contractor, the agreement with that sub-contractor should have similar IP provisions to those in this agreement and which at least achieve the same aims as the agreement regarding IP.

Once the Project is completed, Relevant Background IPR will be licensed for use by the Project Partners in connection with another Project Partners' Foreground IPR solely to the extent necessary to use that Foreground IPR, upon terms to be agreed.

Describe how each Project Partners complies with Chapter 9 SIF Governance Document.

We intend to ensure each Project Partner will comply with Chapter 9 SIF Governance Document through the contractual terms governing the project. However, precisely how this is done will be subject to contractual negotiations with the Project Partners on the agreement for the project.

Costs and Value for Money

The total project cost is £531,041 and we request funding of £443,195. The project partners have supported the project with a 16% contribution demonstrating the value of the opportunity for all parties.

The project cost breakdown is as follows;

National Grid Gas PLC (GT&M)

GT&M are providing a £50,000 contribution to the project that covers our legal and communications activities along with the sub contract activities and contributes to the overall 10% required project contribution. The costs are critical to the project as the lead network we must ensure delivery of the project and ensure the outputs are relevant to our key stakeholders.

The GT&M costs have been considered against actual spend in the Discovery phase, the actual reported cost through our financial system utilises actual labour costs whereas the values utilised for the applications are the business averages. The actual costs in this instance have been lower due to the position of the participants against the average day rate. The actual costs must be utilised to enable RRP reporting to be completed accurately alongside the project reporting we therefore have considered this in the number of days associated to each project participant.

Ultima Forma Ltd

The breakdown of Ultima Forma's costs of £ are 49% labour covering project management, technical and manufacturing, 18% materials for deposition trials, 11% subcontracting mainly for testing along with some specialist consultancy, 1% for travel and 21% for specialist equipment for depositing barriers on supplied assets. In addition Ultima Forma will provide £20,000 of in-kind value through a mix of pre-project planning, experience and data gained from other hydrogen projects and a contribution to overheads.

ROSEN

ROSEN have applied discounted day-rates to the design and consultancy services provided as part of the project which results in a cost reduction of around £17,846 when compared to its standard commercial pricing.

All costs for base resource day rates are at typical competitive industry rates. Any subcontract or materials spend has been purchased from approved suppliers offering quality but value for money.

Compared to Discovery, the Alpha phase adds ROSEN to the consortium and removes Warwick Manufacturing Group (WMG). Within UFL there is additional headcount specifically in manufacturing and project management to align with the increased work scope.

Supporting Documents

Documents Uploaded Where Applicable

Yes

Documents:

Alpha Skills and Expertise - HyNTS Protection.pdf

HyNTS Protection Alpha Application Project Plan (Final).pdf

SIF Alpha Project Registration 2022-10-07 2_13

10036954-HyNTS_Protect-SIF_Alph - End of Phase Report.pdf

10036954-HyNTS_Protect-SIF_Alpha - Technical Report Final redacted.pdf

SIF Alpha HyNTS Protection Show & Tell Webinar - FINAL.pdf

10036954 SIF Alpha Close Down Report 2023-04-05 12_10

SIF Alpha Project Registration 2024-02-20 10_53

This project has been approved by a senior member of staff

☑ Yes