SIF Alpha Round 2 Project Registration

Date of Submission

Jan 2024

Project Reference Number

10079465

Initial Project Details

Project Title

HyNTS Hybrid Storage

Project Contact

Matthew Hammond

Challenge Area

Preparing for a net zero power system

Strategy Theme

Net zero and the energy system transition

Lead Sector

Gas Transmission

Project Start Date

01/10/2023

Project Duration (Months)

6

Lead Funding Licensee

NGT - National Gas Transmission PLC

Funding Mechanism

SIF Alpha - Round 2

Collaborating Networks

UK Power Networks

Technology Areas

Hydrogen

Energy Storage

Gas Transmission Networks

Project Summary

The Hybrid Storage System will enable safe and efficient storage of hydrogen on operational sites using an optimised approach to hydrogens physical state against production and demand profiles.

Add Preceding Project(s)

10060432 - Hybrid Storage Systems for site safety and efficiency

Add Third Party Collaborator(s)

Manufacturing Technology Centre

H2GO Power

HydroGenus

Project Budget

£418,949.00

SIF Funding

£375,369.00

Project Approaches and Desired Outcomes

Problem statement

Perception of Problem and Project Evolution
The National Transmission System (NTS) utilizes compression to managepressures and flows in the pipelines to ensure gas demand can be met. Themajority of compressors on the NTS are driven by gas turbines, which are fuelledby natural gas taken from the NTS. These assets produce emissions and wasteheat which are currently lost to the atmosphere. National Gas Transmission (NGT) has a number of projects looking at fuelling gas turbines with hydrogen generatedfrom electrolysers, where storage is a key element to keep the size and CAPEX ofthe electrolyser unit at cost-effective levels. The Discovery phase of the projecthas considered combining solid state hydrogen storage with high density but slowrelease rates with compressed gas storage with high release rates. It wasdetermined that the solid state storage could not support the demands of the gasturbine alone and that some level of compressed gas storage was required. Theconfiguration of the system was optimised based on the demands of the gasturbines however the Alpha phase will also consider the smart operation of thesystem based on green electricity availability (i.e. weather forecasting).

Innovation Challenge
This project looks to address the challenge of preparing for net zero powersystems using novel ways to reliably support low stability systems. Greenhydrogen production is a low stability system in that the production is reliant on theweather (wind/solar) and/or constraints in the electricity network. This makes itvery hard to predict the alignment of production and demand of hydrogen.
Storage and release of hydrogen within relevant timescales is going to be vital toensuring a consistent energy source and improved resilience. Compressed gasstorage is a method utilized today to support green hydrogen production, however,the space requirements and safety of these systems are limited. Alternativetechnologies such as solid state or liquid hydrogen storage provide benefits instorage density and safety but have challenges in the release rates of thehydrogen. It is believed that a hybrid storage system of solid and gaseous storage
managed by an artificially intelligent management network HyAI could providesafe and reliable opportunity.

Users of Innovation and their needs
As hydrogen is not yet available in gas networks, localised small scale productionof hydrogen could be deployed where decarbonisation of assets and processes isrequired on a small scale. This project is focusing on the application of hybridstorage systems to NTS gas turbines on compressor stations, however thesolution could be applied to any site where hydrogen utilisation would beintermittent and a combination of long and short term storage is required. This could be small industry or businesses.

Previous Innovation Projects

NIA Hydrogen Fuel Gas for NTS Compressors -- this project looked at theopportunity for fueling a gas turbine with hydrogen produced by electrolysis. Thefindings of this NIA project have been fed into the Waste Heat Recovery project toavoid duplication and repetition of work.
SIF HyNTS Compression Discovery and Alpha -- The SIF HyNTS Compressionproject is looking at the opportunity to repurpose a compressor unit for hydrogen,including the gas turbine, providing the technical and safety evidence for this. Theoutputs of HyNTS Compression will feed into the Waste Heat Recovery SIFproject Beta phase.
NIA Hydrogen Production Technologies for the NTS -- this project investigated theopportunity of placing various hydrogen production technologies on NTS sites,including pyrolysis and electrolysis.
SIF Electrolyser Efficiency Improvements from Waste Heat Recovery --determined the feasibility of increasing hydrogen production efficiency throughwaste heat capture from gas turbines using solid oxide electrolysers.

Innovation justification

Preparing for a Net Zero Power System
Green hydrogen production is a low stability system in that the production relieson the weather (wind/solar) and/or constraints in the electricity network making ithard to align production and use of hydrogen. Having an efficient optimisedstorage system means that hydrogen can be produced during periods of highrenewable generation and stored, reducing the overall cost of hydrogen.

Learnings from Previous Projects
The NIA project 'Hydrogen Fuel Gas for NTS Compressors' looked at on sitehydrogen production and storage options for fuelling gas turbines. It concludedthat a compressed gas store of over 11 tonnes would be required alongside a Tier1 COMAH permit which comes with considerable resource and cost to achieve.This has driven the need for an alternative and solid state storage could meet thestorage requirements whilst avoiding entering COMAH regulations, as thehydrogen is stored as a chemical compound and the safety requirements for thatcompound would apply.

Working with Stakeholders
The project has engaged with National Gas Transmission internal teams includingSubject Matter Experts in Rotating Machinery, Operations and Policy andRegulation to help define the system requirements, as well as other networks tounderstand their needs. The project has also engaged with other SIF projects toshare knowledge and experience, including UKPN's Connectrolyser and NGT's Waste Heat Recovery projects.

Innovation
This project is innovative in its approach by hybridising solid and gaseous storageto resolve the limitations of the different hydrogen storage systems. The proposedsolid state hydrogen storage technology stores hydrogen more efficiently, safelyand at a lower cost than compressed gas. The hydrogen forms a chemical bondwith the metal forming a metal hydride, meaning the safety requirements wouldapply to the metal hydride rather than hydrogen itself. The system includes aninnovative machine learning platform (HyAI) using reliable algorithms whichpredict energy generation/storage /demand to optimise operations across thevalue chain. This project will also consider the opportunity to expand the scale ofthe solid-state system and utilise novel methods to improve release ratesalongside the use of gaseous storage.

State of the Art
For small scale hydrogen storage, the current options include compressed gasstorage, liquid storage and carriers such as ammonia. Compressed gas storage iswell established and more suited to short term storage but comes with associatedsafety considerations. Carriers allow hydrogen to be stored as another chemicalsuch as ammonia or liquid organic hydrogen carriers. Liquid allows for easiertransport and storage but the efficiencies of these technologies are low due to thehigh temperatures require to release the hydrogen.
TRL
Currently 4-6, moving to 7
IRL
Currently 1, moving to 4-5
CRL
Currently 1-2, moving to 4-5

Project Size and Scale
The demonstration will take place on a low utilisation compressor station, reducingthe CAPEX on equipment and minimising disruption, whilst allowing the increasedefficiencies to be demonstrated on an active site. The project will consider differentsites on the NTS to better understand the business case and wider roll out of thesolution.

BAU
The key technology to be demonstrated is at low TRL (solid state storage 4-6),and funding the demonstration through innovation funding reduces the risk of theproject. Additionally, hydrogen activities are not currently funded through businessas usual funding.

Counterfactuals
Compressed gas hydrogen storage is an option for our application, but wouldrequire additional safety considerations which could be prohibitively costly for botha demonstration and roll out across the network. COMAH permit application feescould be as much as £1m per site, excluding ongoing annual fees.

Complementary SIF projects.pdf (opens in a new window)
(/application/10079465/form/question/33889/forminput/91706/file/564419/download)

Impact and benefits (not scored)

Financial - future reductions in the cost of operating the network

Financial - cost savings per annum on energy bills for consumers

Financial - cost savings per annum for users of network services

Environmental - carbon reduction – direct CO2 savings per annum

Environmental - carbon reduction – indirect CO2 savings per annum

New to market – products

New to market – processes

New to market - services

Impacts and benefits description

Pre-innovation baseline
In order to quantify the financial benefits of a hybrid storage system a baseline of acompressed gas storage system will be compared against the novel design.Consideration of the wider financial and environmental benefits that hybrid storageenables with the use of hydrogen for compression to meet emission reductiontargets will also be necessary.

Financial Benefits
Significant upfront and ongoing costs are associated with COMAH certification tostore \>5t compressed hydrogen. These costs will be further explored as theproject progresses but are in the order of £800k initially followed by an additional£150k/year for ongoing interventions per site. If large amounts of hydrogenstorage were required across all 12 compressor stations with Avon gas turbines(in order to meet the Medium Combustion Plant (MCP) Directive for low emissionsin 2030), this has the potential to cost £9.6m in addition to yearly costs of £1.8m,increasing the network operation costs. It should also be highlighted that there areadditional implications for COMAH sites including an increased presence in policepatrols and rapid response to perceived threats, therefore an increase in thenumber of sites classified this way will affect the wider area as well.

At high utilisation individual sites such as those identified in the discovery project,the implementation of on-site hydrogen production via electrolysis with hybridstorage also offers the potential to reduce initial CAPEX costs by £6m from£26.5m to £21.4m when compared to on-site hydrogen production withcompressed gas storage only.
More widely, there are currently 30 Avon gas turbines on the NTS which areearmarked for replacement in order to meet the MCP Directive as no alternativelow emissions retrofit technology (such as DLE) will be ready by 2030. If theseunits can be repurposed for hydrogen by 2030 (which would also necessitateadequate hydrogen storage and supply), National Gas could avoid replacing theseunits at a cost of ~£60m each, or £1.8Bn in total.

Environmental - System Emissions
In 2021, Avon gas turbines at compressor stations emitted around 106,000 tonnesof CO2 from burning natural gas. If the fuel gas contained 20%vol hydrogen thiswould decrease emissions by around 7%, or alternatively could eliminate CO2completely if 100% hydrogen is used as the fuel gas. In the highest utilisationscenarios, using 100% green hydrogen could result in significant CO2 emissionssavings of up to 12,000t per year per compressor. Using green hydrogen fromelectrolysis would mean there would be no indirect CO2 associated with the hydrogen production.

Safety Benefits
Deployment of solid state storage could be safer than having significantcompressed gas storage on site, with lower risks and hazards associated withlower operational pressures. Additionally, the ventilation of the units is such thatthe lower explosive limit (LEL) of hydrogen may not be reached, and the systemcould avoid being classed as ATEX, which would reduce costs.

Benefit Synergies
A broader understanding of the wider system benefits (for efficient on-site H2production and storage) will be achieved through working in conjunction with otherSIF projects including HyNTS Waste Heat Recovery, SGNs Carnot Gas Plantapplication & UKPNs Connectrolyser to ensure alignment and that the value of thesynergistic benefits is articulated, as such each energy network is supportingthese Alpha submissions to ensure collaboration.

Initial benefits will be seen during the beta phase, once the demonstration site isoperational, however most benefits will occur once the system has been deployedacross multiple operational sites. We believe this could be achieved through the Project Union timeline of between 2026 and the early 2030s for the gas transmission network.

Teams and resources

Changes to Project Team
Wales and West Utilities are no longer a partner on the project. They had asupporting role in the Discovery phase with no deliverables, and have opted not tocontinue supporting for the Alpha phase.
We have added HydroGenus to the project who are currently a partner on theWaste Heat Recovery SIF. This will allow for greater overlap between the projects.HydroGenus have a wealth of experience for developing low carbon hydrogenhubs in the UK.

Skills and Expertise

National Gas Transmission (NGT)
are the lead participant in the project and willprovide clear direction and insight to the project partners on the project applicationand proposed benefits. NGT will also provide insight into our Hydrogen strategyand the part the national transmission system must play in the Net Zero future.This is vital in the project team developing their implementation strategy andbusiness case as the project progresses through the delivery phases.

H2GO Power
has a significant track record in the implementation of R&D projects,fusing engineering excellence with robust project management. Their team iscomposed of experts both in hardware and software technologies and are capableof supporting the development of the proposed technology and adapting it directlyto the needs of the project.

The Manufacturing Technology Centre (MTC)
is part of the High ValueManufacturing Catapult and is an independent Research and TechnologyOrganisation. In partnership with industry, academia and other institutions theMTC develops and proves innovative technical processes and technologies in anagile, low risk environment, helping accelerate them through the TechnologyReadiness Levels (TRL).

UK Power Networks
are the UK's largest electricity distributor delivering power to8.3 million homes and businesses across London, the east and south east ofEngland. UKPN is responsible for providing electrical demand and generationconnections up to 132kV. It is expected that a significant proportion of hydrogenelectrolyser requests will connect to the distribution network, and it is thereforesuitable for a DNO to be a partner on this project.

Hydrogenus Ltd
are a new partner on the project. They aim to become theleading UK developer for local production of low-carbon hydrogen by electrolysis,with extensive experience in the electricity, hydrogen and water industries,
including financial, regulatory, technical, commercial, and operationalassignments. All the team have experience in undertaking feasibility studies toinform and prepare for follow-on development projects, some with maturetechnologies, and some within the innovation space. HydroGenus' team membershave a track record in assembling, leading and co-ordinating teams for multi-disciplinary projects such as is proposed in this bid.

Additional Resources and Facilities

H2Go Power will undertake some in-house testing on a laboratory scale to look toimprove the pressures and flow rates from the solid state storage. This requiresdesign and build of a small reactor which is reflected in H2Go's materials costs forAlpha. This will be carried out in H2Go's existing facilities, but materials and labourcosts are required for the design and build of the reactor for the testing.

Project Plans and Milestones

Project management and delivery

How will you manage your Project effectively?
The Alpha phase will be undertaken through 4 work packages, utilising agileproject management methodologies to complete a detailed design by the end ofthe 6 month period. We will aim to run tasks in parallel and summarise in aconcise report to conclude the detailed design phase. Requests for information(RFIs) & actions will be tracked utilising SharePoint with partners to ensuretimely/efficient sharing of information.
WP1 - Project Management led by NGT - £14,855.50
This work package will ensure the project meets its projected timing, risk and costthrough the Alpha period and will develop the plan for the Beta phase project.
Milestone11 - Beta application
SC11 - Final report completed and Beta application submitted
WP2 - Business Case & Requirements Development led by NGT - £68,080.50
This work package will develop the key requirements for the system and developthe business case and robust CBA for the system to be deployed.
Milestone1
-
Business Case
SC1 - Business case and CBA refined
Milestone 2 - Benchmarking
SC2 - Review Global Systems and plans and report this against the plannedapproach
Milestone3 - Wider Hydrogen Hub
SC3 - Feed in inputs from UKPN Connectrolyser and wider H2 hub development
WP3 - Hybrid Storage System led by H2GO - £217,019.00
This work package develops the detailed design of the solid-state andcompressed H2 storage on NTS compression systems and determines the costeddevelopment plan for Beta and use case development for NTS deployment.
Milestone4 - Multiphysics simulation results
SC4 - AI-assisted multiphysics simulations for optimising reactor internal heattransfer to enhance reactor performance
Milestone5 - Detailed design and simulation report
SC5 - Detailed design of containerised solid-state system including upgrade solid-state reactor & HyAI Simulation Report including presentation of interactivedashboard
Milestone6 - Benchmarking system
SC6 - Benchmarking additional storage options to support solid state storage
Milestone7 - Energy model development
SC7 - Incorporation of equipment and ancillaries, energy efficiency optimisation,scenarios for configuration optimisation
Milestone8 - Electricity supply
SC8 - Options and requirements for electricity supply for electrolyser and storageequipment
WP4 -
System Demonstration led by MTC and supported by NGT -£75,414.00
This work package determines site specifics and associated costs related toelectricity connection, systems integration, planning & permitting, demonstrationdesign, build & commissioning and the inspection & testing plan.
Milestone9 - Design of demonstration
SC9 - Once a system configuration has been determined through the 'EnergyModel' activities, MTC will produce a system design that will incorporate majorcomponentry and a high-level pipework layout.
Milestone10 - System integration on site
SC10 - Equipment packaging and deployment, layout on site, permitrequirements, build and test plan.
Risks will be managed as identified via the risk register with appropriate mitigationstrategies applied throughout the alpha phase. Project meetings will recordprogress in line with the project plan and actions will be tracked to ensure timelydecisions can be made. The key risk associated with the project is mitigating theimpact of low GT utilisation at the demonstration site to show a valid CBA andbusiness case. By identifying the rollout and number of commercially viable siteson the network to deploy a hybrid storage solution we will avoid sites that requirehydrogen production from entering COMAH status. Ongoing associated risks withproject management and meeting SIF requirements will be manged by the projectteam through project setup and delivery. Contracting discussions will be initiatedas soon as confirmation of award is confirmed as lessons learnt from theDiscovery phase.

Project Management Book - HyNTS Hybrid Storage FINAL.xlsx (opens in a newwindow)
(/application/10079465/form/question/33893/forminput/91730/file/564896/download)
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Key outputs and dissemination

What are the expected key outputs of your Project and your plan fordisseminating them along with any lessons learned?
Objectives and Responsibilities
The Alpha phase will be used to build on the Discovery findings, includingfinalising the usecases for the demonstration, detailed system design, integrationof system on selected site and demonstration and testing plan for Beta phase.Additionally, the business case will continuously be developed as the systemdevelops.
National Gas
will be responsible for finalising the requirements and disseminatingthis to the project partners through regular project meetings. Additionally, NGT willdevelop the implementation plan for the system across the NTS. This will bedisseminated through internal groups including asset strategy, asset managementand appropriate policy teams.
H2Go Power
will be responsible for the detailed design of the solid state storagesystem and will deliver this as a report with associated engineering drawings andplans to be implemented in the Beta phase. This will be delivered through projectmeetings and the reports made available for review by other project partners andNGT internal teams.
MTC
will be responsible for benchmarking and selecting additional storage optionsto support the solid state system, building a full system energy model,
incorporation of findings from the SIF Waste Heat Recovery project and optimisingthe full system efficiency through the energy model. This will be delivered throughprogress meetings and a final report to be disseminated to project partners andNGT internal teams for review.
MTC
will also deliver the design of the demonstration including layout ofequipment and pipework, working closely with NGT to determine the requirementsfor the demonstration site. This will also include the integration of the system ontothe selected site, including transportation and deployment and permitrequirements for safe installation and commissioning. This activity will be carriedout in consultation with relevant internal NGT teams to support the process andthe outputs will be reviewed by NGT teams and partners.
Dissemination of Key Outputs
The above outputs will be compiled by NGT into a single project report which willbe uploaded to the Smarter Networks Portal, along with other supportingdocumentation which has been approved for sharing outside of the project.
Furthermore, the findings from the project will be shared with NGT stakeholdersthrough internal webinars and relevant meetings including Asset Management,Asset Strategy, Policy and Regulation, and Project Union.
National Gas Transmission
will take responsibility for the project disseminationand lessons learnt requirements, which includes creating a communication plan inline with SIF programme requirements, creating LinkedIn posts, and collating theShow and Tell content.
A communications plan will include a LinkedIn post announcing the project at thebeginning of the project timescales, and one at the end to announce the projectresults. The Show and Tell will give the project results an additional opportunity tobe disseminated. The final report and Show and Tell slides will be published on theENA portal.
Additionally, National Gas Transmission will be attending the Energy InnovationSummit during the timeline of the SIF Alpha and will therefore have an opportunityto disseminate about the project on the stand at the event.

Commercials

Intellectual property rights, procurement and contracting (not scored)

What are the Intellectual Property Rights (IPR) arrangements for yourproject?
For SIF projects, each Project Partner shall own all Foreground IPR that itindependently creates as part of the Project, or where it is created jointly then itshall 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 thecontractual negotiations with the Project Partners on the agreement for theproject. On creation of Foreground IPR the creator of the IPR will notify the projectpartners to enable it to be recorded and ownership agreed in line with the contractterms.
Also if the party appoints a sub-contractor, the agreement with that sub-contractorshould have similar IP provisions to those in this agreement and which at leastachieve the same aims as the agreement regarding IP.
Once the Project is completed, Relevant Background IPR will be licensed for useby the Project Partners in connection with another Project Partners' ForegroundIPR solely to the extent necessary to use that Foreground IPR, upon terms to beagreed.
Describe how each Project Partners complies with Chapter 9 SIFGovernance Document.
We intend to ensure each Project Partner will comply with Chapter 9 SIFGovernance Document through the contractual terms governing the project.However, precisely how this is done will be subject to contractual negotiations withthe Project Partners on the agreement for the project.

Commercialisation, route to market and business as usual

How will your idea become business as usual within your network andacross the other networks?
Commercialisation and BAU
The Discovery phase has considered the implementation of this system across theUK Gas Transmission network post delivery of the demonstration in the Betaphase. This project could enable safer, more efficient hydrogen storage to supportthe cost effectiveness of hydrogen deployment on operational sites. It could alsoprovide the opportunity to a wide range of hydrogen users across the country andglobally.
We have considered our approach not only based on the Beta demonstration sitebut other sites including non gas network sites to understand the difference incosts and approach for deploying hybrid storage. The intended demonstration sitefor Beta has an opportunity beyond the network assets for the industrial andtransport hydrogen users in the vicinity which are looking to connect to thehydrogen production unit to help them decarbonise. Additionally, this project will
be demonstrated alongside other SIF projects including NGT's HyNTS WasteHeat Recovery for Electrolysis and UKPN's Connectrolyser to provide a widersystems approach to energy storage and utilisation.
This project will demonstrate the system and validate the predicted benefits. Thedemonstration is planned to take place on an active site, and therefore will requirethe necessary changes to physical assets, control systems as well as policy andregulation, which would then be applicable to a large proportion of sites on theNTS. This will require engagement with relevant internal teams including assetstrategy, asset management, rotating machinery, control systems and hydrogen.These activities required through Alpha and Beta will stand us in good stead tounderstand the approach to deploying this solution across the wider network andUK applications.
The Beta demonstration will deliver key evidence which will feed in to our pricecontrol business plan and hydrogen projects such as Project Union, enabling thissolution to be rolled out across the network.
Commercial Readiness of Partners
MTC have a wealth of experience in supporting manufacturing through researchand development, and have previously supported the SHyLo project with theEuropean Marine Energy Centre (EMEC) where H2Go's solid state storage wasdeployed on a site in Scotland.
H2Go are the owner of the solid state hydrogen storage and the HyAI tool. Thesetechnologies have been demonstrated for commercial applications although theTRLs are around 7-8, and this demonstration through the Beta phase will helpH2Go reach higher TRL and CRLs.
Our project partners are focussed on delivering a scalable hydrogen storagesolution for the future and are dedicated to ensuring cost competitiveness of thetechnology for wide spread use in the future.
Senior Sponsor Involvement
This project is endorsed across all levels of management. The innovation team willbe responsible for the delivery of the project and ensuring value to the businessthrough implementation across the NTS. The project is supported by:
Subject Matter Experts for our operational equipment, ensuring the correct levelof evidence is gathered to enable implementation
Operational teams to ensure the required changes to site are met for thedemonstration

Policy and Regulation teams to ensure the correct approach in any policy andregulation changes is taken to allow hydrogen production, storage andutilisation on a NGT site
The project has been presented to the senior leadership team and CEO whom arein full support of the project and excited to see the projects come together in Betaas a demonstration of this fantastic opportunity. This work could enable us toready our network prior to mass hydrogen production and prevent duplicatedspend through the transition.

Policy, standards and regulations (not scored)

Do you consider there to be any barriers with respect to meeting therequirements of regulations, policy or standards?
Project regulatory barriers
There are no regulatory barriers that prevent the delivery of the project throughAlpha. There are no policy changes required for us to fuel our network equipmentwith hydrogen and this could be utilised prior to hydrogen being injected into thenetwork to decarbonise emissions from our network compression assets in linewith the 2030 MCP emissions requirements.
In Beta we are looking to deploy this project alongside HyNTS Waste HeatRecovery for Electrolysis and Connectrolyser on an operational site which willrequire permits, early engagement to ensure these are attained will be requiredthrough the Alpha phase. As the project will not inject hydrogen into the gasnetwork no derogations will be required for Gas Safety Management Regulation(GSMR), however with hydrogen on an operational site and interacting withnetwork assets we will need approval from the HSE. We have been informedthese deviations will take a minimum of 13 weeks and this will be considered inthe Beta phase.
In the Alpha phase we have a deliverable to review land rights and permits for thehybrid storage system to be situated on our compressor station and manage theCOMAH requirements for the Beta demonstration project elements covered bythis project. HyNTS Waste Heat Recovery for Electrolysis and Connectrolyser willconsider the other elements associated to the electrolyser and electricalconnections to the site and feed into the central steering group for the Betaapplication.
We are actively engaged with the HSE to ensure the NTS safety case forhydrogen and hydrogen blends is ready for Project Union commencing in 2026.This project and its findings will be integrated into this plan to ensure consistencyin approach and alignment.
Longer-term regulatory barriers and policy requirements
The deployment of hydrogen on gas networks in the UK has not yet beenfinalised, however many exploratory demonstrations have been sanctioned acrossthe UK. As we progress past Beta we will need to ensure that the opportunity toduplicate the demonstration is available for other sites. There are several policy
and regulatory systems in review around the introduction of hydrogen consideringboth 100% hydrogen and blended hydrogen. Primary and secondary legislationwill need to be updated to enable blends of hydrogen within the network and allowfor the development of a 100% hydrogen NTS. Alongside this, rules will need to beagreed, such as the uniform network code (UNC) and GSMR to incorporatehydrogen blending and if required adapted for hydrogen transportation.
This does not directly influence this project as we will not be utilising networkhydrogen or injecting into the network, but this is an opportunity for the future.
Evidence creation to influence future policy and regulations
The project will create evidence for the HSE and relevant stakeholders on thedeployment of these systems, which will look to follow the approach utilised by theHydrogen Grid Research and Development (HGR&D) working group. We continueto support Government and Ofgem in gathering the evidence required to deliverpolicy and regulation that will enable the energy transition through working groupssuch as HGR&D and Gas Goes Green (GGG). Evidence of our networkscapability to support the transition is beginning the be reviewed by the HSE anddevelopment of approaches to blending both commercial and technical areunderway through these collaborative working groups.

Value for money

What are the Alpha Phase Project costs and how are they proportionate tothe Project delivery?
Project Costs and SIF Funding Requested
The total project cost is £418,949 including £41,895 contribution plus £1,685contribution in kind, and we are requesting £375,369 of funding. The funding issplit across the partners as follows:
National Gas Transmission - £71,606 (17%) (£41,895 contribution in kind)requesting £29,711 of SIF funding. Carrying out project management activities,business case and requirements development.
H2Go Power - £150,179 (36%) - solid state storage design and lab scale teststo improve performance.
MTC - £154,414 (37%) - system design, energy efficiency optimisation,demonstration design, manufacture and deployment of system on site.
UKPN - Total project costs = £18,525 (4%), SIF requested = £16,840,Contribution in Kind = £1,685 (9.10%). Supporting the project by providing inputfrom Connectrolyser SIF and looking into electricity connection requirements forsystem.
HydroGenus Group Ltd. - £24,225 (4%). Supporting the project by providinginsights into wider hydrogen hub development, including Connectrolyser project,Waste Heat Recovery and local industrial/transport applications.

The finances of all project partners are included in the
milestones summary
(/application/10079465/milestones-summary)
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Totalcosts (£)
Funding sought(£)
Contribution toproject (%)
Contribution toproject (£)
Contributions in kind (£)
71,606
29,711
58.51%
41,895
0
150,179
150,179
0.00%
0
0
18,525
16,840
9.10%
1,685
1,685
154,414
154,414
0.00%
0
0
24,225
24,225
0.00%
0
0
Total
£418,949
375,369
43,580
1,685
The split of funding shows that MTC and H2Go will be carrying out most of thework in the Alpha phase, delivering detailed design and costs of the system to bedemonstrated in Beta.
Compulsory Contribution
£41,895 contribution will be provided by National Gas Transmission which meetsthe 10% financial contribution requirements for Alpha. UKPN are providing acontribution in kind of £1,685.

Associated Innovation Projects

- ○ Yes (Please remember to upload all required documentation)
- ◉ No

Supporting documents

File Upload

H2go Final Report Optimisation Of Low Carbon Hydrogen For Compressor Station Redacted V2 (1) - 5.4 MB
Segment 001 of 3002131-DOC-033 Equipment Layout Presentation V1.0_Redacted.pdf - 1.8 MB
Alpha End of Phase Report - HyNTS Hybrid Storage.pdf - 254.4 KB
3002131-DOC-035 D22 - Permit requirements V 1.0.pdf - 2.0 MB
3002131-DOC-022 v1.0 - System Design and Demonstration.pdf - 1.3 MB
3002131-DOC-021 Energy Model Report 1.0_Redacted.pdf - 1.9 MB
3002131-DOC-010 v1.0 - Additional Storage Solutions_Redacted.pdf - 1.7 MB
3002131-DOC-009 - Benchmarking Document 1.0_Redacted.pdf - 1.6 MB
SIF Alpha Round 2 Project Registration 2024-01-17 11_56 (1) - 108.4 KB
SIF Alpha Round 2 Project Registration 2024-01-17 11_56 - 108.2 KB

Documents uploaded where applicable?

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