SIF Beta Project Registration

Date of Submission

Aug 2023

Project Reference Number

10068217

Project Registration

Project Title

Velocity design with hydrogen - Beta

Project Reference Number

10068217

Project Licensee(s)

SGN

Project Start

Aug 2023

Project Duration

30 Months

Nominated Project Contact(s)

stuart.sherlock@sgn.co.uk

Project Budget

£6,554,978.00

Funding Mechanism

SIF Beta - Round 1

SIF Funding

£5,912,134.00

Strategy Theme

Net zero and the energy system transition

Challenge Area

Data and digitisation

Lead Sector

Gas Distribution

Other Related Sectors

Lead Funding Licensee

SGN - Southern England (inc South London)

Funding Licensees

Collaborating Networks

Cadent

Technology Areas

Green Gas

Summary

This project is undertaking 'full-scale' testing with the aim of validating models forerosion, vibration, noise, and particle transportation in hydrogen flow conditionsthat would likely exist in a converted natural gas network for the purpose ofcontributing to the heat

transformation necessary to meet the 2030 and 2050emissions targets. The project meets the Heat challenge aims to "produce insightsand findings which facilitate decision making for low carbon heating by the energynetworks, industry and government".

Project partners include all the gas distribution network operators (SGN, Cadent,NGN and WWU), National Gas Transmission, Institution of Gas Engineers andManagers (IGEM), and DNV. Collaboratively working with these project partners,we aim to understand how hydrogen network constraints can be minimised at thelowest economic cost.
The energy network innovation for hydrogen networks has evolved in recent yearsfrom desktop studies to multiple large-scale tests, and several live trials, forexample Hydeploy, and proposed future trials such as H100 and the HydrogenVillage trials.
The Discovery phase of the project established that there was insufficient datathat could be relied on to define suitable design standards for Hydrogen andHydrogen-Natural gas mixtures in UK gas pipes.
The Alpha phase of this project was predominantly desktop based and includedthe following activities:

- erosion modelling
- particle transport modelling
- vibration and noise modelling
- laboratory scale tests to investigate possible synergistic hydrogen embrittlementand erosion]
- a conceptual design of full-scale test facility
- a draft test plan for undertaking tests to assess/ validate the hydrogen velocitymodels
- cost/ benefit modelling to assess the remediation costs associated withhydrogen velocity limitations

The perception of the challenge involved with higher hydrogen velocities hasremained largely constant, however it has become apparent that there is anincreasing need to communicate with other ongoing projects to ensure efficienciesand compatibility of proposed solutions, and that it will be important to ensure thata standards body such as IGEM is involved throughout the project to ensureindustry buy-in.
The key users for this demonstration project are the gas distribution andtransmission network operators who need to understand how to apply safehydrogen design velocity limit to their networks, to ensure the integrity of thepressure system is maintained whilst supplying the required energy output, at thelowest economic cost
Project partners:
SGN, WWU, Cadent, NGN, National Grid Gas
The gas distribution and transmission networks are responsible for the design,operation, maintenance of the existing natural gas networks, with expertise and competence in managing below ground and above ground pipelines andinstallations.
Institution of Gas Engineers and Managers (IGEM)
A professional institute, and the authors of the majority of gas transmission anddistribution standards used to design, operate, and maintain the UK's gasnetworks. IGEM's technical committees are responsible for technical and editorialupdates of the standards, which are then adopted by the gas network operatorsfor use in business as usual.
DNV
DNV is a global leader in technical assurance and risk advisory for oil and gas.The DNV team in the UK has subject matter experts in materials and fitness forservice, and in the design, construction and operation of full-scale test facilitieswhich utilise the Spadeadam test site. DNV has experts that have providedtechnical assurance for the gas distribution and transmission network operatorsfor decades.
The aim is to use the outputs from the full-scale tests to validate models that canbe used to set new hydrogen velocity limits that are supported by both theoreticaland empirical data. Validation is required as the networks could be operated in aregime where velocities are much higher than those in any previous validationtesting and historical operating experience.
The new velocity limits will allow the gas distribution and transmission networks,and any of their design sub-contractors, to design future hydrogen networks tomaintain the systems integrity at the lowest economic cost.

Project Description

The project will establish safe design gas velocity limits for the UK industry to usein re-purposing gas networks in the UK to safely deliver 100% hydrogen.

Hydrogen carries approximately one-third of the energy per unit than delivered bynatural gas. Therefore, an increase in mass flow can be expected to deliver thesame heat energy to consumers using hydrogen.
Design gas velocity limits are used by network designers to ensure there is nointegrity risk to pipe components caused by erosion, noise, or vibration fromexcessive gas velocity in the pipes.
While current design codes use gas velocity limits proven to be safe in designingnetworks carrying natural gas by long standing practice, no suitably valid andrepresentative data has been gathered to establish safe limits while carryinghydrogen in UK gas distribution networks.
If hydraulic modelling of gas networks shows gas velocities in the networks thatexceed the safe velocity limits, additional pipe must be

installed (networkreinforcement).
This project will deliver a test campaign, on a full-scale test rig, to produce datathat will be accepted by the industry and the professional body representing gasengineers in the UK as valid to amend the design codes to ensure the safetransport of hydrogen in UK gas distribution infrastructure.
Analysis completed in previous phases of the project show significant networkreinforcement costs can be avoided during the energy transition if the gas designvelocities can be safely increased from current limits.

Preceding Projects

10037659 - Velocity Design with Hydrogen – Alpha

Third Party Collaborators

DNV

Institution of Gas Engineers and Managers

Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

Project Description And Benefits

Applicants Location

SGN
St Lawrence House, Station Approach, Horley, England, RH6 9HJ

DNV
Location of project work:
DNV Spadeadam, Brampton, CA8 7BB
DNV Loughborough, LE11 3GR
Location of demonstration (test rig and testing campaign):
DNV Spadeadam, Brampton, CA8 7BB

Project Short Description

Hydrogen gas does not have the same energy content as natural gas, so, todeliver the same energy requirement, the volume of hydrogen flowing toconsumers would have to increase a little over 3 times for a 100% hydrogennetwork, compared to natural gas.
As existing networks are re-purposed to carry hydrogen-natural gas mixtures andultimately 100% hydrogen, either an increase to the pressure, an increase in gasvelocity, or an increase in the effective diameter (reinforcing) of the pipelineswould be required. Increasing the pressure is not feasible for many parts of thenetworks and replacing/ reinforcing pipelines is costly. Therefore, increasing thevelocity is the most feasible low-cost option.
Network designers are required to limit the velocity of gas in the networks atdesign (peak demand) conditions to prevent erosion from entrained debris ordamage from noise and vibration.
This project will undertake testing at the DNV Spadeadam test facility which aimsto validate hydrogen velocity models for erosion, vibration, noise, and particletransportation, to enable safe design velocity limits for gas networks with thepurpose of providing low-carbon heat for domestic and non-domestic.

Innovation Justification

Gas engineers are required to design pipe networks to ensure that, at peakenergy delivery, the velocity of the gas does not exceed limits. These limits are toprotect pipe components from the effects of erosion from entrained debris, ornoise and vibration.
As Hydrogen delivers approximately one-third of the energy per unit compared tonatural gas, the re-purposing of existing assets to deliver the same energydemand will require an increased flow of gas.
If the design velocity limit is too low, substantial unnecessary reinforcement costswill be incurred as existing infrastructure is transitioned to carry hydrogen. If thedesign velocity limits are too high, asset integrity risk will be increased.

The current design velocity limits (natural gas) are long standing safe industrypractice. However, there has been no suitably representative research done onthe velocities at which Hydrogen will start to entrain debris and to a level thatcauses excessive erosion or causes other hazards due to excessive noise orvibration.
The Discovery and Alpha phases of this project showed:

- Insufficient valid data on the behaviour of 100% hydrogen and hydrogen-naturalgas blends to reliably establish safe velocity limits for these gases in UK gasinfrastructure
- The requirements of a full-scale test campaign to be conducted along with acost-benefit model to establish safe design velocity limits in representativeconditions.

An industry and stakeholder engagement plan, in the Beta Phase scope, ensuresthat the project results are accepted as valid and credible by the industry and usedto develop design codes and standards.

The gas engineering professional body, IGEM, will:

- Lead industry workshops to allow experienced professionals to challenge thedesign of the test rig and the planned test campaigns
- Commission a standards committee to develop suitable design standards forthe industry.

The post-project results will be:

- IRL 7 - The integration of technologies has been verified and validated withsufficient detail to be actionable: The results of the project can be relied upon tobuild safe design standards.
- CRL 8 -- Market Introduction: The design standards are available for theindustry to incorporate into their business-as-usual

practices. The final CRLlevel 9 - Full Launch, may take some period after completion as networkoperators implement the practices into their design of networks to be "hydrogensafe".

The test campaign will be run on a test rig constructed at DNV's Spadeadam testfacility in Cumbria, making maximum use of the facilities and equipment alreadyavailable.
A full-scale test rig is:

- Needed to test actual pipe components and materials used in UK gasinfrastructure under the same operational conditions.
- Limited in the upper size of pipes tested to optimise the costs against datavalidity. Larger sizes of gas transmission pipe are less prone erosion and vibration due to their size and are designed to be cleaned. This also savessubstantial costs in the building of the test rig.
- Required as re-creating operational conditions at lab-scale is technicallychallenging and costly.

As the results of this project will be of benefit to the whole industry and ultimatelyconsumers during the energy transition, SIF funding is the best way to deliver thiswork. Network operators cannot fund this innovation research in their business-as-usual activities as

- It is required to build the safety case for the impending hydrogen transition
- They must ensure valid designs before they can introduce hydrogen into theirnetworks.

The project goes beyond incremental innovation by delivering data to driveimproved design standards used by the whole industry. SIF also provides an openplatform for sharing knowledge and project outputs, allowing for benefits to beshared to the wider industry.
Some counterfactual solutions have been considered and the outcomes detailedbelow.
Suitably representative testing done elsewhere or in other industries:

- None found

Apply existing design velocity limits:

- There will be substantial reinforcement costs that consumers will have to pay forto transition to low carbon heating.

Cleaning the networks:

- This is feasible (and common practice) for large diameter gas transmission linesthat are designed to have cleaning equipment ("Pigs") passed down theirlength.
- However, the smaller diameter pipes in lower pressure distribution networks andservice connections cannot be practically and economically cleaned for severalreasons.
- Much of the debris present in these networks is legacy from town gasdistribution and the lower pressures increase the possibility of ingress of debris.Further, the pipe diameters and design of the fittings make it impossible to runpigs through the pipes.
- To flush the pipes in multiple branched lower pressure networks, sections mustbe physically isolated that can be flushed using a suitable medium (that mustthen be captured and safely disposed). Each section must then be re-integrated, without any flushing media being retained, and without affectingsecurity of supply to consumers. This cost is prohibitive.

Impacts and benefits

The project will deliver cost reductions in operating the networks and wider energysystem.
Alpha phase network modelling looked at the network reinforcement requirements,using current design velocity limits, needed to convert a single low pressuredistribution network (Dundee used as a sample site) to 100% hydrogen.
The Dundee LP network has 575 km of pipe and was chosen as it was consideredto be representative of a medium sized distribution network in the UK.
The modelling showed that if the Dundee network was to deliver the same energywith 100% hydrogen while maintaining the required pressures (to ensure the safeoperation of downstream appliances) throughout the network, the addition of 17.7km of pipe at an indicated cost of £5.7 million would be required.
If gas design velocities are limited in this model to the current design standards(40m/s and 20m/s), the additional reinforcement cost would be increased to £5.9million.
The total UK gas distribution network is made up of approximately 277,000 km ofpipe (of which about 93% is LP networks) and 23.6 million service connectionpipes (connecting Consumer's meters to the gas distribution pipe).
Work completed in the Hydrogen Ready Services project, part of the NIA fundedH21 suite of projects, showed that that approximately 15 million services wouldhave a future supply issue on 100% hydrogen, based on a 5mbar pressure dropcriteria, 20 million if the velocity restriction (currently 15m/s) cannot be increasedat times of peak demand.
Also built into the CBA is assumptions around the likely change in number ofconsumers receiving heat energy from hydrogen after the energy transition usinglatest future energy scenarios produced by the Energy Systems Operator.
The Cost Benefit Analysis submitted with this proposal (in the ProjectManagement Book) analyses the reinforcement costs that can be avoided if thedesign gas velocities can be safely increased, using conservative assumptionsaround the likely hydrogen energy

consumption after the energy transition.
The CBA shows that the Whole Life NPV delivered to Consumers by the deliveryof this project will be £1.55 billion, defined in the Adopted Option 1 in the CBA.
A more conservative Rejected Option 2 in the CBA is based on the projectshowing that a marginal increase in design velocities is safe, resulting in a reduction in reinforcement costs avoided, and delivers a Whole Life NPV of £383million.
NPVs over shorter periods for Adopted Option 1 in the CBA:
1 year: £0.08 million
3 year: £0.35 million
5 year: £19.37 million
10 year: £107.2 million
Should the project results indicate a marginal increase in design velocities is safe,the shorter term NPVs from the Rejected Option 2 in the CBA would be:
1 year: £0.08 million
3 year: £0.35 million
5 year: £4.23 million
10 year: £25.73 million
The Beta phase Total Project Cost is £6,554,978.00 of which £5,912,134.00 of SIFfunding is proposed.
In the Beta Phase, additional analysis will expand to include the effects of designvelocity on medium and intermediate pressure networks, Pressure ReducingStations (PRS), other Above Ground Installations (AGI).
The analysis will use the test data delivered by the project to evaluate theoptimum cost-benefit to balance reduced reinforcement costs without increasingintegrity risk to UK networks during the energy transition.

Project Plans And Milestones

Project Plans, Milestones & Risks

The Beta phase has six work packages:
Work Package 1: Test facility (DNV Spadeadam). SIF Funding: £3,896,082.00
Work package lead: DNV
Work package support: SGN, Cadent, WWU, NGN, National Grid Gas, IGEM
DNV will undertake the detailed design, safety studies, construction, operation,and maintenance of a test rig at Spadeadam to undertake the following tests inrepresentative hydrogen velocities:

- erosion
- particle transportations
- vibration
- noise

The test rig will utilise existing infrastructure and equipment at Spadeadam, suchas high-pressure storage bullets.
Work Package 2: Testing (Erosion and particle transportation): SIF Funding:£816,373.00
Work package lead: DNV
Work package support: SGN, Cadent, WWU, NGN, National Grid Gas, IGEM
DNV SMEs will compile a detailed test schedule for erosion and particletransportation tests and ensure the test rig allows all required outputs to bedelivered. Comparison of the test results with industry models will enable suitableallowable velocity limits to be determined.
Work Package 3: Testing (Noise and Vibration): SIF Funding: £354,273.00
Work package leadL DNV
Work package support: SGN, Cadent, WWU, NGN, National Grid Gas, IGEM
DNV SMEs will compile a detailed test schedule for noise and vibration tests andensure the test rig allows all required outputs to be delivered. Comparison of thetest results with industry models will enable suitable allowable velocity limits to bedetermined.
Work Package 4: Cost-benefit analysis: SIF Funding: £276,724.00
Work package lead: DNV
Work package support: SGN, Cadent, WWU, NGN, National Grid Gas, IGEM
DNV will build on the Alpha phase outputs to analyse the effects of hydrogenvelocities on a wider range of asset types and operating pressures to gain a moreaccurate understanding of the remediation costs required to upgrade UK networkinfrastructure. We have assumed that five additional network models (three low-pressure and two medium pressure/intermediate pressure) will be sufficient forthis work pack.
Work Package 5: Stakeholder engagement and project management: SIFFunding: £315,741.00
Work package lead: DNV

Work package support: SGN, Cadent, WWU, NGN, National Grid Gas, IGEM
DNV will work with the project partners to obtain industry buy-in to the projectoutcomes to allow velocity limits to be applied in their business at the end of theproject (assuming the decision is made to enable hydrogen transmission anddistribution for heat). The following tasks will be included:

- Monthly meetings with all project partners
- Communicate with other related SIF projects and hydrogen research
- Three workshops with IGEM technical panel experts
- Collation and review of debris experience related to high velocities, i.e. high gasuse customers
- Monitoring officer reviews, external communications/presentations
- Project management

Work Package 6: Project Partners input Beta Phase: SIF Funding:£252,941.00
This is a combined work package to cover the input of the project partners,including the Lead Partner SGN over the duration of the Beta Phase of the project.
Success criteria
The project aims to "produce insights and findings which facilitate decision makingfor low carbon heating" by providing evidence to support validation of industrymodels for erosion, particle transport, vibration, and noise. The models should beaccepted by the industry to enable the safe design of hydrogen networks at thelowest economic cost.

Successful outputs are the evidence base and acceptance of models to be usedto determine safe design parameters for hydrogen networks.
Main Risks
A risk with any project focussed on hydrogen for heat is that policy decisions onhydrogen will depend on many factors including supply chain feasibility andsystem resilience. Also, the Gas Safety Management Regulations (GSMR) do notcurrently permit the transport and supply of 100% hydrogen for heat.
Early modelling in the Alpha phase has shown that higher hydrogen velocities maybe permitted, however there is the possibility that the full-scale test results do notsupport a significant allowable increase in the velocity limits.
Risks will be identified and managed in the risk register by the project lead andmonitoring officer.
The nature of this project, being a test schedule that can only be undertaken oncethe test facility has been constructed, means that most of the investment in the project infrastructure must be made prior to the testing commencing.
Any critical test results or findings will be shared with the project partners andescalated as a risk mitigation if it is deemed that they do not enable the projectsuccess criteria to be met.
Stage Gates
In the engagement strategy, to aid in taking project outcomes into "business-as-usual", workshops have been scheduled at key points of the project wherepartners and stakeholders can challenge the designs, test campaigns and outputs.
Should any of these challenges result in a substantial change to the scope of theproject, the project partners will approach UKRI to agree the necessary changes,including halting the project if it is apparent that little of value will be delivered byproceeding further.

Regulatory Barriers

The impact of this project on regulatory barriers:

- This project, and all projects that are gathering evidence for the potential totransport hydrogen for heat, are being undertaken with the knowledge that theyare contributing to the research and development and testing programme thatwill enable strategic decisions by 2026 on the role of hydrogen for heat asstated in the Government's 'UK Hydrogen Strategy'. A decision to progress withhydrogen would enable the creation of a hydrogen gas safety managementregulations, as the current gas safety management regulations does not permitthe transport and supply of 100% hydrogen.
- Relevant design codes and practices that are published by IGEM have beendeveloped for natural gas. Some of these documents such as IGEM/TD/1,IGEM/TD/3, IGEM/TD/4, IGEM/TD/13 specify restricting velocity limits fornatural gas that would likely be exceeded when transporting hydrogen andproviding the same energy output. These will be appropriately revised toaccount for the project outcomes. IGEM is a partner in the project to ensure theproject outcomes are a valid basis for the revisions.
- "Licence to operate" regulations that UK Gas Distribution network operatorsdemonstrate compliance with include health & safety (regulated by the Health &Safety Executive), supply and customer protection standards (Regulated byOfgem). Network operators who are partners in the project will take the amended IGEM standards into their work processes to demonstrate continuedcompliance.

Business As Usual

The route to "business-as-usual" for this project's outcomes is through the projectstakeholder engagement strategy.
The engagement strategy has two key components:

1. All UK gas distribution network operators are partners in the Beta Phase of theproject and will ensure that the project scope and outcomes are valid andreliable for their business. The networks have indicated that there is a desire toadopt safe validated hydrogen velocity limits that have the potential to allowhydrogen network conversion at the lowest economical cost.
2. IGEM, the professional body responsible for issuing design standards andcodes of practice for use by gas engineers were partners in the Alpha phaseand will continue to be project partners in the Beta phase.

IGEM has a specific role within work package 5 'Stakeholder Engagement' whereregular communication in addition to 3 workshops are planned to ensure thatIGEM technical panel members are involved with discussions prior to testing, andwill peer review the test outcomes and conclusions, thus maximising the potentialfor successful findings to be incorporated into IGEM hydrogen supplementstandards.
During the Beta phase, IGEM will convene several industry workshops at keystages of the project where industry professionals will be invited to provide input tomaximise the outputs from the test campaign and ensure alignment with the IGEMhydrogen supplement standards.
Once the test results are validated, Members from the relevant IGEM standardstechnical panels to review and accept the results for use in the hydrogensupplements to IGEM standards IGEM/TD/1, IGEM/TD/3, IGEM/TD/4, andIGEM/TD/13.

Commercials

Consumer interaction and engagement

The project engagement strategy includes network operators and IGEM, theprofessional body. No direct interaction with consumers is planned in the Betaphase of the project, however the gas networks have committed to gathering anydebris related evidence related to known high gas velocities and the potentialissues and solutions for customers with high consumption, such as powerstations.
There are significant research projects that are providing the evidence base on theimpact of hydrogen supply for domestic and non-domestic consumers, such as thehydrogen village project, where a live trial is planned at the location of Whitby orRedcar.
The scope of this SIF project terminates at the consumer's ECV, (next to themeter) so the effect of hydrogen velocity on downstream installations andappliances in consumer's premises is excluded. Note that the effect of hydrogen inconsumer's premises are being evaluated in other projects, including the villagetrial projects.
Once the project outcomes have been suitably incorporated into "business-as-usual", we can anticipate that the project will be part of the proof that the industrywill use to demonstrate the safety case for operating gas distribution assets in theUK containing hydrogen-natural gas mixtures and 100% hydrogen through theheat energy transition.
The project testing is being undertaken outside of the gas networks at the DNVtest facility in Spadeadam, to avoid any potential interruption to customers duringthe tests.

Supply shortages and interruptions

This project will be delivered on test equipment, isolated from operational gassupply assets, installed and operated at DNV's Spadeadam test facility.
No shortages or interruptions or interruptions of supply to consumers will becaused by the implementation of the project.
The outcomes of the project, when incorporated into relevant design standards,will ensure that consumer's security of supply is maintained when the gasdistribution infrastructure is transitioned to conveying hydrogen-natural gasmixtures and 100% hydrogen.

Commercialisation

This project will produce outcomes that can be used by all UK gas transmissionand distribution operators to maintain the safe and efficient supply of heating gas through the energy transition.
The test outcomes will be accepted by the project partners: SGN, Cadent, WWU,NGN, National Grid Gas, IGEM and DNV. The assessments that follow the testingaim to enable the validation of models for erosion, particle transportation,vibration, and noise, which can then be incorporated into design standards.
IGEM authors the main design standards for transmission (IGEM/TD/1),distribution (IGEM/TD/3), and service (IGEM/TD/4) pipelines, and pressurereduction installations (IGEM/TD/13). In addition to this the gas transmission anddistribution networks have their own design specifications which refer to the'parent' IGEM standards.
Having IGEM, and the gas transmission and distribution operators as projectpartners ensures that the project direction is consistent with the management andupdate of the standards and specifications, and that the acceptance of updatesinto the standards for use as business as usual is maximised.
The design standards issued by IGEM will be available to gas network designersand network operators, regardless of whether they are partners in the Beta phaseof the project.

Intellectual Property Rights

The IPR arrangements for project will comply with the Chapter 9 SIF Governancedocument. The work products that could constitute Foreground IPR consist of:

- Design of the test rig.
- The results of the test campaigns.
- The cost benefit analysis.

The partner's retained Background IPR includes:

- The knowledge skills, expertise to design, build and operate the test rig.
- The expertise to design and deliver the test campaigns.
- The distribution network simulation models built by the network operators.
- The hydraulic modelling software used to analyse the distribution networks sothe cost-benefit model can be built.
- The knowledge, skills and experience in the safe operation and maintenance ofgas networks in the UK.

The Foreground IP developed by the project will be freely shared with industry andused by IGEM to develop new design standards for use by all network designers.

To the extent that this Foreground IP could be licenced, a royalty-free licence touse the Foreground IP will be available for use by IGEM and the industrystakeholders who use it to develop new design standards to be assured of safeand reliable gas network designs.

Costs and Value for Money

The total Beta Phase of the project will cost £6,554,990.00 of which the partnersare requesting SIF Funding for £5,912,134.00.
The contribution by partners has been funded through:

- Reduced contingency (Higher risk of cost over-runs to be carried by partners)and margins.

Contributions-in kind have been estimated using UKRI guidance and HMRCdepreciation rates. Payment-in-kind contribution consists of:

- Contribution of existing equipment and materials to be incorporated in the testrig
- Contribution of the indirect and overhead costs required to maintain the safeoperation of full-scale test rigs and the test campaigns at DNV's Spadeadamfacility as an upper tier COMAH site.
- Hydraulic simulation software license required to complete the networkmodelling component of the project cost benefit analysis outcome.
- DNV senior leadership time to sponsor the project
- Use of conferencing facilities, provision of site tours & demonstrations andworkshops as well as publicity material

Partner's contributions to the project combine to a total of 20.59% of the SIFFunding Offer.
Suitably capable and skilled sub-contractors will be employed to construction ofthe test rig at Spadeadam. The components of the test rig will be sourced fromapproved suppliers.
Suppliers and sub-contractors will comply with DNV's Supply Chain Code ofPractice.
The scope of the Beta phase of the project was defined in the Alpha phase of theproject. The scope was agreed by the partners to be the minimum required todeliver the outcomes needed.
In building the project cost, the partners have ensured that:

- The design of the test rig uses the minimum equipment, materials andconsumables to deliver the required test outcomes.
- The test rig design re-uses as much of the equipment, material, and supportingsystems available at DNV's Spadeadam facility as possible.
- The scope of the test campaigns and requirements of the test rig have beendefined in the Alpha phase of the project to produce the minimum outcomesrequired to be accepted as a valid basis for incorporation into new designstandards.

The project costs have been assembled using rates that are competitive with thesupply of similar skilled consultancy services to the UK market.

Document upload

Documents Uploaded Where Applicable

Yes

Documents:

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SIF Beta Project Registration 2023-08-23 11_36 (1)

SIF Beta Project Registration 2024-04-18 11_43

Velocity Beta Annual Report FINAL.pdf

This project has been approved by a senior member of staff

☑ Yes