Decision

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for energy consumers

Decision on the Strategic Innovation Fund: round 1 Discovery Phase (unsuccessful projects redacted)

Publication date:	March 1, 2022
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The Strategic Innovation Fund (SIF) supports network innovation that contributes to the achievement of net zero, while delivering net benefits to energy consumers. It facilitates collaboration with other public funders of innovation so that activities appropriately funded by network consumers are coordinated with activities funded by Government, and funding gaps are avoided.

In July 2021, we[1] launched four Innovation Challenges, which sought to target our innovation funding at four strategic issues facing networks – whole system integration, data and digitalisation, zero emissions transport and heat.

We have now decided to fund 40 Projects across these four Innovation Challenges for the round 1 Discovery Phase.

We operate the SIF in partnership with the UK's innovation agency, Innovate UK, which is part of UK Research & Innovation (UKRI), a non-departmental public body. Our decisions on which Projects to fund is informed by the recommendations of Expert Assessors, who have assessed Projects against Eligibility Criteria set out in the SIF Governance Document.

[1] The terms 'we', 'us', 'our' refer to the Gas and Electricity Markets Authority. Ofgem is the office of the Authority.

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Executive summary

The Competition

The Strategic Innovation Fund (SIF) was launched in July 2021 by Ofgem under the RIIO-2 network price control.[2] The SIF seeks to support energy network innovation that contributes to the achievement of Net Zero, while delivering net benefits to energy consumers. [3]

The SIF is a funding mechanism for the Electricity System Operator, Electricity Transmission, Gas Transmission and Gas Distribution sectors which focusses on finding and funding ambitious, innovative Projects with the potential to accelerate the transition to net zero.[4]

Over RIIO-2, the SIF will feature multiple rounds and phases. Each round is divided into three phases to mitigate the risk associated with the innovation process: Discovery Phase, Alpha Phase and Beta Phase.

This Funding Decision is for the Discovery Phase of the first round of the SIF. This round focuses on four strategic issues facing networks – whole system integration, data and digitalisation, zero emissions transport and heat.

2021 submissions

We received 55 Applications across the four challenges of this Discovery Phase by the closing deadline of 17th November 2021.

Of the 55 Applications received, we have approved the funding of 40 Discovery Phase Projects for a total of £4.57 million. The 40 approved Projects are outlined in Table 1 below.

[2] Further detail regarding the RIIO-2 network price control can be found here: Network price controls 2021-2028 (RIIO-2) | Ofgem
[3] Full details about the SIF can be found here: https://www.ofgem.gov.uk/energy-policy-and-regulation/policy-and-regulatory-programmes/network-price-controls-2021-2028-riio-2/network-price-controls-2021-2028-riio-2-riio-2-network-innovation-funding/strategic-innovation-fund-sif
[4] The UK Government and Welsh Government have both committed to reach net zero carbon emissions by 2050, while the Scottish Government has set a target date for net zero emissions by 2045.

Summary of Projects approved for Discovery Phase SIF Funding

Table 1: Whole System Integration Projects Approved for Discovery Phase SIF Funding

Network type	Project title and description[5]	Lead applicant	Initial Net Funding Required (£)
Electricity Transmission	INCENTIVE - Innovative Control and Energy Storage forAncillary Services in Offshore Wind Exploring the opportunity to stabilise the grid through voltage, current and frequency control technologies for offshore wind	SHE	121,002
Electricity Transmission	Network-DC Developing and testing DC circuit breakers for the directconnection of renewable generation onto a DC network in coastal communities to reduce cost and impact	SHE	142,288
Electricity Transmission	Fast Flex Exploring methods for distributed energy assets toparticipate in flexibility services	SPT	112,221
Electricity Transmission	Asset Reuse and Recovery Collaboration (ARRC) Applying circular economy principles to managing highvalue network assets	SPT	75,963
Electricity Transmission	SCADENT - SuperConductor Applications for DenseEnergy Transmission Understanding the impact and benefits of using High Temperature Superconductor cables	NGET	148,437

[5] Full Project descriptions are available in the main body of the Recommendations Report

Electricity Transmission	SEGIL - Sustainable Electrical Gas Insulated Lines Evaluation of long-distance Gas Insulated Lines toreduce cost and impact of new overhead line installations	NGET	133,814
Electricity System Opertator	Crowdflex: Discovery Exploring consumer characteristics and parameters toparticipate in flexibility services	NGESO	70,057
Gas Transmission	HyNTS Compression Exploring if current assets and methods of working are suitable for hydrogen compression	NGGT	146,659
Gas Transmission	Green Hydrogen Injection into the NTS Establishing a framework for green hydrogen injectioninto the gas grid	NGGT	114,652
Gas Transmission	Nuclear Net-Zero Opportunities (N-NZO) Defining a set of end-user scenarios for low carbonhydrogen demand alongside nuclear generation	NGGT	107,494
Gas Distribution	Excess gas turbine energy generation Exploring if energy generated from gas losses can be used to generate energy for storage or feeding back intothe network	NGN	134,161

Table 2: Data and Digitalisation Projects Approved for Discovery Phase SIF Funding

Network type	Project title and description[6]	Lead applicant	Initial Net Funding Required (£)
Electricity Transmission	NIMBUS - Network Innovation and Meteorology to BUild for Sustainability	SHE	148,476

[6] Full Project descriptions are available in the main body of the Recommendations Report

	Investigating the use of weather data to model and predict the impacts of weather and climate change across the whole life of a network asset		
Electricity Transmission	EN-twin-e Development of a digital twin of the electricity distribution system to aid in decision making when managing and balancing assets	SPT	143,480
Electricity Transmission	Predict4Resilience Using weather data and AI to produce forecasts of specific network faults and risks from extreme weather events	SPT	109,401
Electricity Transmission	Digi-GIFT Designing a holistic data connector for real-time monitoring and analysis of assets	SPT	136,236
Electricity Transmission	Eye in the Sky - Utilising satellite data to improve grid resilience in emergencies Investigating remote sensing satellite data analytics to inform and predict asset management, network faults and impacts of extreme weather events	NGET	119,105
Electricity System Operator	Virtual Energy System Development of a common framework to enable interoperability of a wide range of digital twins using open data	NGESO	149,921
Gas Transmission	Gas Analyser Systems for Hydrogen Blends Investigating the feasibility of a fuel cell-based gas sensor for controlling different blends of hydrogen for the gas network	NGGT	113,414
Gas Transmission	Hydrogen Metering Investigation different metering solutions for hydrogen adoption	NGGT	86,378
Gas Transmission	HyNTS Pipeline DataSet Developing the tools and processes to determine the state and capability of gas transmission pipelines carry hydrogen	NGGT	95,571

Gas Transmission	Gas Networks Interoperable Digital Twin Investigation into the requirements for interoperability between different approaches to digital twins	NGGT	78,779
Gas Distribution	Predictive Safety Interventions Data integration with AI to predict and prevent safety incidents	SGN	58,729
Gas Distribution	Digital Twin - Exploring the societal, operational, and cross industry whole system benefits on the Gas Distribution Network Development of a digital twin to support strategic decision making to optimise operations under different scenarios	SGN	119,127
Gas Distribution	Intelligent Gas Grid Using weather data and AI to autonomously and intelligently monitor and control network gas pressure	SGN	116,401
Gas Distribution	Digital Twins: Exploring the commercial, societal and operational benefits on green hydrogen Projects Exploring the benefits that could be derived from the deployment of a digital twin on a green hydrogen use case	SGN	124,265
Gas Distribution	Thermal imagery analysis - Condition assessment fluid and pressure Thermal imagery to identify gas losses and leakages to improve safety for hydrogen usage	NGN	78,182
Gas Distribution	Digital Platform for Leakage Analytics Exploring new methods to capture and analyse data to reduce gas network leakages	Cadent	114,576
Gas Distribution	CEV: Critical factors for the adoption of smart homes for energy efficiency and implications for consumers and providers Investigating the enablers and barriers to adoption, and network impacts and benefits of smart home technology	NGN	55,395

Table 3: Heat Projects Approved for Discovery Phase SIF Funding

Network type	Project title and description[7]	Lead applicant	Initial Net Funding Required (£)
Electricity Transmission	Flexible Heat *Assessing thermal storage technologies with smart control for domestic flexibility*	SPT	137,858
Electricity Transmission	HEAT BALANCE *Understanding the role large scale thermal storage can provide for heat pump flexibility*	SPT	125,695
Gas Transmission	Ch4rge - Emissions Capture *Investigating a viable solution for compressor machinery train to capture gas losses from hydrogen for reinjection into the network*	NGGT	144,782
Gas Transmission	Hydrogen Barrier Coatings for Gas Network Assets *Evaluating coating for pipes to prevent accelerated wear and tear from hydrogen transmission*	NGGT	74,706
Gas Distribution	Velocity Design with Hydrogen *Assessing different techniques to improve impacts of hydrogen pressure on the pipe network*	SGN	55,542

Table 4: Zero Emission Transport Projects Approved for Discovery Phase SIF Funding

Network type	Project title and description[8]	Lead applicant	Initial Net Funding Required (£)
Electricity Transmission	A Holistic Hydrogen Approach to Heavy Duty Transport (H2H)	SPT	108,238

[7] Full Project descriptions are available in the main body of the Recommendations Report
[8] Full Project descriptions are available in the main body of the Recommendations Report

	Exploring energy options for decarbonisation of the rail system		
Electricity Transmission	Resilient and Flexible Railway Multi-Energy Hub Networks for Integrated Green Mobility Exploring decarbonised rail as a source of flexibility through integration	SPT	118,780
Gas Transmission	HyNTS Deblending Exploring options for different hydrogen blends to allow for refuelling stations directly on the network	NGGT	148,141
Gas Distribution	NAVIGATION Developing a multi-disciplinary solution for EV charging hubs which could be supported by gas networks	SGN	149,724
Gas Distribution	Rail Decarbonisation Planning Development of an overarching implementation strategy and a methodology to decarbonise rail	NGN	113,594
Gas Distribution	Multimodal Hydrogen Transport Refuelling Study Evaluation of the potential for using hydrogen for HGVs	NGN	89,445
Gas Distribution	HyPark Development of an intelligent EV charging hub supported by the gas network for constrained urban areas	WWU	150,000

1. Introduction

Context and related publications

1.1. The SIF is a funding mechanism under the RIIO-2 price control which seeks to target innovation funding on four strategic issues facing networks – whole system integration, data and digitalisation, zero emissions transport and heat. This fund is for the Electricity System Operator, Electricity Transmission, Gas Transmission and Gas Distribution sectors.

1.2. The SIF aims to find and fund ambitious, innovative Projects with the potential to accelerate the transition to net zero. These Projects should help shape the future of the gas and electricity networks and succeed commercially where possible.

1.3. Ofgem is the decision-maker in relation to the SIF, and it is being delivered in partnership with Innovate UK, part of UK Research and Innovation (UKRI). The objective for the SIF is to help transform the UK into the 'Silicon Valley' of energy, making the UK the best place for high potential businesses to grow and scale in the energy market.

1.4. In July 2021, Ofgem launched four Innovation Challenges as part of the round 1 Discovery Phase of the SIF.[9]

1.5. This Funding Decision confirms which Projects will be taken forward within the round 1 Discovery Phase.

The role of UKRI

1.6. UKRI's role is to deliver the SIF in line with the SIF Governance Document - administering the funding programme, monitoring the delivery of Projects, making recommendations to Ofgem on operational matters, supporting third-party innovators and, where possible, supporting successful Projects to become business as usual activities.

1.7. Using UKRI's expertise and extensive business and academic networks, the SIF programme will tap into the best of UK and international innovation whilst also aligning

[9] https://www.ofgem.gov.uk/publications/strategic-innovation-fund-innovation-challenges

with other public innovation funding, delivering measurable benefits to network users and consumers.

1.8. The appointment of UKRI as innovation partner is confirmed by a commercial services agreement which underpins the partnership between Ofgem and UKRI.

Purpose of this document

1.9. This document sets out our decisions on the Applications we received. Alongside this decision we are publishing:

- The recommendations report from the Expert Assessors, which contains insights from unsuccessful Applications;
- The SIF Project Directions, specifying the conditions imposed on each successful Project; and
- Links to where fuller information regarding the funded Projects can be found.

How the Strategic Innovation Fund works

Application process

1.10. Applications for SIF Innovation Challenges are made via UKRI's Innovation Funding Service (IFS) Portal.[10]

1.11. The Funding Party applies to receive SIF Funding for each Project Phase. The Innovation Challenge Documentation sets out the requirements for the eligible scope of, the maximum amount of SIF Funding available for, and the length of each Project Phase. The Innovation Challenge Documentation also includes the address of the secure online portal where Applications can be submitted.

[10] The Application process was designed, managed and delivered by UKRI using their IFS platform. Each of the eligible networks were required to submit their Project proposal by responding to 10 Application questions in IFS to demonstrate how their proposal met the Eligibility Criteria for each of the four Innovation Challenges: heat, zero emission transport, whole system integration, and data and digitalisation.

1.12. Each Application was assessed by Expert Assessors against the Eligibility Criteria set out in chapter 2 of the SIF Governance Document. The Authority, taking into account the Expert Assessors' assessment and recommendations, decides which Projects to award SIF Funding.

1.13. The Funding Party for each Project was required to submit answers in relation to defined question categories alongside supporting information set out in chapter 4 of the SIF Governance Document. Responses to the questions were used to determine whether the Project meets the Eligibility Criteria identified in chapter 2, upon which the success of the Application depends.

Assessment process

1.14. The Assessment of each Project was undertaken by Expert Assessors, with support from UKRI. The Expert Assessors assessed each Application on its compatibility with the Eligibility Criteria detailed in chapter 2 of the SIF Governance document, evidenced by responses to the Application questions discussed in chapter 4 of the SIF Governance Document.

Decision making process

1.15. A final decision was made by the Authority based on the Expert Assessors' recommendation and, where applicable, interview and clarification responses from the Funding Party.

1.16. In circumstances where we believe greater clarity or additional information could be provided by a Funding Party to mitigate issues identified in an Application, we seek to use Project-specific conditions.[11] Our decision on each Project contained within this document indicates our intent regarding Project-specific conditions, however we note that the exact wording of the Project-specific conditions may vary slightly within the SIF Project Directions that they are given effect within.

[11] Project-specific conditions are implemented in the SIF Project Directions. Note that project-specific conditions within SIF Project Directions start as condition number 3. Project-specific condition 1 and 2 are common in all SIF Project Directions.

1.17. Projects which did not meet the Eligibility Criteria (outlined in chapter 2 of the SIF Governance Document) have not been awarded SIF Funding.

1.18. UKRI and Ofgem do not intend to name Projects or organisations that were unsuccessful, in order to protect their IPR and innovations. However, some insights such as the overall number of unsuccessful Applications or the technical focus area is published within the Expert Assessor's recommendation report.

1.19. We have provided feedback directly to Funding Parties as to why any Project were unsuccessful.

Differences between Project Phases

1.20. As per the SIF Governance document, the Discovery Phase is the initial Project Phase, focussing on enhancing the understanding of the Problem to be solved. It also facilitates a common understanding of what energy consumers and network users need from the innovation and identifies any constraints which may impact on solution of the problem and options for the management of those constraints.

1.21. The Alpha Phase of a Project focuses on preparing and testing the different solutions to the problem identified during the Discovery Phase, ahead of any future large-scale demonstration of the Project.

1.22. The Beta Phase of a Project focuses on the deployment of the solution to the problem. The duration of the Beta Phase will depend on the scale and complexity of the solution deployed.

2. Decision on Innovation Challenge: whole system integration

Section Summary

This chapter contains our decision on Applications in response to the whole system integration Innovation Challenge. We have decided to fund 11 Projects, with a total of £1,306,748.00 of SIF Funding being distributed. This consists of 4 gas Projects and 7 electricity Projects.

Summary of the Innovation Challenge

2.1. Achieving a Net-Zero economy is a system transformation challenge consequent upon the Government's Net-Zero strategy. As recently highlighted by the Council for Science and Technology[12], clearer understanding of the entirety of the system will enable the identification of multiple intervention points required to achieve this goal.

2.2. The energy system is made up of a complex range of activity across networks, markets, supply, and demand. A range of organisations play crucial roles in managing different parts of this system. Working across traditional boundaries can create opportunities for better integration of services to consumers, who typically experience the system as a whole. Innovative whole system solutions are required to optimise the system, reducing costs whilst enhancing the experience of consumers.

2.3. Taking a whole system approach to innovation means considering the full range of opportunities, risks, and interdependencies that exist across the full energy system to integrate and optimise them in a way that best serves the consumers. This can deliver greater benefits around cost, emissions, and services to consumers, whilst also maximising economic growth.

2.4. Networks can maximise outcomes by working collaboratively with each other and with a wide variety of system stakeholders to develop innovations that supports whole system approaches across energy supply, demand, markets and networks. This will enable new

12 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/910446/cst-net-zero-report-30-january-2020.pdf

products, services, and processes to emerge and ensure satisfaction for a wide range of consumers.

2.5. Further information on the whole system integration Innovation Challenge can be found on the IFS portal.[13]

2.6. A total of 16 proposals were submitted to UKRI through the IFS portal in relation to this challenge by the closing deadline of 11am 17th November 2021.

Summary of our decisions

2.7. We have decided to fund 11 Projects under the whole system integration Innovation Challenge.

2.8. In total, subject to the fulfilment of conditions, we are awarding £1,306,748.00 of SIF Funding to gas and electricity SIF Projects under the whole system integration – Discovery Round 1 Innovation Challenge.

2.9. These funded Projects are:

- Network-DC;
- Green Hydrogen Injection into the NTS;
- HyNTS Compression;
- Nuclear Net-Zero Opportunities (N-NZO);
- INCENTIVE - Innovative Control and Energy Storage for Ancillary Services in Offshore Wind;
- Asset Reuse and Recovery Collaboration (ARRC); Fast Flex; Crowdflex: Discovery;
- Excess gas turbine energy generation;
- SEGIL - Sustainable Electrical Gas Insulated Lines; and
- SCADENT - SuperConductor Applications for Dense Energy Transmission.

[13] https://apply-for-innovation-funding.service.gov.uk/competition/1011/overview

Table 5: Summary of funded Projects - Innovation Challenge: whole system integration

Total number of Projects funded:	11 Projects funded
Gas Projects funded:	4
Gas Projects total funding:	£502,966.00
Electricity Projects funded:	7
Electricity Projects total funding:	£803,785.00
Total SIF Funding awarded (£):	£1,306,748.00
Total value of partner contributions (£):	£221,876.29

2.10. We have set out our assessment of individual Projects and our decisions in Annex 1.

3. Decision on Innovation Challenge: data and digitalisation

Section Summary

This chapter contains our decision on Applications in response to the data and digitalisation Innovation Challenge. We have decided to fund 17 Projects, with a total of £1,840,436.00 of SIF Funding being distributed. This consists of 11 gas Projects and 6 electricity Projects.

Summary of the Innovation Challenge

3.1. This section covers the requirements and assessment of Applications received in response to the data and digitalisation Innovation Challenge.

3.2. The complexity and scale of achieving Net-Zero will require greater provision of reliable information across parties for system planning, operation and integration of technologies. The government's Energy White Paper[14] emphasised the need for a modern digital infrastructure to underpin energy markets and optimise physical networks.

3.3. As the move towards a Net-Zero energy system accelerates, network consumers will require simplified and accessible digital products, processes and services that can improve their user experience. Data and digital initiatives are already beginning to show the potential to improve the efficiency of energy networks whilst making it easier for third parties to interact with and innovate for the energy system.

3.4. Digitalisation of energy network activities will contribute to better coordination, planning and network optimisation. These will be required for a smarter, more flexible energy system which is underpinned by a larger proportion of intermittent renewables, alongside low carbon fuels.

3.5. Greater quality, interoperability, and availability of information from across the energy system is increasingly needed to support digital innovation. Delivering the digital infrastructure which improves the provision of information across the energy system will

[14] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/945899/201216_BEIS_EWP_Command_Paper_Accessible.pdf

act as a key enabler to delivering strategic outcomes posed in other challenges. These include, but are not limited to, decarbonising heat and transport and integrating a greater proportion of flexible demand and generation.

3.6. Further information on the data and digitalisation Innovation Challenge can be found on the IFS portal.[15]

3.7. A total of 23 proposals were submitted to UKRI through the IFS portal in relation to this challenge by the closing deadline of 11am 17th November 2021.

Summary of our decisions

3.8. We have decided to fund 17 Projects under the Data and Digitalisation Innovation Challenge.

3.9. In total, subject to the fulfilment of conditions, we are awarding £1,840,436.00 of SIF Funding to gas and electricity SIF Projects under the Data and Digitalisation – Discovery Round 1 Innovation Challenge.

3.10. These funded Projects are:

- Gas Analyser Systems for Hydrogen Blends;
- Hydrogen Metering;
- Thermal imagery analysis - Condition assessment fluid and pressure;
- HyNTS Pipeline DataSet;
- Predictive Safety Interventions;
- Digital Platform for Leakage Analytics;
- Digital Twin - Exploring the societal, operational, and cross industry whole system benefits on the Gas Distribution Network;
- Intelligent Gas Grid;
- Digital Twins: Exploring the commercial, societal and operational benefits on green hydrogen Projects;
- CEV: Critical factors for the adoption of smart homes for energy efficiency and implications for consumers and providers;
- Gas Networks Interoperable Digital Twin;

[15] https://apply-for-innovation-funding.service.gov.uk/competition/1009/overview

- Eye in the Sky - Utilising satellite data to improve grid resilience in emergency;
- NIMBUS - Network Innovation and Meteorology to BUild for Sustainability;
- EN-twin-e;
- Virtual Energy System;
- Predict4Resilience; and
- Digi-GIFT.

Table 6: Summary of funded Projects - Innovation Challenge: data and digitalisation

Total number of Projects funded:	17 Projects funded
Gas Projects funded:	11
Gas Projects total funding:	£1,847,436.00
Electricity Projects funded:	6
Electricity Projects total funding:	£806,619.00
Total SIF Funding awarded (£):	£1,840,436.00
Total value of partner contributions (£):	£75,837.29

3.11. We have set out our assessment of individual Projects and our decisions in Annex 2.

4. Decision on Innovation Challenge: zero emission transport

Section Summary

This chapter contains our decision on Applications in response to the zero emission transport Innovation Challenge. We have decided to fund 7 Projects, with a total of £877,922 of SIF Funding being distributed. This consists of 5 gas Projects and 2 electricity Projects.

Summary of the Innovation Challenge

4.1. Consumers need reliable, cost-effective transportation that is readily available when demanded. Personal transportation preferences are shifting as new trends emerge in transport. These include e-mobility, new public transportation links, as well as national and international changes in supply chains for goods.

4.2. Strategic targets for deep decarbonisation of the transport sector also exist, which have significant implications for electricity networks and potential implications for gas networks.

4.3. The networks will need to be prepared to enable large scale deployment of battery electric vehicles (EVs) while keeping costs to consumers affordable and equitable.

4.4. The introduction of hydrogen-fuelled heavy goods vehicles is likely to create novel technical challenges across roads, rail, and ports, such as effectively managing integration of electrolysis across the electricity networks and hydrogen transportation infrastructure.

4.5. Further information on the zero emission transport Innovation Challenge can be found on the IFS portal.[16]

4.6. A total of 11 proposals were submitted to UKRI through the IFS portal in relation to this challenge by the closing deadline of 11am 17th November 2021.

[16] https://apply-for-innovation-funding.service.gov.uk/competition/1012/overview

Summary of our decisions

4.7. We have decided to fund 7 Projects under the zero emission transport Innovation Challenge.

4.8. In total, subject to the fulfilment of conditions, we are awarding £877,922 of SIF Funding to gas and electricity SIF Projects under the zero emission transport – Discovery Round 1 Innovation Challenge.

4.9. These funded Projects are:

- Rail Decarbonisation Planning;
- Multimodal Hydrogen Transport Refuelling Study;
- HyNTS Deblending;
- HyPark;
- NAVIGATION;
- A Holistic Hydrogen Approach to Heavy Duty Transport (H2H); and
- Resilient and Flexible Railway Multi-Energy Hub Networks for Integrated Green Mobility.

Table 7: Summary of funded Projects - Innovation Challenge: zero emission transport

Total number of Projects funded:	7 Projects funded
Gas Projects funded:	5
Gas Projects total funding:	£650,904.00
Electricity Projects funded:	2
Electricity Projects total funding:	£227,018
Total SIF Funding awarded (£):	£877,922
Total value of partner contributions (£):	£75,660.24

4.10. We have set out our assessment of individual Projects and our decisions in Annex 3.

5. Decision on Innovation Challenge: heat

Section Summary

This chapter contains our decision on Applications in response to the heat Innovation Challenge. We have decided to fund five Projects, with a total of £538,583 of SIF Funding being distributed. This consists of three gas Projects and two electricity Projects.

Summary of the Innovation Challenge

5.1. Consumers need improved accessibility to low-carbon heating options which remains reliable and affordable in comparison to existing solutions. For many domestic, commercial, and industrial end consumers, heat represents a significant proportion of their energy bills.

5.2. Heating accounts for almost over a third of the UK's overall greenhouse gas emissions and to date has proved challenging to decarbonise. Presently most heating requirements are served by natural gas or oil.

5.3. Heat networks, electric and hybrid heat pumps, hydrogen, biofuels, and other technologies have potential to contribute to the heat transformation necessary to meet national 2030 and 2050 emissions targets.

5.4. It is likely that the best low-carbon heat choices will be dependent on local characteristics such as local heat sources, or infrastructure capacity, and consumer preferences.

5.5. In all scenarios, the energy networks will play a crucial role in delivering the infrastructure required to support the decarbonisation of heat.

5.6. Further information on the heat Innovation Challenge can be found on the IFS portal.[17]

5.7. A total of six proposals were submitted to UKRI through the IFS portal in relation to this challenge by the closing deadline of 11am 17th November 2021.

[17] https://apply-for-innovation-funding.service.gov.uk/competition/1010/overview

Summary of our decisions

5.8. We have decided to fund 5 Projects under the heat Innovation Challenge.

5.9. In total, subject to the fulfilment of conditions, we are awarding £538,583 of SIF Funding to gas and electricity SIF Projects under the heat – Discovery Round 1 Innovation Challenge.

5.10. These funded Projects are:

- Ch4rge – Emissions Capture;
- Hydrogen Barrier Coatings for Gas Network Assets;
- Flexible Heat;
- Heat Balance; and
- Velocity Design with Hydrogen.

Table 8 Summary of funded Projects - Innovation Challenge: Heat

Total number of Projects funded:	5 Projects funded
Gas Projects funded:	3
Gas Projects total funding:	£275,030.00
Electricity Projects funded:	2
Electricity Projects total funding:	£263,553.00
Total SIF Funding awarded (£):	£538,583
Total value of partner contributions (£):	£29,283

5.11. We have set out our assessment of individual Projects and our decisions in Annex 4.

6. Next steps

Funding of selected Projects

6.1. At the same time as issuing this decision, Ofgem has issued SIF Project Directions in relation to each successful Project, explaining the terms that the Funding Party has to comply with as a condition of receiving SIF Funding.

6.2. Ofgem will shortly issue a SIF Funding Direction to specify the amount of money to be recovered from network customers, through their network charges, to fund the Eligible SIF Projects.

6.3. The expectation is for funded Projects to start on 1 March 2022, each according to the conditions in its SIF Project Direction, SIF Funding Direction and the SIF Governance Document.

Monitoring and evaluation of Projects

6.4. All Projects receiving SIF Funding will be subject to review and, for this purpose, be allocated a monitoring officer who will be employed by UKRI.

6.5. During Project delivery, Ofgem, with the assistance of information gathered by the monitoring officer, will monitor Projects. The monitoring officer will review each Project's progress against the scope, timeline, deliverables, milestones, and budget agreed in the SIF Project Direction. Monitoring will support the identification of potential problems, and the assessment of whether Projects have met the conditions attached to progression to the next Project Phase. For further details on Project monitoring, see chapter 6 of the SIF Governance Document.

Future phases of Innovation Challenge

6.6. A timeline detailing how funded Projects will move through the SIF process is published in Table 6 below. All Projects wanting to proceed to the Alpha Phase and Beta Phase after successfully completing a Discovery Phase will need to submit a new Application.

Table 9: Timeline for Round 1 Innovation Challenge

Phase	Date	Item
Discovery	1 March 2022	Discovery Phase round 1 launch
Discovery	2 and 7 March 2022	Launch webinars
Discovery	30 April 2022	End of Discovery Phase round 1
Discovery	30 April 2022	End of Discovery Phase report due
Alpha	22 April 2022	Applicant briefing
Alpha	May 2022 – February 2023	Alpha Phase
Beta	TBD – Early 2023	Beta Phase competition opens for Applications.

Annex 1: Application assessment - Innovation Challenge: whole system integration

Chapter 2 of this document provides detail about the scope of the Innovation Challenge: whole system integration, as well as summarising the total number of Projects funded and total value of SIF Funding awarded.

This annex details our assessment and decisions on Applications submitted in response to that Innovation Challenge. Our assessment of each Project is set out within:

- Pages 28-41 set out our assessment of each gas Project that has been selected for funding, together with our decision.

- Pages 42-46 set out our assessment of each gas Project that has not been selected for funding, together with our decision. These tables are however redacted from our published document, in order to protect the IPR and innovations of unsuccessful projects.

- Pages 47-75 set out our assessment of each electricity Project that has been selected for funding, together with our decision.

- As all electricity Projects submitted under this challenge were selected for funding, no electricity Projects were redacted from the published document.

Gas Projects selected for funding

Green Hydrogen Injection into the NTS

Table 10: Green Hydrogen Injection into the NTS Project Costs

Cost type	Cost
Total eligible costs	£114,652
Total contribution	£0.00
Total SIF Funding requested	£114,652

Table 11: Project Partner funding breakdown for Green Hydrogen Injection into the NTS

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
National Grid Gas Plc	£12,230.00	£0.00	£12,230.00
CNG Services Ltd	£48,123.82	£0.00	£48,123.82
Element Energy Ltd	£45,327.50	£0.00	£45,327.50
Centrica Plc	£4,800.00	£0.00	£4,800.00
Scottish and Southern Energy Power Distribution Limited	£4,170.00	£0.00	£4,170.00

Project description

Establishing a framework for green hydrogen injection into the gas grid.

Summary of Expert Assessors' feedback

Assessors identified that the Problem to be addressed has been well articulated and a reasonable articulation of how significant environmental and system benefits could be achieved through the delivery of the Project. It was broadly recognised that the proposed Project team was strong, but that the proposal conveyed limited enthusiasm and could aim to be more ambitious, perhaps by investigating how benefits will be realised to the end consumers and consumers of the network.

The Expert Assessor's feedback is more fully summarised in the recommendations report published alongside this SIF Funding Decision.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
As part of its end of Phase Report, the Funding Party must evidence review of the work completed by IGEM on gas quality and blending and the evidence presented through the BEIS Hydrogen Business Models consultation.

Condition 4
The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

Broadly, Ofgem agrees with the assessors that this idea is well described and aligns with the competition scope. It involves network innovation and could lead to increased green hydrogen blends in the gas network. Additionally, this Project could help to inform other future hydrogen network decisions.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The Funding Party has clearly explained a range of potential benefits of blending H2 into the NTS and the proposal on the benefits at this system level. The Funding Party has considered a good range of positive impacts focussed primarily on carbon savings. Furthermore, although the proposed benefits are considerable there needs to be consideration of how a successful Project would further progress to full decarbonisation of the gas grid, in order to make the solution commensurate with Net-Zero national and local policies. As a result, a Project-specific condition was imposed to review the work completed by IGEM on gas quality and blending and the evidence presented through the BEIS Hydrogen Business Models consultation to ensure learnings can be adopted and consumer benefits can be realised.

Eligibility Criterion 3: Projects must involve network innovation.

The Project has been clearly explained based on 3 well-described workstreams and is clearly focussed on network innovation, namely injection of green hydrogen into the gas transmission network.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The Funding Party has provided a clear description of the approach to ensuring the proposed solution becomes business as usual within their network and across the other networks. Route to market is well considered, with a vision for the progression through Alpha Phase and Beta Phase Projects and pull through to implementation in the gas grid. Downstream benefits for various stakeholders are described, including informing future BEIS/ Ofgem considerations which mitigates any risks to the disruption of competitive markets, as they will be the gatekeepers to policy decisions. As such, a Project-specific condition was imposed for the Funding Party to participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The Funding Party sufficiently summarised why the Project is suitable for SIF Funding, and it was assessed that this Project topic is a significant problem that needs addressing. Additional Phases could examine other issues limiting H2 deployment at scale in conjunction with injection, to take a more innovative whole systems perspective.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

A wide range of suitable stakeholders have been described, including how they will interface with the Project. The skills appendix and video provide a clear explanation of the role each Project Partner would play in the wider Project and the Project summary and postcard outline the expected short and longer-term outcomes of the follow-on phases of the proposed Project.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The estimated costs were assessed to be appropriate for the work described. The applicant has outlined the concessions that Project Partners have offered in terms of rates and the potential value to the environment and government targets as value for money arguments.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

Ofgem agrees with the assessors that, on the whole, a good and sufficient response for the Project plan work packages, timeframes and risk register were provided for successful delivery in a Discovery Phase.

HyNTS Compression

Table 12: HyNTS Compression Project Costs

Total eligible costs	£155,332
Total contribution	£8,673
Total SIF Funding requested	£146,659

Table 13: Project Partner funding breakdown for HyNTS Compression

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
National Grid Gas Plc	£38,389.00	£0.00	£38,389.00
Siemens Power Generation Ltd	£57,825.00	£8,673.75	£49,151.25
DNV Services UK Limited	£50,182.50	£0.00	£50,182.50
ITM Power Plc	£3,000.00	£0.00	£3,000.00
Scotia Gas Networks Ltd	£3,056.04	£0.00	£3,056.04
Northern Gas Networks Limited	£2,880.00	£0.00	£2,880.00

Project description

Exploring if current assets and methods of working are suitable for hydrogen compression.

Summary of Expert Assessors' feedback

The Expert Assessors felt that evaluating the suitability of existing natural gas compression systems for hydrogen duty was a suitably important issue to address and will provide evidence for the role of zero carbon gases in the transmission network and for system operation. There is an overarching view that the capabilities of the consortia are strong, and the Project plan is robust. The proposal has been well constructed and gives confidence of a high standard of delivery.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application

Condition 3
Prior to Project commencement, the Funding Party must provide to Ofgem and UKRI evidence that the Project does not duplicate any work included in the existing NIC Project of NGGTGN04.

Condition 4
The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The main theme of the Project is set out well. The Application was easily understood and the problem of how the Project could address the issues that the transition to hydrogen from natural gas for the operation of the gas networks might create. The core idea of the Project is well described and addresses the competition scope.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The benefits have been identified and are clearly described and supported by metrics. These are principally around enabling decarbonisation of the transmission gas network, but also in reducing the costs of transforming the network. Costs which would ultimately be borne by the consumer. There are a good range of benefits presented and they appear potentially achievable. An additional benefit highlighted in the Application is the provision of evidence for policy decisions around use of hydrogen in the gas networks.

Eligibility Criterion 3: Projects must involve network innovation.

The Project summary provided a clear and concise indication that this Project was focussed upon innovation for the energy networks.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The value proposition to networks and other stakeholders in the UK and internationally has been outlined. There is an intention to progress towards commercialisation of the solution

and we agree with the assessors when they stated they felt that this would not undermine the development of competitive markets.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

A comprehensive understanding of similar innovations and alternative approaches is presented. There is a strong justification as to why this Project is innovative in comparison to similar Projects.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The Application describes the elements of participation from the wide range of Project Partners/ sub-contractors and this blend of stakeholders in the Project meets the requirements of the competition very well.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs were seen as reasonable and suitable for successful delivery of the Project and that the Project represents value for money. It was noted that a contribution-in-kind is being made by one of the Project Partners, offering additional value for money.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

We agree with the assessors that the Project plan, milestones and risks are well thought through and described. The methodology is clear and is likely to deliver successful Project outcomes. It was commented that the inclusion of the Alpha Phase and Beta Phase in the RASIC table is particularly helpful in giving foresight of longer-term responsibilities between Project Partners.

Nuclear Net-Zero Opportunities (N-NZO)

Table 14: Nuclear Net-Zero Opportunities (N-NZO) Project Costs

Total eligible costs	£116,430
Total contribution	£8,936
Total SIF Funding requested	£107,494

Table 15: Project Partner funding breakdown for Nuclear Net-Zero Opportunities

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
National Grid Gas Plc	£9,039.00	£0.00	£9,039.00
National Grid Electricity Transmission Plc	£4,600.00	£0.00	£4,600.00
Northern Gas Networks Limited	£2,880.00	£0.00	£2,880.00
Rolls Royce Plc	£3,298.82	£0.00	£3,298.82
URENCO Limited	£2,657.48	£0.00	£2,657.48
Frazer-Nash Consultancy Limited	£89,354.86	£8,934.49	£80,419.37
National Grid Electricity System Operator Limited	£4,600.00	£0.00	£4,600.00

Project description

Defining a set of end-user scenarios for low carbon hydrogen demand alongside nuclear generation.

Summary of Expert Assessors' feedback

The assessors felt that there were reasonable opportunities for understanding siting options/constraints for future Advance Nuclear Technology (ANT) deployment, and that these could be important to underpin their eventual optimal roll out from an energy networks perspective. The assessors had concerns that the focus of the Project should be more orientated towards the energy networks, and that benefits of this investment must be realised for energy network users. This must be evidenced more strongly if the Project is to

proceed to future stages. There are split opinions on whether this Project is timely, or would be more appropriate later, closer to Advanced Modular Reactor deployment.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

As part of its end of Project Phase report, the Funding Party must evidence it has reviewed and built upon the work completed under the UKRI Low Cost Nuclear Challenge to minimise duplication.

Condition 4

The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Condition 5

As part of its end of Project Phase report, the Funding Party must clearly demonstrate how benefits will be realised for energy network consumers/users.

Condition 6

As part of its end of Project Phase report, the Funding Party must evidence consideration for additional aspects around Advanced Nuclear Technologies deployment, such as use of waste heat for district heating, public acceptance and electricity system dispatch requirements.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The scope of the Project was enough to meet the requirements of the Innovation Challenge, with a focus on the whole system benefits of considering ANTs alongside energy network opportunities. However, like some of the assessors, we felt that the proposal Project lacked clarity at times. The focus is sometimes placed upon an analysis of future demand centres to be served by transmission networks and optimal siting from an energy networks perspective, whilst at other times focussing on the technical design of ANTs. The latter was considered less suitable for a Strategic Innovation Fund Project.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The Funding Party identified and outlined environmental benefits of the Project in facilitating an economic move to nuclear produced hydrogen as part of the energy supply. Like the assessors, we generally agreed that the benefits from the proposed Project will be to achieve a better understanding of optimal siting locations based on scenario modelling and existing infrastructure. However, they did feel that the impact on the energy networks, and consequently the benefits to consumers were unclear and should be of increased focus if successful in the Discovery Phase. As such, we have imposed a project-specific condition on the Funding Party to clearly demonstrate in its end of Project phase report how benefits will be realised for energy network consumers/users.

Eligibility Criterion 3: Projects must involve network innovation.

We support the whole system approach to considering energy network interfaces with an energy supply technology, and noted that the wholistic approach to the Project could assist planning for timely integration of ANTs, whilst minimising the of cost to end user, meeting energy demands and stepped capacity increases.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

Like the assessors, we felt that the appropriate partnerships were represented in the Project to evaluate the route to market and that value propositions to each of the Project Partners were understandable from the response. We do not have concerns regarding the Project undermining competitive markets. The broad observation was that this was an early-stage feasibility study and pathway to enrolment as business as usual, particularly regarding the network aspects, was unclear and needs more development if successful.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The proposal is looking at the novel integration of an early-stage technology (advanced nuclear technologies) that spans the electrical and gas sectors. This is viewed as an innovative area and a focus that has not previously been considered within the UK, although Projects delivered internationally have been referenced by the applicants.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

We supported the whole system approach to considering energy network interfaces with an energy supply technology, and noted that the wholistic approach to the Project could assist planning for timely integration of advanced nuclear technologies, whilst minimising the of cost to end user, meeting energy demands and stepped capacity increases.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

Like the assessors, we viewed costs as being consistent with those expected in the market and that the Project represented sufficient value for money.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan, risk register and methodology were consistent with the scope of the proposed work and sufficient, although the scope of work is considered to be ambitious for the Project's shorter duration. Close and effective Project management will be required to keep the Project on projected timelines.

Excess Gas Turbine Energy Generation

Table 16: Excess gas turbine energy generation Project Costs

Total eligible costs	£141,902
Total contribution	£7,741
Total SIF Funding requested	£134,161

Table 17: Project Partner funding breakdown for Excess Gas Turbine Energy Generation

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
Northern Gas Networks Limited	£2,880.00	£0.00	£2,880.00
Northern PowerGrid Limited	£1,800.00	£0.00	£1,800.00
Revolution Turbine Technologies Ltd	£77,411.23	£7,741.12	£69,670.11
Digital Catapult	£59,811.00	£0.00	£59,811.00
Stockton & District Advice & Information Service	£0.00	£0.00	£0.00

Project description

Exploring if energy generated from gas losses can be used to generate energy for storage or feeding back into the network.

Summary of Expert Assessors' feedback

The assessors found this to be an interesting Project that identifies some potential areas of innovation which could impact positively on the whole energy system. However, the extent of the benefits, particularly to the consumer, is unclear at this stage. Evaluation of potential benefits should be carried out in more detail during Discovery Phase. The Project planning and management was reasonable but could be more robust and detailed as it moves into delivery. Generally, the approach to learning and applying technology with successful use cases from different sectors was welcomed.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
As part of its end of Project Phase report, the Funding Party must evaluate and clearly demonstrate how the benefits from the Project will be realised for energy network consumers and users.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The applicant clearly described that the big idea is to generate electricity through the recovery of excess gas pressure in the distribution grid. We think that the proposal meets the criteria of the Innovation Challenge through whole systems working across different network types.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

A reasonable summary of potential benefits includes positive environmental, economic and social impacts. Benefits are expected to be realised by consumers through reduced costs, although the scale and ambition of those benefits was unclear and should be better evidenced if successful in future phases. As such, we imposed a project-specific condition on the Funding Party to clearly demonstrate in its end of Project Phase report how the benefits from the Project will be realized for energy network consumers and users.

Eligibility Criterion 3: Projects must involve network innovation.

All elements of the Project summary were well presented and provided consistent information and summary of the Project. The Project endeavours to apply new technical approaches to the energy networks, and therefore is focussed on network innovation.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The potential solution would be adapted from the offshore oil and gas sector and investigated for gas networks use. Commercialisation and Application would be led through

an industrial Project Partner and supported by the Digital Catapult. This provides a reasonably clear route to market. More description could have been provided to explain how learnings would be disseminated, supporting additional rollout. The Project is not viewed to have a risk to undermining competitive markets.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.
The locations where similar technology has been piloted in the oil and gas sector were clearly outlined. There was clear acknowledgement that, although a relatively mature technological approach, this is a new Application of the technology in a different environment. References to similar technologies and alternative approaches to the Problem were referenced. We agree with the assessor's assessment that this represents a novel approach which is innovative.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The organisations directly involved in Project delivery are appropriate and include consumer representation, which is welcomed.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project budget and grant request for each Project Partner align with the competition guidance. The balance of costs across Project Partners appears reasonable given their roles on the Project. An additional contribution is provided by a Project Partner which represents additional value for money to the consumer.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Discovery Phase work packages and milestones were sufficiently summarised and timeframes were illustrated in the Project plan, which is clear but simplistic. The methodology described indicates the Project could progress in a timely manner.

Gas Projects not selected for funding

Table 18: [REDACTED]

Table 19: [REDACTED]

Table 20: [REDACTED]

Table 21: [REDACTED]

Table 22: [REDACTED]

Electricity Projects selected for funding

Network-DC

Table 23: Network-DC Project Costs

Total eligible costs	£150,588
Total contribution	£8,300
Total SIF Funding requested	£142,288

Table 24: Project Partner funding breakdown for Network-DC

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
Scottish Hydro Electric Transmission Plc	£124,300.01	£0.00	£124,300.01
National Grid Electricity System Operator Limited	£4,910.00	£0.00	£4,910.00
Renewable UK Association	£3,750.00	£3,750.00	£0.00
The Carbon Trust	£4,200.00	£0.00	£4,200.00
Transmission Investment Services Limited	£4,800.00	£0.00	£4,800.00
National Grid Interconnector Holdings Limited	£4,550.00	£4,550.00	£0.00
The University of Edinburgh	£4,077.86	£0.00	£4,077.86

Project description

Developing and testing DC circuit breakers for the direct connection of renewable generation onto a DC network in coastal communities to reduce cost and impact.

Summary of Expert Assessors' feedback

Overall the assessors viewed the Application positively. It focusses on an important area of which merits consideration. The Problem is well described and there are considerable

economic, environmental and cost benefits which could be achieved through successful delivery. The approach to planning and delivery is good.

The main concern highlighted is that this should build on previous work nationally and internationally. There needs to be some refinement of the core focus of the Project to progress into the Alpha Phase, for instance whether a technical design for a DC interrupter or economic benefits of a Direct Current Circuit Breaker implementation as part of a DC mesh network is the target outcome. It has been viewed that the greatest benefit could be achieved by coordinating common specifications, developing standards, and creating a market for these solutions. Equipment manufacturers should be brought in to contribute directly in the Project in future phases.

This is a valuable Project to pursue, which is appropriate to be funded through the SIF and which is not covered by other existing regulatory funding mechanisms or programmes. It does however need to explain in fuller detail how the outcomes will ultimately transition directly to a BAU rollout, rather than simply require further ongoing investigation beyond the Beta Phase.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Condition 4

As part of its end of Project Phase report, the Funding Party must set out a clear plan of engagement for Alpha Phase with one or more DC Circuit Breaker equipment manufacturers. Additionally, the Funding Party must also evidence, in its end of Project Phase report, consideration for the role of a DC Circuit Breaker equipment manufacturer in the Project.

Condition 5

As part of its end of Project Phase report, the Funding Party must document a refined Project focus, showcasing how the Project will build on previous work completed internationally and nationally and what the Project's target outcome is.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The Project complies with the Whole System Integration challenge requirements. The idea was viewed as being ambitious with potential for considerable positive outcomes. Like the assessors, we observed that there has been similar work carried out in previous years considering the use of DC Circuit Breakers. The Project could deliver good additionality to this work by leading coordinating activities between the relevant industry Project Partners. Particularly in developing standards, a code of practice, and stimulating creation of a functioning market. Consideration of IP access, and (in later phases) equipment design with manufacturers should be made.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The Application provides reasonable justification of achieving considerable cost savings by avoided investment in network assets to facilitate connecting offshore wind farms. A reasonable qualitative justification was given that this will achieve environmental benefits by improving the economic case for a low carbon electricity generation source. A fuller economic analysis of benefits should be developed in a later Phase of the Project, and this should draw from previous work conducted by industry rather than duplicating existing work.

Eligibility Criterion 3: Projects must involve network innovation.

There is appreciable network innovation involved in the Project with regards to the focus on DC connections and equipment to improve the integration of offshore wind to the electricity transmission network.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The route to market including regulatory and standards changes are sufficiently explained. The dissemination of information and learning, and how this will be incorporated into business as usual, are also well explained. The Project Partner information was appropriate for the ongoing developments. The development of standards and specifications for DCCB appears to be valuable.

Further information on future investment is needed for greater clarity. Particularly for third party suppliers to better establish the value of and route to the market. As such, we have imposed a project-specific condition on the Funding Party to evidence engagement with a DC Circuit Breaker equipment manufacturer, and consideration for the role of a DC Circuit Breaker equipment manufacturer in the Project.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The Applicants' intent is high risk for a risk adverse industry, with potential for substantial UK end-user, government, industry and environmental gains. Any strategic necessity for a European hardware source is not referenced, and some further description of how the learnings from parallel international studies would be incorporated into the Project could have been given.

The existing supply chain will not respond unless there is clear support, and this Project could provide a way forward. Whilst there is focus on UK market requirements, exploitation should be global.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

A diverse stakeholder team is described with linkages to the Project workplan and representation of Project Partners and stakeholders is reasonable for the delivery of the Discovery Phase.

We agree with the assessors that the Funding Party should consider representation from a DC Circuit Breaker (DCCB) equipment manufacturer, and have imposed a project-specific condition for the Project to consider such a manufacturer as part of its end of Project Phase report.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project team is appropriate for task and available timescale. There is good transparency on key staff and associated costs. Considering the potential considerable benefits of the Project, this appears to offer good value for money. The additional Project Partner contribution is welcome as it provides greater benefits for consumers.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan is realistic and well explained. Clear milestones have been identified and the delivery is clear. The risks are appropriate for this Project and the mitigations are appropriate and ongoing. The responsibilities are identified at a high level. The Project is likely to deliver based on this planning.

INCENTIVE – Innovative Control and Energy Storage for Ancillary Services in Offshore Wind

Table 25: INCENTIVE – Innovative Control and Energy Storage for Ancillary Services in Offshore Wind Project costs

Total eligible costs	£136,002
Total contribution	£15,000
Total SIF Funding requested	£121,002

Table 26: Project Partner funding breakdown for INCENTIVE

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
Scottish Hydro Electric Transmission Plc	£32,904.85	£0.00	£32,904.85
The Carbon Trust	£87,555.00	£15,000.00	£72,555.00
National Grid Electricity System Operator Limited	£11,180.00	£0.00	£11,180.00
University of Strathclyde	£4,362.00	£0.00	£4,362.00

Project description

Exploring the opportunity to stabilize the grid through voltage, current and frequency control technologies for offshore wind.

Summary of Expert Assessors' feedback

Assessors felt that this was an excellent proposal with the potential for real innovation. It is taking a well-defined Problem, interruptible generation, and turning it into the potential solution. It is a strong team with a robust Project plan.

It does not appear to address how (and at what cost) these resources may be provided in a low wind system. To strengthen the Project further it should also explore full system responses to maintain stability when wind resources cannot be provided, and the associated potential system costs of doing so.

The methodology of taking a holistic approach to the relevant market, regulatory, commercial, and technical issues to provide a route to market was very welcomed.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Condition 4

As part of its end of Project Phase report, the Funding Party must set out its views on whether the Project's proposed solutions differ significantly from the current mechanisms and services that the Electricity System Operator (ESO) currently operates.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

We agreed with the assessors that the Project has the potential to deliver in line with the SIF objectives. The justification for the Project was well laid out and ambitious and the Project has the potential to deliver significant changes.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The potential benefits are in the three areas of reducing CO2, value for money, and energy network operational benefits. Echoing the assessor's views, we see the potential benefits as highly valuable.

Eligibility Criterion 3: Projects must involve network innovation.

There were significant innovative components to Project's approach of solving grid stability in a highly renewable energy system. The blended approach of technical, market, regulatory, and commercial approaches was novel and offered potential for significant innovation.

There has been R&D effort invested in ways and means to have asynchronous generation emulate the inertia characteristics of conventional synchronous generation in recent years and more clarification will be needed for how this Project will differentiate in its approaches.

As such, we imposed a project-specific condition on the Funding Party to set out in its end of Project Phase report its views on whether the Project's proposed solutions differ significantly from the current mechanisms and services that the Electricity System Operator (ESO) currently operates.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

A prime purpose of the Project is to identify and resolve market, regulatory, commercial, and technical barriers on the route to market and ultimately prove the technology by a trial installation (in the Beta Phase) at an offshore wind farm grid connection transformer station. This would provide a route to market in the UK and potentially world-wide.

In particular, the route to market will be looking at the barriers to private sector investment in implementing the solution. It therefore meets this SIF Eligibility Criteria. Further development of the value proposition for the range of key stakeholders involved, as well as development of standardisation for OEMs, which assessors viewed as a valuable addition.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

Excellent justification has been provided for pursuing and building upon the innovations discovered in other related Projects. The applicant has described how the integration of multiple approaches provides significant innovation in developing a novel approach to solving system problems.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The Project has a suitable range of stakeholders.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs were demonstrated to be fair and costed competitively for the scope of work described, with a comprehensive breakdown of costs. Additional contributions have been committed from the Offshore Wind Accelerator which further adds value to the consumer.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

A good Project plan were provided with clear milestones. The work packages are logical. The risk register is appropriate and the Project approach is particularly good. The approach outlined meets this SIF Eligibility Criteria.

Asset Reuse and Recovery Collaboration (ARRC)

Table 27: Asset Reuse and Recovery Collaboration (ARRC) Project costs

Total eligible costs	£97,687.04
Total contribution	£21,723.93
Total SIF Funding requested	£75,963

Table 28: Project Partner funding breakdown for Asset Reuse and Recovery Collaboration (ARRC)

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
SP Transmission Plc	£7,429.80	£3,184.20	£4,245.60
Frazer-Nash Consultancy Limited	£73,950.30	£7,395.03	£66,555.27
SP Distribution Limited	£3,184.20	£3,184.20	£0.00
Scottish and Southern Energy Power Distribution Limited	£5,162.24	£0.00	£5,162.24
ScottishPower Renewable Energy Limited	£3,184.20	£3,184.20	£0.00
BEAMA Limited	£1,592.10	£1,592.10	£0.00
National Grid Electricity Transmission Plc	£1,592.10	£1,592.10	£0.00
Network Rail Limited	£1,592.10	£1,592.10	£0.00

Project description

Applying circular economy principles to managing high value network assets.

Summary of Expert Assessors' feedback

This proposal has broadly been received positively by assessors, it is considered a novel approach to reuse and recovery of energy network assets. There is clear potential for

environmental and economic benefits to implementing well-functioning circular economy principles and processes. Assessors felt that there were some areas which could have been described in more detail, such as the specific areas of innovation that might be explored and the value proposition to stakeholders and consumers. Overall, it has been viewed as a proposal worthy of exploration.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Condition 4

As part of its end of Project Phase report, the Funding Party must include a high-level assessment of the carbon risk and benefit of its proposed solution or solutions in the Discovery Phase.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

This Project meets the scope of the Innovation Challenge. The idea has been well articulated and could have a considerable impact on the industry. There appears to be an opportunity to look more widely at the whole system nature of this, including across other industries. As such, we imposed a project-specific condition on the Funding Party to include a high-level assessment in its end of Project Phase report of an assessment of the carbon risk and benefit of the Project's proposed solution in the Discovery Phase.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

Success metrics and a range of positive impacts on a range of stakeholders were clearly and well described. Creating second life opportunities, recycling, and appropriately disposing of energy infrastructure assets could have a positive impact on business and the environment.

Eligibility Criterion 3: Projects must involve network innovation.

Good capabilities are shown. This would involve network innovation, and there is opportunity to provide representation from other industries such as construction or non-energy utilities. The response would have benefited from an explanation of the type of assets that may be interchangeable across stakeholders in the energy supply chain to provide context for the potential for the whole system approach.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The applicants identified various wider industry groups in which Project Partners are involved, providing opportunities to disseminate information on their proposed work and involve other European energy infrastructure asset owners/managers. Regulatory considerations have been mentioned briefly, only in recognising that they would have to be considered. The initiative is not viewed to be likely to undermine the development of any competitive markets.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The proposal references several related initiatives in other industry which can be learned from and built upon. This does appear to be a novel approach within the energy sector and was considered innovative by the assessors.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

Descriptions of participating organisations and team members have been provided and the relevant expertise and assets are represented.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project budget and the grant request align with the competition guidance. Costs appear to be costed at competitive rates and represent good value for money. The full available costs have not been requested whilst there are several organisations referenced to be engaging in the Project who are not seeking costs.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Funding Party outlined a clear set of work packages and activities within a Project plan as well as a risk register for the Discovery Phase.

Fast Flex

Table 29: Fast Flex Project costs

Total eligible costs	£129,907
Total contribution	£17,686
Total SIF Funding requested	£112,221

Table 30: Project Partner funding breakdown for Fast Flex

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
SP Transmission Plc	£33,842.29	£6,768.46	£27,073.83
Imperial Consultants UK Limited	£55,597.73	£0.00	£55,597.73
GE Digital	£29,550.00	£0.00	£29,550.00
National Grid Electricity System Operator Limited	£6,672.00	£6,672.00	£0.00
Scottish Power Renewables (UK) Limited	£0.00	£0.00	£0.00
SP Distribution Plc	£2,122.82	£2,122.82	£0.00
SP MANWEB Plc	£2,122.82	£2,122.82	£0.00

Project description

Exploring methods for distributed energy assets to participate in flexibility services.

Summary of Expert Assessors' feedback

The Project is well structured, and mostly clearly explained and justified. The opportunity for, and benefits of, a predictable, fast flexibility market to respond to network instabilities are evident. The Project builds on the work of previous Projects and adds a new heat vector, to the possible solutions. The potential benefits are significant.

The delivery team are viewed as highly capable. The final outputs were not entirely clear to us or all assessors. The target outputs could be to develop new modelling capabilities, develop a flexibility participation platform, or creation of new market products. However, at

this stage it is viewed unanimously as a valuable Project , with the scope and outputs of the Project expected to be refined in later phases.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Condition 4

As part of its end of Project Phase report, the Funding Party must demonstrate how they have taken onboard learnings from other similar and relevant Projects.

Condition 5

As part of its end of Project Phase report, the Funding Party must provide documentation showcasing how the monitoring and control development will be agnostic for flexibility providers, and that interoperability with other systems will be considered.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The Application very effectively conveys the ambition, likely benefits to whole system and users, and the specific contribution of the Discovery Phase to the overall proposition. There is no doubt that the Project is well aligned to the competition scope of the Innovation Challenge.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The presentation of impacts and benefits which could emerge from the Project are strong. The case for how these impacts will translate in to benefits to consumers is made very well and some quantification of those benefits is shown. Costs and benefits described are measurable and will be assessed during the Discovery Phase Project and beyond.

Eligibility Criterion 3: Projects must involve network innovation.

The applicants have provided a clear summary of participation in the Project , with helpful given detail on roles and expertise in the skills appendix. The Project focuses upon network innovation.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The main purpose of the Project is to lead to the development of a market mechanism for demand side grid control. By focusing on a market mechanism, it will be instrumental in setting up competitive markets both within the technology concepts proposed and with other inertia adding or control technologies. The advanced state of the UK's transition to a Net-Zero grid means that technologies and markets could be developed in advance of other networks and result in a global competitive advantage. The commentary sets out a clear roadmap to adoption of the potential solution(s).

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The applicant provides a clear and concise overview of the history of research and innovation in this area in several countries and location. Some of the research has led to business-as-usual systems while other have yet to do so and some of the barriers to this have been described. The proposition is innovative, novel and risky. It has been noted that there are many other examples of flexibility provision, and innovation Projects in this area, which this Project should support and build upon to help energy networks move these approaches in to widespread business as usual activities. As such, we have imposed a project-specific condition as part of the Funding Party's end of Project Phase report to demonstrate how it has taken onboard learnings from other similar and relevant Projects.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The Project team formed demonstrate extensive collaboration between relevant Project Partners. The Project Partners are well placed to deliver the piece of work described even though the limited time challenge may prove challenging for coordination of activities.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project funding request are viewed as reasonable for the most part. Applicants have agreed to provide resource in kind over and above their labour costs to provide added value for money. Project participants should ensure that resource costs are suitable for the activities carried out against the roles described, as some assessors observed that costs were a higher that should be expected against the required activities. The value for money proposition is seen as strongest against improvements to modelling capabilities that can effectively evidence avoided costs that can be achieved through predictable, fast flexibility market.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

Work plan and milestones appear well-structured, with mostly explicit allocation of responsibilities to Project Partners. The risk register is well-aligned with the plan; risk descriptions and owners are clear and appear reasonably comprehensive. This gives confidence in capacity of Project Partners to coordinate effective delivery.

Crowdflex: Discovery

Table 31: Crowdflex: Discovery Project costs

Total eligible costs	£206,830
Total contribution	£136,773
Total SIF Funding requested	£70,057

Table 32: Project Partner funding breakdown for Crowdflex: Discovery

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
National Grid Electricity System Operator Limited	£9,817.00	£0.00	£9,817.00
Octopus Energy Group Limited	£68,250.00	£68,250.00	£0.00
Ohme Technologies Limited	£68,250.00	£68,250.00	£0.00
Element Energy Ltd	£56,425.00	£0.00	£56,425.00
Western Power Distribution Plc	£2,728.00	£272.80	£2,455.20
Scottish and Southern Electricity Networks Distribution Limited	£1,360.00	£0.00	£1,360.00

Project description

Exploring consumer characteristics and parameters to participate in flexibility services.

Summary of Expert Assessors' feedback

The proposal is viewed as innovative with the potential for significant system and consumer benefits. The Discovery Phase aims to develop the lessons from a previous NIA Project , with the same Project Partners, and to use the results to scope out the data, digital systems, automation and commercial frameworks for a viable domestic flexibility market. It is important that Crowdflex disseminates learning and involves other potential market participants, to ensure access to IP generated and the development of competitive markets. There are other notable Projects which relate to this in scope. These include the recently approved BiTRADER and EQUINOX. Some Project Partners are participating across these Projects.

There have been wide range of Projects exploring the integration of demand side flexibility in markets. To avoid duplication, a priority objective of this Project should be to enable access to these types of assets and approaches under business-as-usual market arrangements. The arrangements for doing this should be made a priority for the Projects, to be presented to Ofgem.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

The Funding Party must provide to Ofgem and UKRI prior to Project commencement a summary of how this Project , BiTRADER and EQUINOX differ, and a resource plan. The Funding Party must also share its end of Project Phase report with the Funding Party of BiTrader (Electricity North West) and Equinox (Western Power Distribution) .

Condition 4

The Funding Party must review the outputs from similar funded Projects which have explored the integration of demand side flexibility in markets, and include, as part of its end of Project Phase report, a plan for how different demand side flexibility assets would be accessed under business as usual market arrangements.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The big idea, that domestic demand flexibility can become an integral part of the grid management and develop markets for flexible demand products, is a potentially large component for designing an electricity system of the future that accommodates ever greater renewable generation and electricity demand. It is well aligned with the scope of the Innovation Challenges and SIF more widely. It meets this SIF Eligibility Criteria.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The fundamental benefit from demand flexibility is to reduce the need for investment in generation and distribution resources in the electricity systems. Significant benefits of the

Project are clearly articulated in terms of potential revenue/savings for consumers and carbon benefits. The proposal describes major potential system benefits.

Eligibility Criterion 3: Projects must involve network innovation.

The Project summary was well described. It highlights the network innovation and system operator aspects of the Project well.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The route to market is clear as the Project Partners have a clear set of capabilities between them to deliver future business propositions. Since the Project is developing market conditions that allow for demand flexibility from a variety of providers in will have to demonstrate how commercial and technical inter-operability will be achieved to allow fair access. If this is done appropriately it can promote the development of competitive markets, but should be monitored closely through phases. The Project will have to demonstrate how the findings and IP will be made more widely available in later stages, given the range of potential utilities and third parties that would participate in a market under business as usual.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

A clear justification is given of the need for innovation in domestic flexibility markets to assist in managing network constraints, system balancing and costs. The applicant has provided a good summary of the key findings of previous research. Reference to relevant previous work is not comprehensive but provides a reasonable case for how this Project will investigate novel approaches to integrating reliable, predictable, automated flexibility response from domestic consumers using market structures for network services, including tariffs.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

A strong Project Partner team is described, though additional capabilities could be introduced with expertise on consumer behaviour and other prospective domestic sector flexibility providers.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project is viewed as providing very good value for money as it will unlock significant contribution in kind from two of the subcontractors, Octopus Energy and Ohme Technology. Costs are competitive and proportionate to the planned work.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.
The structure of the Project plan, the work packages and the risks are appropriate and logical.

SEGIL - Sustainable Electrical Gas Insulated Lines

Table 33: SEGIL - Sustainable Electrical Gas Insulated Lines Project Costs

Total eligible costs	£133,814
Total contribution	£0.00
Total SIF Funding requested	£133,814

Table 34: Project Partner funding breakdown for SEGIL

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
National Grid Electricity Transmission Limited	£23,780.00	£0.00	£23,780.00
Ørsted Onshore UK Limited	£5,088.00	£0.00	£5,088.00
Scottish Power Transmission Limited	£4,914.90	£0.00	£4,914.90
National Grid Electricity System Operator Limited	£2,130.00	£0.00	£2,130.00
University of Manchester	£29,300.00	£0.00	£29,300.00
General Electric	£10,942.70	£0.00	£10,942.70
J.Murphy & Sons Limited	£10,600.00	£0.00	£10,600.00
Frazer-Nash Consultancy Limited	£47,058.42	£0.00	£47,058.42

Project description

Evaluation of long-distance gas insulated lines to reduce cost and impact of new overhead line installations.

Summary of Expert Assessors' feedback

This is a strong proposal clearly centred on network innovation to enable a more rapid and cheaper integration of offshore renewable assets within the grid. It has identified a significant opportunity to accelerate decarbonisation of the electricity system at lower costs

to consumers, and with reduced environmental impacts. Evaluation should be made of counter factual approaches and whether the economic costs will make this approach competitive for business-as-usual rollout. Assessors felt that the benefits will need to be refined and quantified in more detail as the Project progresses.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

Prior to Project commencement, the Funding Party must provide to Ofgem and UKRI a revised Project plan which includes greater detail than provided in the Funding Party's Application on the energy network focussed activities and the expected outputs of these activities during the Project.

Condition 4

The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Condition 5

As part of its end of Project Phase report, the Funding Party must demonstrate how the Project differs from similar national and international initiatives, and whether it makes economic sense for the Project to progress to additional demonstration activities.

Condition 6

As part of its end of Project Phase report, the Funding Party must provide evidence of engagement with a gas network. This engagement should focus on gaining insights, best practice and lessons learned from buried high-pressure lines to incorporate into Project delivery.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The Project proposal meets the whole system integration Innovation Challenge of the Strategic Innovation Fund. Although the proposal is focussed upon gas insulated lines (a technical solution focussed upon the electricity transmission network) the Problem and opportunity have been considered from a systems perspective. Aspects such as

commercial, regulatory and reputational factors are also likely to drive development and should be addressed by the Project also.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

A range of system benefits covering cost, time, resources, maintenance and potentially performance were well described.

Eligibility Criterion 3: Projects must involve network innovation.

The Project is focussed on electricity transmission network assets, with a concerted focus on network innovation.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The route to market is explained at a high level, which is considered appropriate for the Discovery Phase but should be developed in further detail for future phases. The Project is not viewed as undermining the competitivity of markets, if the knowledge and learning is disseminated properly across industry.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

A good understanding is demonstrated of current state of the art innovation in gas insulated lines and similar existing Projects worldwide. The Project is viewed as innovative in its ambition to significantly expand the technical capabilities of gas insulated line deployments. However, there could be better articulation of the additional technical challenges faced when attempting deployment over greater distances. It was noted by assessors that non-SF6 solutions have been tested and GIL approaches at higher MVAs also trailed. The Discovery Phase should provide further and clear differentiation on how this Project will build upon these with innovative, novel approaches.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The Project Partners are judged to be suitable to support the Project although there could have been further justification as to why the selected Project Partners were chosen, rather than third parties with comparable capabilities. A strong response has been given to

stakeholder participation and we would like to see an ongoing opportunity for interested stakeholders to engage with the Project.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The response provides detailed cost breakdown, Project Partner contributions and justification for the costs which seem appropriate for the activities and Project deliverables. The potential benefits of improvements in integrating of offshore wind capacity offer good justification that this investment is value to money for the consumer. The delivery of the Project principally through consultancy-based Project Partners is deemed appropriate for the Discovery Phase, although we would like to see greater ownership of delivery from transmission operators by owning roles such as Project management.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The response and the associated appendix are written clearly and transparently outlining the Project plan including stages, outputs, milestones risks. This was a comprehensive approach which gave confidence of delivery. It was observed that additional time should be built into the Project plan to engage with additional OEMs developing potential solutions, as full market consideration should be given and equal access opportunities outside of the listed Project Partners given. As such, we imposed a project-specific condition on the Funding Party to provide evidence of engagement with a gas network. This engagement should focus on gaining insights, best practice and lessons learned from buried high-pressure lines to incorporate into Project delivery.

SCADENT - SuperConductor Applications for Dense Energy Transmission

Table 35: SCADENT - SuperConductor Applications for Dense Energy Transmission Project Costs

Total eligible costs	£148,437
Total contribution	£0.00
Total SIF Funding requested	£148,437

Table 36: Project Partner funding breakdown for SCADENT

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
National Grid Electricity Transmission Plc	£28,993.33	£0.00	£28,993.33
Ørsted Onshore UK Limited	£5,088.00	£0.00	£5,088.00
Western Power Distribution Plc	£4,692.00	£0.00	£4,692.00
SP Transmission Plc	£4,314.90	£0.00	£4,314.90
UK Power Networks (Operations) Limited	£5,331.73	£0.00	£5,331.73
University of Strathclyde	£29,990.50	£0.00	£29,990.50
Nexans France	£12,395.37	£0.00	£12,395.37
AMSC United Kingdom Limited	£10,873.33	£0.00	£10,873.33
Frazer-Nash Consultancy Limited	£46,758.42	£0.00	£46,758.42

Project description

Understanding the impact and benefits of using High Temperature Superconductor cables.

Summary of Expert Assessors' feedback

The applicants have proposed an innovative Project with the potential for considerable benefits to enabling increased capacity in high voltage transmission systems. Good

justification has been given for how this could realise cost savings for consumers and facilitate the introduction of electrified transport and heating at scale.

The Project plan is robust and correct stakeholders are involved. The early stages of the Project should seek to evaluate the counter factual options to addressing the Project of electricity network capacity, before settling on high temperature superconductors as the preferred solution.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

Prior to Project commencement, the Funding Party must provide to Ofgem and UKRI evidence that costs are at competitive rates for the Project activities in the Discovery Phase.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

This idea has great ambition and is explained well in the context of the current energy system and the state of the art of HTS cables, making this proposal for 132kV cables novel but with promising options for addressing the network demand issues if successful. The Project addresses the Innovation Challenge with intent to shape path for affordable/low-disruption upgrade to UK networks to support future requirement for zero carbon-footprint heat, power and transport. Consideration of potential disruption to local communities by widespread deployment should be considered if successful.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The applicants provided a strong response with qualitative justification of benefits in several areas. Widespread economic and environmental benefits are claimed which are assessed to be achievable and significant. These are sought to be evidenced through the delivery of the Project , but should be evaluated against counter factual approaches. The approach makes a case for realising cost benefits for the consumer, though more detail could be given on how these will be conferred on to consumer energy bills. For example, the impact on

vulnerable consumers and those in fuel poverty has not been separated from other consumer categorisations.

Eligibility Criterion 3: Projects must involve network innovation.

An excellent summary of the Project and its objectives has been provided. The description refers to 132kV networks being given additional capacity by using high temperature superconductor technology. The Project proposal is clear, easy to understand. The scope appears very appropriate in order to investigate a technical and economic issues outlined. It is unclear whether some of the approaches being considered within this Project could also be applied to lower voltage assets in the distribution system, or if expansion of capacity via overhead lines with be tested as a counterfactual. These may constitute an opportunity for further investigation.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The route to market has been described in the context of the progression of the Project through Discovery Phase, Alpha Phase and Beta Phase with outline indication of the investment required to prototype and demonstrate solutions. Most of the route to market process describes internal processes for testing, ratifying and introducing new asset types as business as usual within the network.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The applicants have provided a strong summary and understanding of related Projects internationally and at lower voltage. Justification has been given for how this Project is differentiated from past research and innovation Projects. It appears novel and worthy of further exploration through Strategic Innovation Funding.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

An excellent summary of the Project and its objectives has been provided.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The costs outlined are deemed to be appropriate to meet this Eligibility Criteria. The distribution of costs against the Project plan seems appropriate. Some resource rates are

high, which may be justified as a strategic steering role within the Project but clarity should be sought on Project inception of the role in delivery of these roles. As such, we imposed a project-specific condition on the Funding Party to provide to Ofgem and UKRI prior to Project commencement evidence that costs are at competitive rates for the Project activities in the Discovery Phase.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan is well set out and the work packages well defined with high level responsibilities. The risk register is assessed as being robust for Discovery Phase delivery. Further adoption of agile approaches could help the Project to be responsive to developments during the short Discovery Phase.

Annex 2: Application assessment - Innovation Challenge: data and digitalisation

Chapter 3 of this document provides detail about the scope of the Innovation Challenge: data and digitalisation, as well as summarising the total number of Projects funded and total value of SIF Funding awarded.

This annex details our assessment and decisions on Applications submitted in response to that Innovation Challenge. Our assessment of each Project is set out within:

- Pages 77-114 set out our assessment of each gas Project that has been selected for funding, together with our decision.

- Pages 115-118 set out our assessment of each gas Project that has not been selected for funding, together with our decision. These tables are however redacted from our published document, in order to protect the IPR and innovations of unsuccessful projects.

- Pages 119-139 set out our assessment of each electricity Project that has been selected for funding, together with our decision.

- As all electricity Projects submitted under this challenge were selected for funding, no electricity Projects were redacted from the published document.

Gas Projects selected for funding

Gas Networks Interoperable Digital Twin

Table 37: Gas Networks Interoperable Digital Twin Project Costs

Total eligible costs	£79,644
Total contribution	£865
Total SIF Funding requested	£78,779

Table 38: Project Partner funding breakdown for Gas Networks Interoperable Digital Twin Project Costs

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
National Grid Gas Plc	£9,427.00	£0.00	£9,427.00
RAVMAC Limited	£64,346.21	£0.00	£64,346.21
National Grid Electricity System Operator Limited	£865.66	£865.66	£0.00
Southern Gas Networks Plc	£2,125.00	£0.00	£2,125.00
Northern Gas Networks Limited	£2,880.00	£0.00	£2,880.00

Project description

Investigation into the requirements for interoperability between different approaches to digital twins.

Summary of Expert Assessors' feedback

The applicants have presented a high-quality Project plan which offered clarity on the objectives, work packages and deliverables of the Project. Overall, the assessors felt that the concept of the proposal has potential, and welcomes the approach of coordinating activities with other energy networks to ensure common approaches and interoperability across digital twins.

The Expert Assessor's feedback is more fully summarised in the recommendations report published alongside this SIF Funding Decision.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
As part of its end of Project Phase report, the Funding Party must engage with members of the teams behind other SIF Projects focussed on digital twins, including: "Digital Twins: Exploring the commercial, societal and operational benefits on green hydrogen projects", "Digital Twin - Exploring the societal, operational, and cross industry whole system benefits on the Gas Distribution Network", and "EN-twin-e" to identify common areas of scope and collaboration opportunities. Additionally, the Funding Party must share its end of Project Phase report with the three SIF Project teams listed above.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The proposal has been assessed to meet the criteria for Data and Digitalisation Innovation Challenge. The focus is clearly on developing use cases for which data and digital technologies could be applied, and has been done so in a clear manner. Some of the component technologies of digital twin technologies have been described, although the proposal is very broad in scope at this stage.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The benefits are described as being an outcome primarily of real time monitoring of the gas networks. This presents an opportunity to deliver operational efficiencies and more intelligent transition to low carbon gas use, which should then be passed onwards to gas network consumers. Benefits, or the expected costs of technology deployment, are not quantified at this stage but would be expected to be developed against particular use cases in later phases.

Eligibility Criterion 3: Projects must involve network innovation.

The proposal has clear focus upon energy network associated data and innovation activities which relate to digital twin technologies. The Project summary has been well described. Standardisation of communications protocols is most clearly understood.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The proposal is not viewed to undermine the development of competitive markets in any way. A description of the value proposition to gas networks has been described reasonably well. There do appear to be dependencies to realising benefits on the development of interoperable approaches by the other energy networks. This is implicit but should be highlighted as a core dependency. A credible narrative is given for how digital twins can support the transition to a Net-Zero energy system.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The applicants have given a reasonable overview of related activities in the UK energy sector, and comparisons with some other sectors.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The proposal meets the requirement of involving participation from a range of stakeholders, with several networks involved and a business with suitable technical capabilities.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs are viewed as appropriate and costed competitively given the scope of work. The balance of costs towards the technical lead Project Partner is viewed positively.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan and delivery methodology have been well described in this section. There is clarity on the work packages and deliverables provided. The risk register is clear and detailed to an appropriate level for the Discovery Phase. The approach described provides confidence in the capability of the team to deliver the plan.

HyNTS Pipeline DataSet

Table 39: HyNTS Pipeline DataSet

Total eligible costs	£95,571
Total contribution	£0.00
Total SIF Funding requested	£95,571

Table 40: Project Partner funding breakdown for HyNTS Pipeline DataSet

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
National Grid Gas Plc	£10,819.00	£0.00	£10,819.00
Rosen (UK) Limited	£81,261.80	£0.00	£81,261.80
Cadent Gas Limited	£3,490.20	£0.00	£3,490.20

Project description

Developing the tools and processes to determine the state and capability of gas transmission pipelines carry hydrogen.

Summary of Expert Assessors' feedback

The proposal sets out a compelling case for why networks need to understand the suitability and condition of gas networks to be repurposed for hydrogen use. Potential carbon and cost benefits are outlined. The consortia have suitable capabilities for the delivery of the Project. The proposal has been delivered to a high standard, although the route to market for the potential tools and approaches is underdeveloped. The Project partners will need to demonstrate how their proposal offers additionality to current approaches and frameworks.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

As part of its end of Project Phase report, the Funding Party must evidence a refined scope of work to clarify the Project's focus, as the Project's focus is currently diffused across

several areas including network repurposing, inspection of hydrogen assets, new tools for inspection and data management associated with internal line inspection.

Condition 4
Prior to Project commencement, the Funding Party must provide to Ofgem and UKRI an outline for how activities differentiate from those of similar projects which have investigated gas conversion, such as National Grid's Project Union , Project Cavendish (NIA_NGGT0143) and Aberdeen Vision (NIA_SGN0134) .

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.
A strong case has been made for the alignment with the programme in regard to the needs of hydrogen transmission, and the impacts it might have in supporting national net zero targets. The proposal is considered to address the Innovation Challenge and wider SIF objectives.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The potential benefits are clearly described and are considered to align with the SIF objectives. The principal benefits to consumers are enabling decarbonisation of gas supply at lower cost, as well as minimising the impact of gas conversion disruption on consumers.

Eligibility Criterion 3: Projects must involve network innovation.

The Project summary is clear and concisely explains the Project to a high standard. The phases of the Project have been clearly defined.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The value proposition to gas networks is clear. There has been consideration of how operational efficiencies will be increased, by allowing existing infrastructure to be better utilised.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

A detailed review of the current state-of-the-art in regard to understanding the transmission challenges for hydrogen has been provided. We agree with the assessor's evaluation of this proposal being an to be innovative and novel. It is understood to be an iterative improvement on current data capture and analysis techniques, applied to the particular problem of understanding pipe systems and their integrity for transporting hydrogen through time.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The partners have strong relevant capabilities for delivery of the programme of work, with wider stakeholder engagement also planned.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The partner costs have been assessed as being within common industry ranges, although they lie at the higher end of those ranges. The applicants are challenged to demonstrate improved cost competitiveness in future phases with more granular breakdown of costs against specific work packages.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project delivery methodology and risk assessment are completed to reasonable quality and give confidence for successful delivery. The plan shows good alignment with the stated business opportunity.

Gas Analyser Systems for Hydrogen Blends

Table 41: Gas Analyser Systems for Hydrogen Blends Project costs

Total eligible costs	£113,414
Total contribution	£0.00
Total SIF Funding requested	£113,414

Table 42: Project Partner funding breakdown for Gas Analyser Systems for Hydrogen Blends

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
National Grid Gas Plc	£11,443.00	£0.00	£11,443.00
Cadent Gas Limited	£3,790.20	£0.00	£3,790.20
Des19ncor Limited	£98,181.33	£0.00	£98,181.33

Project description

Investigating the feasibility of a fuel cell-based gas sensor for controlling different blends of hydrogen for the gas network.

Summary of Expert Assessors' feedback

This is a very well-articulated proposal with a strong justification of innovative potential. The gas industry's need to analyse many different gases in real time is a significant problem that the Project aims to address. The potential benefits are well described, attractive and in line with the objectives of the SIF. The Project is costed competitively and represents good value for money compared with alternative approaches. The potential for exploitation of any successful outcomes is considered to be high.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

Prior to the Project commencement, the Funding Party must provide to Ofgem and UKRI clarification of the discrepancies between the Finances Overview and Finances Spreadsheet in the Project's Application.

Condition 4
As part of its end of Project Phase report, the Funding Party must include a review of sensing and analyser solutions which are used in environments outside energy networks, and outline the benefits of the components under development in the Project compared to these available alternatives.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The concept is well-defined and shows good alignment to the challenges in the competition. A successful product could be underpinning in the transition to hydrogen ready gas networks.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

A range of credible environmental, carbon, and cost reduction benefits have been discussed. The benefits are in line with the SIF objectives and this could be an enabling technology for transportation of hydrogen fuel. The counter factual of other approaches to cost reductions and further development of the quantitative value to consumers is expected to be developed as the Project progresses.

Eligibility Criterion 3: Projects must involve network innovation.

The proposed Project has a clear focus on network innovation, investigating the use of novel sensors and data analysis techniques across the gas networks. The supporting materials have been produced to a satisfactory standard and highlight the benefits and impacts of the proposed approach.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The value proposition to transmission and distribution network operators and other stakeholders is well described. Better understanding of the quantitative benefits in later phases will enable greater consideration and articulation of how the value of those benefits will be realised by consumers. The Project will not undermine the development of competitive markets.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

A well-argued and evidenced case has been made for the proposed innovation, with appendices providing additional supporting information on the commercial differentiation of the proposed technology compared to other gas analyser solutions. Patents demonstrate the novelty and also provide grounding for the protection of IP.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

There is a highly complementary consortium behind the Project, with an appropriate range of stakeholders and leading academic input. The roles and skills of the parties involved should ensure a balanced and successful Project.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The costs are appropriate to the scope of the proposed work, and a good case has been made for the value proposition of the Project for the applicants, the UK economy, and consumers. There is a good balance of costs between the partners and contributions in-kind improve the value for money case to consumers.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan is ambitious but well-structured to deliver the required results in the timeframe. The milestones and roles are clearly defined and a supporting Gantt chart is provided as appendix material. A risk analysis has been carried out and key risks outlined, with credible mitigation strategies. Some consideration has been given to major constraints on the outputs, although these would have benefited from more detailed discussion. This section has been completed to a very high standard.

Hydrogen Metering

Table 43: Hydrogen Metering Project costs

Total eligible costs	£86,378
Total contribution	£0.00
Total SIF Funding requested	£86,378

Table 44: Project Partner funding breakdown for Hydrogen Metering

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
National Grid Gas Plc	£30,780.00	£0.00	£30,780.00
Northern Gas Networks Limited	£2,880.00	£0.00	£2,880.00
DNV Services UK Limited	£47,917.50	£0.00	£47,917.50
IGEM House Ltd	£4,800.00	£0.00	£4,800.00

Project description

Investigation different metering solutions for hydrogen adoption.

Summary of Expert Assessors' feedback

This is a well formulated feasibility study by a highly capable team for understanding the performance of metering hydrogen in a grid transition from gas. The Project shows promising prospects to achieve substantial positive impacts for the environment, consumers, to open up competition, together with informing the regulatory environment and contributing to standards. The proposal could have been improved by better articulation of the Intellectual Property Management approach, exploring the international market, and explaining in more detail the data management strategy. Overall, this proposal has been assessed to be ambitious and well presented.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Condition 4
As part of its end of Project Phase report, the Funding Party must clarify whether the development of a test facility, rather than trialling in a real-world environment where assets will continue to be used, provides greater value for money to consumers.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The core idea of the Project is clearly described and it has been well established how it will address the problem and needs of its users. The Project has excellent alignment with the scope of the Innovation Challenge and provides a clear route to determining the challenges of metering hydrogen in current network systems. The range of meter types in scope is also a good representation of what will likely be required in a hydrogen economy.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The quantified Projected potential value to the environment in terms of a gas to hydrogen grid transition is considered realistic. The approach to modelling for revealing potential costs across the network and informing regulatory decisions shows promising prospects. Other targeted benefits such as opening up the market, skills development, new standards are well described. The Discovery Phase is ideal to building the benefits case supported by further quantification. The Projection of cost savings for industrial users and consumers is appears ambitious and will require further assurance as the Project progresses. We agree with the assessors that the benefits described are achievable in principle.

Eligibility Criterion 3: Projects must involve network innovation.

A comprehensive outline of the Project has been provided, and all supporting appendices and video have been completed to the required standard. The Project aligns with the competition criteria in addressing knowledge gaps that will contribute to the discussions around the feasibility of a move to hydrogen fuel.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

A reasonable case has been made for the value proposition of the Project for the sector, and there is scope for wide impact and exploitation across the supply chain. The main outcomes are clearly defined and a key partner provides a route for technology transfer into the commercial market and supply chain.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

A comprehensive understanding of similar innovations is demonstrated, and a strong justification is presented as to why this Project is innovative. The Project will aim to tackle a unique challenge by advancing the state of the art in metering hydrogen, which accommodates a wide range of meters and scenarios across the existing gas network. The stated test approach shows promising prospects to show how existing assets would perform in a gas grid transition, together with the impact for customers.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

There is a strong consortium with good representation of stakeholders across the domain and roles are clearly defined. DNV provide expertise and access to test facilities that will underpin the study, although we encourage the Project to invite engagement and challenge from the wider industry that will be involved in the metering or use of hydrogen. As such, we have a imposed a Project-specific condition for the Funding Party to clarify whether the development of a test facility, rather than trialling in a real-world environment where assets will continue to be used, provides greater value for money to consumers.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The costs are appropriate to the scope and scale of the Project and there is a good balance of effort across the partners in line with the proposed programme of work. Detailed justifications for costs are not provided but a strong case has been made for the value for money and the potential impact across the industry. Some partner resource rates are assessed to be high but within expected industry ranges. The Project should ensure that resource allocation is proportionate to the work to be carried out and is challenged to improve value for money if taken forward in later phases.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan is presented well and appears realistic. Roles and dependencies are clearly stated and milestones are in place. Supply chain engagement at kick-off is welcomed. Overall, the plan inspires confidence in successful Project completion.

Digital Twins: Exploring the commercial, societal and operational benefits on green hydrogen projects

Table 45: Digital Twins: Exploring the commercial, societal and operational benefits on green hydrogen projects Project costs

Total eligible costs	£265,324
Total contribution	£141,059
Total SIF Funding requested	£124,265

Table 46: Project Partner funding breakdown for Digital Twins

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
Southern Gas Networks Plc	£35,853.00	£10,625.00	£35,853.00
National Grid Gas Transmission Plc	£1,895.49	£0.00	£1,895.49
DNV Services UK Limited	£44,100.29	£10,898.00	£44,100.29
Amazon Web Services Limited	£42,417.00	£119,536.00	£42,417.00

Project description

Exploring the benefits that could be derived from the deployment of a digital twin on a green hydrogen use case.

Summary of Expert Assessors' feedback

The Application is predicated on a good foundation, with digital twins potentially offering valuable new capabilities for networks and generators to achieve system-level improvements in efficiency, and deliver additional customer value. The route to market and commercialisation plan still requires further development, with the value proposition mainly referencing benefits to hydrogen delivery, rather than those unlocked directly by the digital twin. Some assessors raised questions around whether the overall Project costs were high considering the outputs of the Discovery Phase, and stressed that the Project delivery methodology would need to be managed well to keep all activities on track.

The application of digital twin methodologies and technologies to a hydrogen gas network was viewed as novel, with the opportunity to test directly on a real-world test environment

compelling. On balance this was seen as an ambitious Project with the potential to deliver value to digital twin initiatives in the energy sector. Assessors would like to see the expansion of stakeholder engagement activities to refine use cases and ensure adherence to user needs.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

Prior to Project commencement, the Funding Party must provide to Ofgem and UKRI clarification of existing budgets provided to the H100-Fife project for data capture and digitalisation aspects, and how the budget for this Project is clearly differentiated from that H100-Fife's activities.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The Big Idea has been reasonably well described. National system level benefits of digital twins are communicated but less detail is provided for the necessity for supporting in flight H100-Fife. However, we echo the assessors' view that the Project in of itself takes a constructive approach to good design practices, with the development of ideas being led by local business needs.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The range of potential benefits are described and are in line with the objectives of the SIF. Many of the potential benefits in this question of the Application are derived from the use of hydrogen itself, rather than the digital twin. We viewed this as suitable, since the digital twin is likely to be used principally as an enabling technology.

It is highlighted that since the impacts and benefits on consumers may be indirect, they should also be considered in relation to the costs of hydrogen rollout, so as not to overstate the net potential benefits. Furthermore, consideration needs to be given to counterfactual approaches. Some metrics for tracking benefits have been touched upon but will need to be better defined during the Discovery Phase.

Eligibility Criterion 3: Projects must involve network innovation.

The Project is summarised well and the scope is clear. The integration of hydrogen, electricity and water data in an interopable manner was viewed positively.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The route to market had been articulated only in outline terms. Sector wide benefits of digital twins are again referenced, but a clear commercialisation approach for either a product or service-based proposition developed through this initiative should be developed in the Discovery Phase.

There are still outstanding policy decisions on the use of hydrogen in the gas distribution networks, which presents a risk to the existence of a market for these solutions in future. However, given these uncertainties we felt that there was a credible case for better defining the route to market in the Discovery Phase, and that preparation of digital twin innovation in advance of widespread hydrogen use was prudent.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.
The applicant has demonstrated a good understanding of similar innovations. The application of digital twin technologies to hydrogen gas networks is novel, and the identification of use cases and user needs in relation to hydrogen transportation offers good prospects for innovation. It is clear that digital twin technologies have been researched and adopting CDBB methodologies will enable the Project to focus on novel areas of idea development, as well as boosting the opportunities of interoperability with other networks or infrastructure types.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The organisations involved in delivery have appropriate roles and skills to achieve positive Project outcomes.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The overall Project costs are high compared to other Discovery Phase Projects, but on balance costs are considered appropriate considering the novel application and complexity

of the Project scope. It should certainly represent a sufficient sum to complete the Project, but the Project may find it challenging to ramp up delivery of the Project within the 2-month period. The balance of costs seems reasonable between the partners. Significant contributions are offered by Project Partners on top of the SIF funding, which provides a case for added value to the consumer.

As part of the high project costs, we have imposed a Project-specific condition on the Funding Party to clarify existing budgets provided to the H100-Fife Project for data capture and digitalisation aspects, and how the budgets for this Project are clearly differentiated from the activities in that Project.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan is reasonably granular, with appropriate milestones identified. The risk register was of reasonable quality. The Project methodology does reference using Agile methodologies which was received positively. There is confidence that the Project plan will support successful Project delivery.

Digital Twin - Exploring the societal, operational, and cross industry whole system benefits on the Gas Distribution Network

Table 47: Digital Twin - Exploring the societal, operational, and cross industry whole system benefits on the Gas Distribution Network Project costs

Total eligible costs	£300,322
Total contribution	£181,195
Total SIF Funding requested	£119,127

Table 48 Project Partner funding breakdown for Digital Twin

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
Southern Gas Networks Limited	£45,443.00	£10,625.00	£34,818.00
National Grid Gas Plc	£1,895.49	£0.00	£1,895.49
IBM UK Limited	£91,031.00	£51,034.00	£39,997.00
Amazon Web Services Limited	£161,953.00	£119,536.00	£42,417.00

Project description

Development of a digital twin to support strategic decision making to optimise operations under different scenarios.

Summary of Expert Assessors' feedback

The overall Project delivery methodology has been explained reasonably well. The Project plan is logical but further information on milestones and dependencies would have improved the response. The risk register identifies many valid risks but has been viewed as fairly generic and optimistic in its ratings.

The activities are viewed as being very internally focussed amongst the Project Partners, given the wide range of external stakeholders that would look to use or gain value from the digital twin, it would be expected that greater resources would be put towards engaging and understanding their needs. Broadly the Project plan and delivery methodology give sufficient confidence in the Partners to deliver to plan.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
As part of its end of Project Phase report, the Funding Party must demonstrate how the Project's activities differentiate from other digital twin activities with cost-allocations under the price control mechanism, and how the SIF funding is being used for higher risk, innovative components of development.

Condition 4
As part of its end of Project Phase report, the Funding Party must provide evidence detailing how intellectual property and licensing arrangements associated with the Project will remain open for all interested parties. The end of Project Phase report must also include documentation of steps taken to avoid the creation of a technical monopoly in the energy system.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.
The digital twin development and future deployment are reasonably described and have good prospects for addressing the aims of the Innovation Challenge.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The applicants have described a concise set of valid benefits for a small range of stakeholders. Overall, the benefits are in line with the SIF objectives but more development is expected in future stages should the Project progress.

Eligibility Criterion 3: Projects must involve network innovation.

A good summary of the Project has been provided. The applicant has demonstrated a clear objective and has focussed on network innovation aspects of the digital twin development. Potential users and user needs are described at a high level.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The route to business-as-usual deployment that is been outlined is sufficient and includes explanation of how modelling techniques utilising the digital twin will be transitioned iteratively to business-as-usual activities. The Project will not undermine the development of competitive markets.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The applicant has provided good examples of similar solutions in other sectors from partners IBM and AWS. The applicant has made a valid argument that this will be a first of a kind Project in relation to UK gas networks. Overall, the proposal was viewed as being sufficiently novel and innovative to proceed, but we would like to see improvements in future stages should the Project proceed to further account for and outline for international projects.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The partners are well selected with suitable competencies. We along with the assessors consider the delivery partners as likely to deliver the necessary skills and experience to make the Project successful.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The funding request is reasonable given the scope and timetable of work. IBM and AWS rates were viewed as being high against market standards, but as both Partners offer additional contributions in kind this has effectively improved the value for money to an acceptable level. The split of costs across partners and activities appears appropriate and competitive.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The overall Project delivery methodology has been explained reasonably well. The Project plan is logical but further information on milestones and dependencies would have improved the response. The risk register identifies many valid risks but has been viewed as fairly generic and optimistic in its ratings.

The activities are viewed as being very internally focussed amongst the Project Partners, given the wide range of external stakeholders that would look to use or gain value from the digital twin, it would be expected that greater resources would be put towards engaging and understanding their needs. Broadly the Project plan and delivery methodology give sufficient confidence in the Partners to deliver to plan.

Intelligent Gas Grid

Table 49: Intelligent Gas Grid Project costs

Total eligible costs	£116,401
Total contribution	£0.00
Total SIF Funding requested	£116,401

Table 50 Project Partner funding breakdown for Intelligent Gas Grid

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
Southern Gas Networks Plc	£22,101.64	£0.00	£22,101.64
Utonomy Limited	£94,299.36	£0.00	£94,299.36

Project description

Using weather data and AI to autonomously and intelligently monitor and control network gas pressure.

Summary of Expert Assessors' feedback

The Project team have demonstrated a good case for their innovation and they have undertaken extensive research across the UK and internationally to make a strong case for this being a novel and innovative proposal. Some assessors felt that the remote pressure control technology was the focal point of the Project and have raised concerns that there is not enough meaningful work on the data capture and artificial intelligence processing referenced. These areas should be expanded on within the Project ahead of Alpha Phase. The Project Plan and delivery methodology could be strengthened in some areas but overall, the Project has been considered ambitious with the potential for considerable benefits. These areas should be expanded on within the Project.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

As part of its end of Project Phase report, the Funding Party must provide an estimate with justification for when the technologies under development within this Project will be sufficiently developed for incorporation into business-as-usual activities.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The Project is proposing to leverage data to monitor, control and optimise networks which aligns with one of the challenges set by Ofgem and confirms this Project meets the SIF eligibility criteria. The Project explains the pressure control technology to be utilised well.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The potential for emission reduction benefits have been described and are credible. There are implicit benefits to providing more efficient operations of networks, though the nature of these benefits has not been explicitly described. To realise the full benefits referenced the Project will need to help inform potential government and regulatory policy decisions regarding the transportation of hydrogen and biomethane. Further development and quantification of how these benefits will be realised by the consumer is expected in future Phases.

Eligibility Criterion 3: Projects must involve network innovation.

The Project will look at the conditions of the network and forecasting of energy demands with the use of the remote pressure control technology for current and future hybrid gases. This is viewed as a novel application of the previously developed work and has been assessed as innovative. The Project has a clear focus on network innovation.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The value of the innovation to the networks and customers is demonstrated. The route to market described is commercially relevant for Utonomy who will offer a new solution to its customers. Users of the products have been identified and an outline of how solution development will proceed through testing, trialling and deployment. The Project is not viewed as undermining the development of competitive markets and the solution will be made available for use by other gas networks on a commercial basis.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The whole Project is concentrated on a patented pressure technology and the application of it to gas networks and the transportation of hydrogen and biomethane. There is extensive research of similar innovations with good justification of how both the technology and the approach are novel in the gas network environment. Related Projects have been described in extensive detail, both domestically and internationally.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The Partners have suitable skills for delivery of the Project.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project team have a good split of workload with one Partner taking the lead on most activities. The costs appear to be reasonable for the scope of work and are costed competitively. The Project management resource allocation appears to be greater than the 2-month Project delivery period will allow, this will need clarification ahead of Project commencement.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project Plan is sufficient to give confidence in successful delivery of the Discovery Phase. The breadth of work appears ambitious, but potentially achievable within the given timeframes. More developed risks and work packages would be in expected in future phases should the Project progress.

Predictive Safety Interventions

Table 51: Predictive Safety Interventions Project costs

Total eligible costs	£58,729
Total contribution	£0.00
Total SIF Funding requested	£58,729

Table 52 Project Partner funding breakdown for Predictive Safety Interventions

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
Southern Gas Networks Plc	£5,588.88	£0.00	£5,588.88
FYLD Limited	£53,140.00	£0.00	£53,140.00

Project description

Data integration with AI to predict and prevent safety incidents.

Summary of Expert Assessors' feedback

It was generally a well-presented Application. The lack of consideration and detail in the response to the Project plan could be addressed to benefit the Project delivery particularly around the ways of working. The major areas of weakness in the proposal are the lack of supporting evidence for the innovation and the lack on detail regarding expected commercial exploitation outcomes. Despite most assessors recommending this Project for funding comments are divided as to the suitability with concerns raised as it seems that FYLD Limited is well funded and could develop the solution without SIF funding, and concerns IP rights will be exploited from Australia, not from a UK base. The proposal should be more transparent in this regard. The Project does offer an opportunity to reduce downtime and injury at the whole system level and if successful is looking to deliver a predictive model which will be valuable. The consortium of partners is strong and capable to deliver this Project. Although there is insufficient detail as to the role that NGGT are to provide in the Project.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
As part of its end of Project Phase report, the Funding Party must include justification as to why the Project should continue with SIF funding rather than under business-as-usual activities.

Condition 4
As part of its end of Project Phase report, the Funding Party must provide evidence detailing how intellectual property and licensing arrangements associated with the Project will remain open and transparent for all interested parties.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The core idea is explained in good detail and shows strong potential for meeting the aims of the competition in developing new products and services for the utilities industry and addressing the needs of digitalisation of the sector. There are many fieldwork operations and HSE apps available in the market and it might be more cost-effective to use and potentially adapt an existing, proven, and commercialised app. There is an established platform which provides the basis for the Project and which will de-risk the exploitation opportunity. User requirements are understood and at the core of the proposal.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The applicant has provided a very good summary of the expected benefits to customers of improved operational and safety performance in the field. The impact Projections are based on the deployment of the current version of the app, prior to the currently proposed improvements/progression, which provides an evidence base and indicators for future benefit tracking. The injuries data and recent improvements are great and reassuring. For full impact, it would be useful to see evidence of helping other networks learn.

Eligibility Criterion 3: Projects must involve network innovation.

The applicant has clearly summarised the Project, outlining the further development of the fieldwork management AI Application they developed and spun off to harness data for predictive analytics about safety and operational events, facilitating predictive action.

Consideration should be given to where the line in the sand is between business-as-usual expenditure and innovation. Clearer acknowledgement of sharing progress with other networks would be beneficial. As such, we have imposed two project specific conditions on the Funding Party to provide additional details in its end of Project Phase report.

The video and postcard are informative and of good standard.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

There is a viable route to market via an established platform and market presence in the sector, and there is a clear value proposition for the target market. The value proposition to other key stakeholders is clearly described and shows how the consortium can get the solution to a business as usual. There has been consideration on how the operations will create efficiencies and reduce accidents and down time and ultimately how they will increase productivity and offer a path to better customer satisfaction. Future funding has been considered and appears to be already secured at a sufficient level to deliver the full product.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The applicant noted that they did not find a suitable app in the market in 2019, however it would have been useful to outline the current service orientated architecture (SOA) and the reasons the SOA is unsuitable. The response would have benefited from more detailed supporting evidence to substantiate this position and identify nearest competition to explain why this Project is innovative.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The SGN skills summary is generalized and the outline for other Partners are appropriate to achieving the Project outcomes.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs demonstrate good value to the proposed scope of work, although the proposal provides no breakdown or justification for the spend areas. There is an

appropriate balance of costs between the partners. The value proposition of the Project for the applicants has been demonstrated.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The applicant has provided a very brief outline of the Discovery phase work packages. The appended Gantt chart illustrates timeframes and provides sufficient detail on the activities planned and roles.

Thermal imagery analysis - Condition assessment fluid and pressure

Table 53: Thermal imagery analysis - Condition assessment fluid and pressure Project costs

Total eligible costs	£86,138
Total contribution	£14,956
Total SIF Funding requested	£78,182

Table 54 Project Partner funding breakdown for Thermal imagery analysis - Condition assessment fluid and pressure

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
Northern Gas Networks Limited	£2,880.00	£0.00	£2,880.00
National Grid Gas Plc	£3,700.00	£0.00	£3,700.00
Synovate Limited	£79,558.33	£7,955.83	£71,602.50

Project description

Thermal imagery to identify gas losses and leakages to improve safety for hydrogen usage.

Summary of Expert Assessors' feedback

All assessors recommended this Project for funding. This proposal provides high confidence. This is based on the quality of the partners, the rigorous Project and risk-based approach. The Discovery Phase is appropriately formulated to establish the justification, strategy, and roadmap. The answer could have been strengthened with more information about external Projects exploring similar strategies and better integration between the milestones in the budget and the Project plan. Despite the gaps, the proposal is timely and positioned to inform important conversations around hydrogen.

This Project solves an important problem by enabling potential gas networks with hydrogen. The Application was strong and has provided a compelling justification for funding, as reflected by scores to individual responses. Project has relevance to the assessment of the current network of PE for suitability for repurposing for hydrogen. It is also applicable to the assessment of current methane leaks in the network. It is thus in scope but could also be considered as applicable to business as usual.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The Project complies with the Data and Digitalisation challenge requirements. The proposal sets out clearly what it intends to do and why this would be of use in the energy transition, from methane in the NG network to hydrogen. The novel leakage detection sensor is well described and has good prospects for addressing the aims of the competition scope.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The Application identified a comprehensive range of benefits that are far reaching with significant potential for positive impact, spanning customers, network users, environmental and commercial, as well as for wider groups of stakeholders. Many of these benefits and impacts are measurable and quantifiable with the methods that the Consortium is putting in place.

Eligibility Criterion 3: Projects must involve network innovation.

The Project summary is clear, and the postcard, video and skills appendix have been completed to a good standard. The Applicant has added valuable supplementary information to the Project summary. The proposed Project addresses network innovation, as described in the competition scope.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The routes to market are clearly defined and realistic based on high engagement planned. The value proposition of novel sensing for low pressure gas leakage detection has promising prospects to appeal to the identified target groups across the supply chain. The planned investment case and procurement strategy is appropriate to gaining market confidence in moving to hydrogen supply. The applicant also states that they will look at forming partnerships and licensing IP. It would be useful to include detail on end user requirements and key performance metrics, impact on efficiencies and productivity.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The response provides a good justification for Project funding under SIF. The innovation and its novelty are well described, although explicit justification for why the Project should be funded by SIF is not provided.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The Project includes participation from an appropriate range of stakeholders. The three partners comprising a gas grid operator and regional distributor, and industry experts in robotics and sensing technologies applied to gas transmission represent an ideal consortium.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs are appropriate and should be sufficient to complete the Project successfully.

The applicant has provided a convincing justification for the Project and why it is good value for customers. There has been an additional contribution to the Project outside of the core SIF costs.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan comprising six work packages with well-defined objectives and deliverables is entirely appropriate for a feasibility study in the Discovery Phase. The addressing of the problem statements, defining the value proposition, estimating the costs, benefits and risks represent a well-defined programme of work. Stakeholder engagement and key meetings are extensive. This is a tight but achievable plan to assess viability and define subsequent steps. The risk assessment is rigorous and detailed both for the Discovery Phase and the whole Project with solid mitigation and ownership.

CEV: Critical factors for the adoption of smart homes for energy efficiency and implications for consumers and providers

Table 55: CEV: Critical factors for the adoption of smart homes for energy efficiency and implications for consumers and providers Project costs

Total eligible costs	£55,395
Total contribution	£0.00
Total SIF Funding requested	£55,395

Table 56: Project Partner funding breakdown for CEV

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
Northern Gas Networks Limited	£2,880.00	£0.00	£2,880.00
Newcastle University	£29,842.18	£0.00	£29,842.18
National Energy Action	£22,672.65	£0.00	£22,672.65
Northern Powergrid Limited	£0.00	£0.00	£0.00

Project description

Investigating the enablers and barriers to adoption, and network impacts and benefits of smart home technology

Summary of Expert Assessors' feedback

This Application split assessor feedback. Whilst most of them thought this was a good Project, there was strong and experienced team, and they welcomed the smart home approach. There were areas where the application could be improved.

The route to market was the main concern with assessors noting that the applicants appear to be ready to build 'their solution', not one that has been tested is needed by other players. As noted above the limited references to other up to date and evolving body of work by other organisations was also an issue.

Additional explanation of how the findings will be used in future phases and how the Project overall can achieve the goals and benefits sought for energy network companies and their consumers would be advantageous.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Condition 4

Prior to Project commencement, the Funding Party must provide to Ofgem and UKRI clarification of the role of the network operators in this Project.

Condition 5

As part of its end of Project Phase report, the Funding Party must outline its initial views for a route to market for the Project. This outline should consider identifying potential users of the framework and knowledge base, a dissemination strategy for Project findings, and opportunities to influence customer action via National Energy Action.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The Big Idea has been clearly articulated and addresses the requirements of the data and digitalisation challenge. The idea is ambitious, and the applicant has a clear understanding of how it can potentially deliver real benefit within this Project and follow-on Projects. For an optimised energy system, non-digital solutions like building fabric changes may also have to be considered and so this Project would have benefitted from a wider focus than just digital and date driven solutions.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The high-level benefits case is clear. The future use of the outputs has been thought though and described. The support of the Customer Engagement Village Project adds weight that this Project might integrate in a practical commercial environment.

Eligibility Criterion 3: Projects must involve network innovation.

The Project summary is clear and well thought out. The postcard does a good job of capturing what the main summary points. This answer would have benefitted from an explanation of the degree and nature of relative importance of energy networks to the questions being addressed in this Project. As such, we imposed a project specific condition for the Funding Party to clarify the role of the network operators in the Project prior to Project commencement.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The Project has the potential to facilitate greater levels of competition. An appropriate level of thought for dissemination has been given for this stage of the Project.

Consideration should be given to who do the applicants think will pay for this service to exist? Who will have the incentive to invest and keep information up to date? Some insight on the size of the potential benefits also could be given. As such, we imposed a Project-specific condition on the Funding Party to outline in its end of Project Phase report the Project's route to market.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

A very clear expression of the challenges for take up of energy reduction are outlined. The premise of introducing greater scientific rigour to investments is welcomed. The applicant has researched the area well and demonstrated their insight into the challenges. They have outlined why their approach is different. The overall solution is innovative.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The Project partners are suitable for the Project but more clarity around the roles of the network operators could have been provided, which resulted in a Project-specific condition for the Funding Party.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

We agree with the assessors that the Project costs were appropriate.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan is clear, the work packages are logical and clear milestones have been provided. Some information on how the teams will work together should be considered should the Project progress to a future stage.

The risk was appropriate for this stage and appropriate mitigation was been provided. Risks associated with establishing and researching end users' requirements should be managed to ensure effective learnings.

Digital Platform for Leakage Analytics

Table 57: Digital Platform for Leakage Analytics Project costs

Total eligible costs	£125,328
Total contribution	£10,752
Total SIF Funding requested	£114,576

Table 58: Project Partner funding breakdown for Digital Platform for Leakage Analytics Project costs

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
Cadent Gas Ltd	£7,639.23	£7,639.23	£0.00
Southern Gas Networks Plc	£3,112.88	£3,112.88	£0.00
National Grid Gas Plc	£4,415.69	£0.00	£4,415.69
Guidehouse Inc.	£110,160.00	£0.00	£110,160.00

Project description

Exploring new methods to capture and analyse data to reduce gas network leakages.

Summary of Expert Assessors' feedback

Overall assessors have recommended this Project for funding. The proposed Project addresses the important problem of leakage analytics in gas distribution pipework. The potential benefits to end users are well described. The Project has a high chance of delivering at the discovery stage. Consideration must be given to how this platform will integrated with digital twins to make a cohesive system. There is a very good understanding of the previous work and the potential to build upon this. The team is strong, and the supporting material is well thought through.

The main concerns highlighted for not recommending this Project for funding is higher costs for third party contractor and more justification is needed, and inadequately addressing the barriers to developing and deploying a modelling capability.

The reduction of methane leakage is a high priority for Government and industry, and the Project should interact with the appropriate workstreams to identify if this innovation could realise benefits sooner in the current system.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

As part of its end of Project Phase report, the Funding Party must provide clarification for how the innovation a part of this Project aims to reduce methane leakage, and how this Project differs from existing digital leakage analytics platforms used for calculating methane leakage.

Condition 4

The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The Project has been assessed and complies with the Data and Digitalisation challenge requirement and was viewed as ambitious. The Project has the potential to develop a replicable innovative solution and deliver benefits.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The Application gives reasonable justification of achieving considerable cost savings with the potential impacts to users are well described.

Eligibility Criterion 3: Projects must involve network innovation.

The Project aim is clear, and the Project Partners are strong and experienced. The postcard, video and skills appendix were helpful and done to a high standard.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The route to market of this Project has been well thought through the challenges and rightly understood the global potential of a successful solution. It was positively noted that

the international market has been considered. The dissemination of information and learning, and work required with Ofgem to continue insights is useful.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The application demonstrates a good understanding of existing leak detection technologies and justifies why the proposed technology is innovative. The innovation and its novelty are well described. Good justification is provided for why the Project should be funded under SIF.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The role of Project partners is well described.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs are appropriate and should be sufficient to complete the Project successfully. The balance of costs among the partners seems reasonable and the team are strong and complimentary. There has been an additional contribution to the Project outside of the core SIF costs.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project is likely to deliver based on this planning. The Project plan and milestones are well thought through and presented and have clear ownership. A robust methodology to ensure effective Project delivery is well described.

Gas Projects not selected for funding

Table 59: [REDACTED]

Table 60: [REDACTED]

Table 61: [REDACTED]

Table 62: [REDACTED]

Electricity Projects selected for funding

NIMBUS - Network Innovation and Meteorology to BUild for Sustainability

Table 63: NIMBUS - Network Innovation and Meteorology to BUild for Sustainability Project costs

Total eligible costs	£148,475.56
Total contribution	£0.00
Total SIF Funding requested	£148,475.56

Table 64 Project Partner funding breakdown for NIMBUS

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
Scottish Hydro Electric Transmission Plc	£17,364.98	£0.00	£17,364.98
Scottish Hydro Electric Power Distribution Plc	£12,453.46	£0.00	£12,453.46
Icebreaker One	£118,657.12	£0.00	£118,657.12

Project description

Investigating the use of weather data to model and predict the impacts of weather and climate change across the whole life of a network asset.

Summary of Expert Assessors' feedback

NIMBUS has been assessed to provide a good fundamental scope of work and the Application provided was strong in most areas. Climate change resilience is a prime imperative for the energy sector, and the approach described in the Application appears to be credible and timely. In the Discovery Phase the Project Partners should take stock of other national and local Projects are currently underway, some of which may provide additionality to this Project through sharing lessons, processes and evidence bases for underpinning any next steps.

In future phases the consortia should be able to offer greater specificity on the digital products or services that will be developed, and how these will be commercialised under business as usual. We would also like to see further development and evidence of the value proposition to network consumers in both the near- and longer-term timeframes.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

Prior to Project commencement, the Funding Party must provide to Ofgem and UKRI evidence that costs are at competitive rates for the Project activities in the Discovery Phase.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The Big Idea has been very clearly articulated and addressing the requirements of the Data and Digitalisation challenge. The approach to improving the visibility of infrastructure and assets will support network planning, modelling, and forecasting capabilities.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

Explanation of how the proposed Project idea may achieve economic resilience and carbon benefits has been given. We noted that qualitative benefits have been described with metrics for tracking these benefits identified. Quantification of benefits will be presented in Alpha/ Beta Phase Applications.

Eligibility Criterion 3: Projects must involve network innovation.

The applicants have provided a strong Project summary which provides contextual background and a well-defined scope for the Project. The Project involves a good level of network innovation, and in addition could offer benefits beyond the networks.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The Project does not present risks to the development of competitive markets. Methods for dissemination across other energy networks will be an important aspect of achieving business as usual, including gas networks.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

Good consideration of cross-sectoral Applications and learning potential has been provided. We understood how this Project builds upon previous work and will take novel and innovative approaches against the Problem use cases identified.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The consortium members have strong experience and the skills to deliver the Projects. There is good data management and metrology capability represented.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs are reasonable and lie within industry expectations. The value for money case is sufficient for the activities and outputs described. However, we noted that some cost rates are at the higher end of industry norms and have challenged the Project via a Project-specific condition that it evidence costs are at competitive rates for the Project activities in the Discovery Phase.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan has been produced to a high standard which gives clarity of the delivery activities and methodology. The work-packages are clear with defined lead parties. The risk register approach is good with clear ratings and mitigations, the risk register should be developed and provide more granular detail during the Discovery Phase.

Digi-GIFT

Table 65: Digi-GIFT Project costs

Total eligible costs	£141,356
Total contribution	£5,120
Total SIF Funding requested	£136,236

Table 66: Project Partner funding breakdown for Digi-GIFT

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
SP Transmission Plc	£51,201.60	£5,120.16	£46,081.44
National Grid Electricity Transmission Plc	£16,000.00	£0.00	£16,000.00
University of Manchester	£63,538.46	£0.00	£63,538.46
SP Distribution Limited	£10,615.38	£0.00	£10,615.38

Project description

Designing a holistic data connector for real-time monitoring and analysis of assets.

Summary of Expert Assessors' feedback

The fundamental idea focussed on within this proposal is seen as valuable and related outputs will certainly be necessary to realise full energy system benefits through the energy transition. Assessors have challenged whether this Project requires the SIF support or is a requisite activity which will need to be delivered at some stage under the networks business plans. However, at this nascent stage of development it is considered to be a valuable area to explore with innovative aspects. The Project should engage with and explore partnership with parallel initiatives including the Data and Digitalisation Taskforces, Open Energy, the Open Networks Project. And relevant industry bodies such as Electralink. This will help identify alignment opportunities and secure the widespread industry buy-in which will be necessary to achieve successful outcomes.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
As part of its end of Project Phase report, the Funding Party must clarify if the Project aims to establish a competing data model and connector to Common Information Model IEC 61970 standards, or if the Project aims to provide interoperability with such standards. As part of this, the Funding Party must provide, in its end of Project Phase report, justification for why a particular approach was taken.

Condition 4
The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The big idea is ambitious with a range of technical benefits succinctly articulated. There is good alignment with the scope of the Innovation Challenge, and the Project clearly addresses some of the specific areas mentioned in the Innovation Challenge brief.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The applicants have made a good case for why the digitalisation of the energy networks and easy access to the data is real-time are key enablers for the transition to a low carbon and cost-effective energy system. This is widely accepted across the industry.

Eligibility Criterion 3: Projects must involve network innovation.

The Project summary is clear and easy to follow. Project Partners are credible and well positioned with relevant historical Project experience. We were pleased to see the involvement of Distribution Network Operators and Transmission System Operators.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The exploitation of the Project and future dissemination have been outlined. Working with the Energy Networks Association and relevant working groups will be important, but it is also important to note that the Project will also have to ensure engagement with wider industry and digital technology providers. Cross industry buy-in will be crucial to successfully deliver Project outputs. The Project is not viewed as undermining the development of competitive markets as long as an open and transparent procurement process is followed for the delivery of the agreed solutions.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The innovative aspects of the Project have been clearly demonstrated with the Applicants showing a good understanding, although greater coverage of similar innovations would have benefited the application. In particular the Energy Data and Digitalisation Taskforce as well as the National Digital Twin programme should be reviewed to ensure alignment of activities.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The combination of organisations is strong and all have relevant experience within the organisation, although more detail could have been given on the capabilities of the delivery team, given the technical area of focus is not the core function of all organisations involved.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The innovative aspects of the Project have been clearly demonstrated with the Applicants showing a good understanding, although greater coverage of similar innovations would have benefited the application. In particular the Energy Data and Digitalisation Taskforce as well as the National Digital Twin programme should be reviewed to ensure alignment of activities.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan is strong, work packages have been detailed and clear milestones outlined. The risk register covers most of the major potential risks and provides mitigating actions.

EN-twin-e

Table 67: EN-twin-e Project costs

Total eligible costs	£ 161,043
Total contribution	£ 17,563
Total SIF Funding requested	£ 17,563

Table 68: Project Partner funding breakdown for EN-twin-e

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
SP Transmission Plc	£39,149.00	£7,829.80	£31,319.20
University of Strathclyde	£51,135.00	£0.00	£51,135.00
Digital Catapult	£56,780.00	£0.00	£56,780.00
National Grid Electricity System Operator Limited	£8,672.00	£8,672.00	£0.00
SP Distribution Limited	£5,307.00	£1,061.40	£4,245.60

Project description

Development of a digital twin of the electricity distribution system to aid in decision making when managing and balancing assets.

Summary of Expert Assessors' feedback

The Project has been well articulated with a clear problem, solution and plan to get there. The consortium appears to be very capable with suitable skills and expertise. The applicants make a compelling case for both the imperatives of pursuing this initiative and of the benefits of digitising the energy networks to realise positive benefits for consumers, industry, and carbon reductions. Concerns have been raised about the cost rates quoted and the Project should re-evaluate how they can maximise the value to consumers through competitive costs, both in this Discovery Phase and in future Phases.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
As part of its end of Project Phase report, the Funding Party must engage with members of the teams behind other SIF Projects focussed on digital twins, including: "Digital Twins: Exploring the commercial, societal and operational benefits on green hydrogen projects", "Digital Twin - Exploring the societal, operational, and cross industry whole system benefits on the Gas Distribution Network", and "Gas Networks Interoperable Digital Twin" to identify common areas of scope and collaboration opportunities. Additionally, the Funding Party must share its end of Project Phase report with the three SIF Project teams listed above.

Condition 4
Prior to Project commencement, the Funding Party must provide to Ofgem and UKRI evidence that costs are at competitive rates for the Project activities in the Discovery Phase.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The ideas are bold and realistic in tackling the aims of the Innovation Challenge. A compelling vision has been given that describes a system collecting, organising and presenting information about the entire network to support better operational decision making. We found the approach described offers improvements in how networks manage an increasingly complex system more effectively.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The impacts and benefits are wide ranging and are described for consumers, both in terms of cost and participation through incentives. These were viewed positively, with clear potential for delivering net benefits to network consumers. Some of these benefits were described at a very high level, and we would expect more developed analysis at future phases should the project continue.

Eligibility Criterion 3: Projects must involve network innovation.

This is a very clear summary which has been convincingly formulated. It succinctly explains the strategy for developing a digital twin spanning transmission and distribution which will give greater transparency of network status than currently possible.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The pathway to business as usual is realistic for driving wider adoption of the Digital Twin platform with an appealing value proposition to stakeholders. The collaboration with the Electricity System Operator and other energy networks is vital to realise a successful route to market. Regulatory considerations have been made and are understood at an outline level.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

A good statement of the Project scope and how it builds upon the current state of the art has been provided. A very good understanding of other related Projects and initiatives has been shown. We felt that the 'live simulation of the distribution network in operational time and information exchange between the physical system and the twin' would constitute a highly innovative achievement, if realised.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The Partners represented offer a strong range of suitable abilities. Representation includes a transmission and network operator, an end user, a university and RTO.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

Overall Project costs were assessed at lying within the range of being considered competitive at market rates. However, many of the labour cost rates were viewed as being high for the extent and scope of work to be carried out within the Project. As such, we imposed a Project-specific condition for the applicants to evidence prior to Project commencement that costs are at competitive rates for the Project activities in the Discovery Phase.

The split of costs between partners is viewed as proportionate. An additional 11% funding contribution is provided by Project Partners to offer improvements to the value to consumers.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan and milestones represent a sound structure as a feasibility study in the Discovery Phase. The structure is well aligned with the Project aims. Work packages are clear with an appropriate work package owner. The phasing of work is sensible. The risk register is sufficient.

Predict4Resilience

Table 69: Predict4Resilience Project costs

Total eligible costs	£ 129,722
Total contribution	£ 20,321
Total SIF Funding requested	£ 109,401

Table 70 Project Partner funding breakdown for Predict4Resilience

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
SP Transmission Plc	£31,842.29	£3,184.23	£28,658.06
Arup Limited	£72,099.44	£7,209.94	£64,889.50
University of Glasgow	£6,504.00	£650.40	£5,853.60
Met Office	£10,000.00	£0.00	£10,000.00
SP Distribution Limited	£4,245.64	£4,245.64	£0.00
National Grid Electricity Transmission Plc	£5,030.69	£5,030.69	£0.00

Project description

Using weather data and AI to produce forecasts of specific network faults and risks from extreme weather events.

Summary of Expert Assessors' feedback

Overall, this proposal is well prepared and planned. A credible problem has been identified and the scope of work has been assessed as having potential for realising significant benefits for network customers and consumers by ensuring a more resilient network. Assessors felt that there was some assumption that benefits would be realised by improvements to predictive forecasting, without appreciation of whether impactful interventions be possible within the time constraints. Aspects such as topography and ground permeability are not explicitly being considered in this Project, and one assessor flagged these as important when assessing the impact of heavy rainfall events on critical assets.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
As part of the end of Project Phase report, the Funding Party must provide evidence that the Project's tools and techniques are being designed in a way which will enable use by other networks. As part of this, the Funding Party must participate in any meeting related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Condition 4
As part of its end of Project Phase report, the Funding Party must engage with members of the team behind the Project "NIMBUS - Network Innovation and Meteorology to BUild for Sustainability" to identify common areas of scope and collaboration opportunities. Additionally, the Funding Party must share its end of Project Phase report with the members of the team behind the Project "NIMBUS - Network Innovation and Meteorology to BUild for Sustainability".

Condition 5
Prior to Project commencement, the Funding Party must provide clarification on whether topography and ground permeability data are being considered within the Discovery Phase, and justification for why or why not these data sources are being examined.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

Justification of the Application's relevance to the Innovation Challenge scope is strong. The Project scope is clearly described, aiming to achieve a more reliable and resilient network through providing actionable decision-making capabilities to control room staff for predicting and handling extreme climate events that contribute to network faults. The potential benefits for network operators using data in innovative ways to ensure continued quality of service to consumers are evident and aligned to the objectives of the SIF.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

A range of benefits is considered, addressing user needs and CO2 implications. User cost reductions are indicated, although not fully substantiated. The benefits for consumers for a more reliable service in all weather conditions should be quantifiable in more detail with relevant metrics if the Project progresses to later Phases, as well as associated carbon reduction. Additional high-level wider benefits are referenced including for health and safety and provision of services to other utilities.

Eligibility Criterion 3: Projects must involve network innovation.

The focus of the Project is summarised clearly and is well specified in terms of the objectives of the Discovery Phase. The Project shows good alignment to the business opportunity and the supporting material has been developed to a good standard. The Project is assessed to be focussed on energy network innovation.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

There is a clear plan for any successful product roll-out within the lead applicant's organisation and the investment needs for this have been considered. User acceptance testing to ensure that the services developed are valuable to users, including within networks own organisations will also be needed. Other Transmission Operators and the Electricity System Operator are discussed, but the route to for exploiting the tool across these other networks and the value proposition to them have not yet been clearly defined. As such, we imposed a Project-specific condition on the Project for it to provide, as part of it ends of Project Phase report, evidence that the Project's tools and techniques are being designed in a way which will enable use by other networks.

Overall, the application is not viewed to undermine the development of competitive markets.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

An extensive literature and Project review has been provided within the application. There is sufficient supporting information to suggest that the approach is novel and provides commercial differentiation.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

There is a strong consortium behind the proposal with a good mix of stakeholders, academic input and the MET office. The balance of skills across the partners should deliver the required outcomes.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs are assessed as being within expected market rates and the overall Project cost is suitable for the planned scope of work. There is a contribution in kind from Project Partners which improves the value for money case.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan shows a considered approach to aligning tasks, milestones and associated resourcing with the overall objectives of the proposal. The risk register has identified a good range of risks with some mitigating actions. Overall, the Project methodology gives confidence of successful delivery for this Phase.

Virtual Energy System

Table 71: Virtual Energy System Project costs

Total eligible costs	£ 163,178
Total contribution	£ 13,260
Total SIF Funding requested	£ 149,921

Table 72 Project Partner funding breakdown for Virtual Energy System

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
National Grid Electricity Systems Operator Limited	£25,225.98	£25,225.98	£0.00
Arup Limited	£119,960.00	£119,960.00	£0.00
National Grid Gas Plc	£839.11	£0.00	£839.11
Western Power Distribution Plc	£5,456.00	£2,728.00	£2,728.00
Scottish Power Energy Networks Holdings Limited	£9,692.32	£0.00	£9,692.32
National Grid Electricity Transmission Plc	£2,004.91	£2,004.91	£0.00
National Grid Electricity Systems Operator Limited	£25,225.98	£25,225.98	£0.00
Scottish Hydro Electric Transmission Plc	£1.00	£1.00	£0.00
Northern Gas Networks Ltd	£1.00	£1.00	£0.00

Project description

Development of a common framework to enable interoperability of a wide range of digital twins using open data.

Summary of Expert Assessors' feedback

The scope and ambition of the virtual energy system initiative is ambitious with the potential to provide the energy sector with a powerful tool for operation, collaboration and innovation. The Discovery Phase described in this application has been well scoped, and the Project provides a suitable first steppingstone towards achieving the wider strategic aspirations.

The range of organisations involved in delivery have very relevant expertise and skills to develop successful Project outcomes. Additional involvement from future users of the virtual energy system, such as organisations involved in scale data processing, would add value to the group. Some concerns have been raised about the resource costs required to deliver some of the Project activities, and the Project should challenge itself to be fully transparent with costs of subcontractors and to deliver best value for consumers.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

As part of its end of Project Phase report, the Funding Party must demonstrate how the Project's activities differentiate from other digital twin activities with cost-allocations under the price control mechanism, and how the SIF Funding is being used for higher risk, innovative components of development.

Condition 4

As part of its end of Project Phase report, the Funding Party must outline how intellectual property and licensing arrangements will be managed throughout the Project delivery to ensure participation opportunities are maintained for all interested parties, and the risk of creating a technical monopoly over the virtual energy system is mitigated.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The Big Idea is ambitious and well aligned with the requirements of the Innovation Challenge. The long-term strategy of developing a full virtual energy system is likely to run in to a range of challenges and difficulties. Though the approach of commencing with a Discovery Phase Project and laying the foundations of the initiative through the Common Framework is seen as a sensible approach. Management of Intellectual Property will be

important to ensure that licensing arrangements do not limit the scope of opportunity for third parties and smaller organisations in participating or interacting with a future virtual energy system.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

A range of potential impacts have been considered within the proposal, including economic, environmental, and service provision to consumers. An outline estimation of the financial benefit that could be realised is given of £13M per annum, which we view as achievable. Although this is acknowledged to be indicative and will need to be tested through more detailed analysis in later phases.

Eligibility Criterion 3: Projects must involve network innovation.

The Project has been reasonably well described. Furthermore, biographies of the delivery team have been provided which give confidence in their ability to deliver. There is a clear energy network focus of the Project, with potential for other energy vectors or demand side loads to be included within the scope of the common framework.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The output of the Project is clearly outlined and future potential costs and commercial value have been considered. We acknowledged the complexity around ownership of outputs, Intellectual Property, and the balance between commercialisation and public good for such a product/service. However, the response lacked any vision as to how this may potentially develop over time. Although the Project is not viewed as undermining the development of competitive markets at this stage, we recommend further consideration of how the outputs will be licensed, curated or governed will be necessary in later phases. This should include demonstration that they maintain or improve the development of competitive markets. As such, we imposed a Project-specific condition on the Applicants to include, as part of its end of Project Phase report, an outline of how intellectual property and licensing arrangements will be managed throughout the Project delivery to ensure participation opportunities are maintained for all interested parties, and the risk of creating a technical monopoly over the virtual energy system is mitigated.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The response demonstrates a comprehensive understanding of the landscape of existing and planned innovation around the subject matter, and seeks to collaborate with and integrate the outputs of these into the workstreams of the Virtual Energy System. There is good justification of how this project is novel to energy networks, and the scale of ambition is certainly risky.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The consortium is viewed as being well constructed with an appropriate range of capabilities and skills represented.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs are appropriate and mostly used to cover the cost of the primary delivery Partner. All costs have been properly justified although the application would have benefitted by further breakdown of costs by subcontractor and against their activities.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The work plan and risk appendix attached have been completed to a quality which gives confidence in the delivery team’s ability to successfully execute within the Project period. The risk matrix covers commercial, technical and regulatory aspects and provided suitable mitigations.

Eye in the Sky - Utilising satellite data to improve grid resilience in emergency

Table 73: Eye in the Sky Project costs

Total eligible costs	£119,105
Total contribution	£0.00
Total SIF Funding requested	£119,105

Table 74: Project Partner funding breakdown for Eye in the Sky

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
National Grid Electricity Transmission Plc	£66,358.66	£0.00	£66,358.66
National Grid Gas Plc	£4,664.00	£0.00	£4,664.00
Spottitt Ltd	£48,082.22	£0.00	£48,082.22
European Space Agency - ESRIN	£0.00	£0.00	£0.00

Project description

Investigating remote sensing satellite data analytics to inform and predict asset management, network faults and impacts of extreme weather events

Summary of Expert Assessors' feedback

All assessors have viewed this application positively. The problem is well described and there are considerable benefits associated with asset resilience and therefore savings to the end user.

The main gap identified in previous innovations is using satellite imagery to support the response to extreme events. This gap should be considered in the discovery phase. To finesse the Project , the Project Partners should ensure that technology always remains in service of the business goals it is there to support, that greater attention is paid to stakeholders (raising their awareness and learning their needs, particularly field workers) and that the route to market develops a better plan for inclusive scalability.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
As part of its end of Project Phase report, the Funding Party must include justification as to why the Project should continue with SIF Funding rather than under business-as-usual activities.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The Project has been assessed and complies with the Data and Digitalisation challenge requirements. The idea has been broadly defined, whilst the solution may not be clearly defined yet the approach and benefits are clearly documented. Through Discovery Partners must identify quickly the area of focus where most value can be added.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The Application benefits are clearly described for Economic and Regional impacts.

Eligibility Criterion 3: Projects must involve network innovation.

The application involves reasonable network innovation, which is clearly articulated. The extent of the innovation will depend on how innovative the project is in use of data science and analytics to derive insight and forecasts from the satellite imagery.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The value to the lead network is well defined. For the Discovery Phase, it is overall a good plan for the lead network BAU implementation however, it would have been useful to consider how this innovation would transfer and impact operational efficiencies. For example, how will processes and systems transition to new approach. As such, we imposed a Project-specific condition for the Project to justify why the Project should be continue with SIF Funding rather than under business-as-usual activities.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The level of the innovation is clearly explained and supported with some evidence. There are alternative approaches not involving satellites that could have been explored for example GIS models, created by airplanes using LIDAR produce high resolution maps, or ground and asset located sensors. There are various other Projects / initiatives supporting networks to use satellite imagery and the Project should continue to work closely with related initiatives to support better learnings.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The representation of Project Partners and stakeholders is credible for the delivery of the Discovery Phase. With specific credit given from one Assessor for including the water sector mentioned It would be useful to understand the deliverables each partner is delivering.

Particularly the intent to help scale the capability to other energy networks.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project team is reasonable for task and available timescale. The balance of costs between the partners is generally justified. The Project should also continuously consider if the ESA is the best value for money for consumers in future phrase.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan is well structured with clear work packages. A good assessment of the risks has been provided. Appropriate mitigation is presented, and the risks are re-scored post mitigation.

Annex 3: Application assessment - Innovation Challenge: zero emissions transport

Chapter 4 of this document provides detail about the scope of the Innovation Challenge: zero emission transport, as well as summarising the total number of Projects funded and total value of SIF Funding awarded.

This annex details our assessment and decisions on Applications submitted in response to that Innovation Challenge. Our assessment of each Project is set out within:

- Pages 141-157 set out our assessment of each gas Project that has been selected for funding, together with our decision.

- Pages 158-161 set out our assessment of each gas Project that has not been selected for funding, together with our decision. These tables are however redacted from our published document, in order to protect the IPR and innovations of unsuccessful projects.

- Pages 162-168 set out our assessment of each electricity Project that has been selected for funding, together with our decision.

- As all electricity Projects submitted under this challenge were selected for funding, no electricity Projects were redacted from the published document.

Gas Projects selected for funding

HyNTS Deblending

Table 75: HyNTS Deblending Project costs

Total eligible costs	£148,141
Total contribution	£0.00
Total SIF Funding requested	£148,141

Table 76: Project Partner funding breakdown for HyNTS Deblending Project costs

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
National Grid Gas Plc	£21,908.00	£0.00	£21,908.00
Element Energy Ltd	£66,725.00	£0.00	£66,725.00
HyET Hydrogen BV	£34,320.18	£0.00	£34,320.18
Element 2 Limited	£13,000.00	£0.00	£13,000.00
Jaguar Land Rover	£12,187.84	£0.00	£12,187.84

Project description

Exploring options for different hydrogen blends to allow for refuelling stations directly on the network.

Summary of Expert Assessors' feedback

The proposal has been assessed as ambitious and able to provide a good evidence base on the widespread use of hydrogen as an energy vector to meet transportation needs. A single assessor raised concerns around the costs for delivery, and highlighted that alternative approaches should be considered in the early phases. If successful, the Project could provide good demonstration of the technical and commercial feasibility of using hydrogen as a transportation fuel. It has potential to provide benefits back to network consumers and consumers through the emissions reductions and continued reliability of their energy supply.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
Prior to the commencement of the Project, the Funding Party must provide to Ofgem and UKRI evidence that the Project does not duplicate any work included in the existing Network Innovation Allowance (NIA) and Network Innovation Competition (NIC) projects NIA_NGGT0177 and included under phase 2 of NIC NGGTGN04 .

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The proposal is viewed as being extremely ambitious and well suited to addressing the zero emission transport Innovation Challenge. We agree with the assessors that assumptions against the outline design should be tested at the feasibility study stage, rather than presuming the optimal approach from the outset. Furthermore, the Project scope operates on the presumption that a policy decision will be made to use significant amounts of hydrogen in the gas grid. The Project should engage closely with Ofgem and government to track and provide evidence to inform these policy decisions.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The use of the gas network to accommodate the distribution of hydrogen made from surplus renewables power and from carbon captured steam-methane reformation, coupled with the provision of separation facilities, offers a route to early adoption of hydrogen as a transport fuel. A qualitative justification of achievable benefits is provided.

Eligibility Criterion 3: Projects must involve network innovation.

The Project summary has been assessed to be clear and informative. The applicants have outlined the network innovation aspects of the Project well.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The Project is not viewed as directly undermining the development of competitive markets. The Project does have potential to bring a transport fuelling approach using hydrogen to market. This is likely to be in competition with other approaches to transportation fuelling, but does not undermine the development of alternative approaches. A route to market has

been articulated but the Project will have to demonstrate commercial value and competitivity in comparison to alternatives.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The commentary and appendix provide good insight into relevant prior works that support the technical basis for the solution both nationally and internationally. The proposal offers novel approaches by using smaller, transportable units that can be deployed to end user sites rather than at gas network sites. Proof of a commercial model for scaling at a national level beyond initial demonstration would also be regarded as an innovative addition to past work.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The Project team is composed of organisations from across the value chain. The participation from the partners is welcome and necessary to meet the challenges of the Project delivery.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

We agree with assessors who viewed the costs as being fair and reasonable in comparison to market rates, for the type and scope of work to be delivered. Additional contributions from commercially benefitting Project Partners would be expected in later phases.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project has been planned through Discovery, Alpha and Beta Phases. Alongside assessors, we have reasonable confidence that the Project plan is robust enough for Discovery Phase delivery. The Project should note that Projects are expected to take a responsive and flexible approach to Project planning, as learning and developments are made through each Phase. The risk register meets the minimum standards but could be more comprehensive.

HyPark

Table 77: HyPark Project costs

Total eligible costs	£150,000
Total contribution	£0.00
Total SIF Funding requested	£150,000

Table 78: Project Partner funding breakdown for HyPark

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
Wales & West Utilities Limited	£38,582.62	£0.00	£38,582.62
PassivUK Limited	£86,729.28	£0.00	£86,729.28
Easee Ltd	£20,000.00	£0.00	£20,000.00
Scottish Power Energy Networks Holdings Limited	£1,592.10	£0.00	£1,592.10
Scottish & Southern Electric Plc	£1,020.00	£0.00	£1,020.00
Western Power Distribution Plc	£2,076.00	£0.00	£2,076.00

Project description

Development of an intelligent EV charging hub supported by the gas network for constrained urban areas.

Summary of Expert Assessors' feedback

This is a strong proposal for a Discovery Phase Project which is suitable for funding. It appears to take an innovative approach to managing EV charging demand, although the literature review of alternative approaches should be expanded during the Discovery Phase. There is good representation from a range of relevant stakeholders. Quantification of the benefits, particularly against the counterfactual of grid reinforcement or alternative approaches will have to be developed.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
Prior to commencement of the Project, the Funding Party Project must engage with members of the team behind the Project "Resilient and Flexible Railway Multi-Energy Hub Networks for Integrated Green Mobility" SIF Project to identify common areas of scope and collaboration opportunities. Additionally, the Funding Party must share its end of Project Phase report with members of the team behind the Project "Resilient and Flexible Railway Multi-Energy Hub Networks for Integrated Green Mobility".

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The focus of producing electricity at the point of need for high density, rapid EV charging, combined with storage, heat use and analytics/smart connections, is well-described and addresses the problems and opportunities described earlier. It is considered ambitious and addresses the aims of the Innovation Challenge.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The applicant has provided a good description of credible benefits arising from the innovation. Further quantification of benefits will be required in later stages to give confidence that these benefits can be realised by the consumer. Potential negative unintended consequences should also be considered to mitigate the risk of scaling the innovations.

Eligibility Criterion 3: Projects must involve network innovation.

The Project summary is brief but gives a reasonable understanding of the scope and aims of the Project. The sector-coupling approach to providing transportation fuelling solutions is viewed as innovative. Greater consideration could be given to the commercial innovation required to implement the technical solutions. There is a clear network innovation focus of this Project.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The route to market is outlined to an acceptable level. There are no concerns that the Project might undermine the development of competitive markets but the energy network leads should endeavour to make available equal access to third party technology if the Projects progresses to later stages.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The Project is viewed as providing innovative components and is sufficiently risky to meet this SIF Eligibility Criteria.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

There is good stakeholder representation in the Projects with good skillsets to deliver the Project.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The costs have been assessed as reasonable for the scope of work in the Discovery Phase.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan is reasonable to give confidence of successful deliver of the Project. Work packages and deliverables could have been described in better detail, including outlining the measurables that will demonstrate successful delivery. The risk analysis is good quality. It includes and quantifies expected major risks.

Multimodal Hydrogen Transport Refuelling Study

Table 79: Multimodal Hydrogen Transport Refuelling Study Project costs

Total eligible costs	£89,445
Total contribution	£0.00
Total SIF Funding requested	£89,445

Table 80: Project Partner funding breakdown for Multimodal Hydrogen Transport Refuelling Study

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
Northern Gas Networks Plc	£2,520.00	£0.00	£2,520.00
Element Energy Limited	£34,125.00	£0.00	£34,125.00
Transport for the North	£7,920.00	£0.00	£7,920.00
Durham University	£13,005.00	£0.00	£13,005.00
Herriot Watt University	£31,875.00	£0.00	£31,875.00
Eversholt Rail Limited	£0.00	£0.00	£0.00

Project description

Evaluation of the potential for using hydrogen for HGVs.

Summary of Expert Assessors' feedback

The applicants have presented an ambitious proposal which could have considerable impacts. Benefits realisation for consumers and the investment requirements to execute a strategy could be better quantified and will need to be built upon in future phases and for the Alpha Phase Application. There was strong support for funding the Project, but it was noted that stringent Project management and a focus on valuable outputs would be required. A high performing team has been presented which gives confidence that there is potential for successful delivery of the proposed scope.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:
Condition 3
As part of its end of Project Phase report, the Funding Party must evidence its consideration of potential regulatory barriers as part of its overall deployment strategy.

Condition 4
As part of its end of Project Phase report, the Funding Party must document specific details on how the Project plans to realise benefits for consumers, and the investment requirements needed for the execution of its strategy.

Condition 5
The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The idea is explained with clarity and gives confidence of comprehensive evaluation of how hydrogen fuelled heavy road and rail vehicles can be serviced. The proposal is ambitious and aligns well with the requirements of the zero emission transport Innovation Challenge.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

A clear set of benefits are identified for existing energy networks, as well as other stakeholders.

Eligibility Criterion 3: Projects must involve network innovation.

The scope of the Project is well presented and explains the aims and methods together with details of the personnel involved. There is a clear network innovation component.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

We have no concerns that the Project would undermine the development of competitive markets.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The proposal follows a series of funded collaborations exploring the various aspects of the drive to hydrogen as a transport fuel. A fairly comprehensive review of related Projects and innovations in this area has been provided. The whole system approach and ambition to develop a coordinated strategy is viewed as a novel and potentially impactful to address market failures that have impeded progress in this area previously.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

There is good representation from a range of stakeholders covering the North of England. Given the Project scope the additional inclusion of an electricity distribution network would be valuable.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

Project costs are broadly viewed as providing value for money and costed competitively for the scope of work. The scope of work is viewed to be ambitious within the costs of the Discovery Phase.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The overall Project plan is logical with a clear methodology and outputs defined. The Discovery Phase activities are viewed as being ambitious and will need to be managed closely.

Rail Decarbonisation Planning

Table 81: Rail Decarbonisation Planning Project costs

Total eligible costs	£124,994
Total contribution	£11,400
Total SIF Funding requested	£113,594

Table 82: Project Partner funding breakdown for Rail Decarbonisation Planning

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
Northern Gas Networks Plc	£4,320.00	£0.00	£4,320.00
EA Technology Limited	£57,808.75	£0.00	£57,808.75
Frazer-Nash Consultancy Limited	£44,855.47	£0.00	£44,855.47
UK Power Networks (Operations) Limited	£6,610.04	£0.00	£6,610.04
Network Rail Limited	£6,650.00	£6,650.00	£0.00
Eversholt Rail Limited	£4,750.00	£4,750.00	£0.00

Project description

Development of an overarching implementation strategy and a methodology to decarbonise rail.

Summary of Expert Assessors' feedback

This is a competent proposal involving the rail, gas and electricity networks for a Project to investigate alternate technologies to mainstream electrification to enable an optimal plan for the complete decarbonisation of rail transport. There would be positive benefits for all three networks in devising a toolkit for finding optimum solutions. There was unanimous

agreement that this Project warranted funding and is in line with the objectives of the SIF and the zero emission transport Innovation Challenge.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The idea shows ambition and addresses the scope of the Innovation Challenge well. The outputs could be used to develop more detailed plans for location specific decarbonisation and inform the optimal use of technologies.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

A comprehensive list of qualitative benefits was submitted. The Discovery Phase will derive comparative metrics to guide further decision making. Benefits include a cost-efficient transition to low carbon rail, with benefits realised for both energy network customers and rail users.

Eligibility Criterion 3: Projects must involve network innovation.

The Project summary is very clear and sets out the parameters for the toolkit to be developed.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The value proposition of this Discovery Phase to the consortium members is reasonably well described. The proposal is not viewed as undermining the development of competitive markets.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The applicants show a good understanding of current approaches to rail electrification and has given a good explanation of how their idea is innovative in comparison. The approach of viewing rail decarbonisation plans on a more localised basis in conjunction with the challenges of the energy networks is novel and innovative.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

There is good representation from a range of organisations within the Project, with further engagement with wider stakeholder planned both across the rail and energy sectors. There is clearly a strong energy network component. As the Project progresses the innovation requirements of the energy sector will need to be described in more detail, with mature activities being built into business-as-usual operations at the earliest opportunity.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project budget and its distribution between the Project Partners are appropriate. It is sufficiently explained why public funding and support is required for a process that creates collective investigation of the challenges and joint ownership of solutions between the rail, electricity and gas networks. Contributions in kind are made by Project Partners which further enhances the value for money offered.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan is clearly outlined with work packages and milestones established. The response demonstrates competency to successfully deliver against the proposed plan. A good risk register has been returned outlining most key risks with mitigations.

NAVIGATION

Table 83: NAVIGATION Project costs

Total eligible costs	£149,724
Total contribution	£0.00
Total SIF Funding requested	£149,724

Table 84: Project Partner funding breakdown for NAVIGATION

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
Southern Gas Network Plc	£0.00	£0.00	£0.00
Intelligent Power Generation Ltd	£49,997.35	£0.00	£49,997.35
Smart Power Networks Ltd	£49,896.55	£0.00	£49,896.55
Farad.ai (ALIAN Ltd)	£49,830.51	£0.00	£49,830.51

Project description

Developing a multi-disciplinary solution for EV charging hubs which could be supported by gas networks

Summary of Expert Assessors' feedback

This is a competent Application that identifies a genuine Problem at has identified opportunities for addressing it. It brings together a very complementary consortium to develop a new integrated product offering to accelerate the transition to renewable EV charging and support the use of hydrogen in gas networks. The cost-competitivity of the proposal against alternative approaches is still to be proven. This should be assessed as part of progression into later phases. There is merit in exploring the innovation opportunity, but meaningful sponsorship of the Project and its outputs need to be shown by the gas network lead. Furthermore, the Project would benefit from the direct involvement of an electricity distribution network.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
As part of its end of Project Phase report, the Funding Party must include an assessment of the cost-competitiveness of its proposed solution against other approaches to solving the challenges of providing ultra-rapid EV charging infrastructure.

Condition 4
Prior to Project commencement, the Funding Party must provide to Ofgem and UKRI an updated Project plan to demonstrate specific roles, responsibilities and outputs for Southern Gas Networks (SGN) as the Funding Party.

Condition 5
As part of its end of Project Phase report, the Project must demonstrate consideration of the future role of an Electricity Distribution Licensee with the Project.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The innovative step within the Project lies in bringing together three 'proven technologies' in a novel combination: an AI-powered model to identify optimal siting for ultra-rapid EV chargers; a fuel-flexible, pollutant-free power generator and a smart network controller (SNC) to ensure compliance with technical requirements and enable participation in balancing and flexibility markets. The proposal is viewed as ambitious.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

It is convincingly explained in qualitative terms how the enhanced provision of ultra-rapid charging points in locations of main consumer demand will mitigate range anxiety and deliver economic and environmental benefits both to consumers and network operators. Some metrics for evaluating benefits are proposed and quantified analysis will need to be developed for future rounds.

Eligibility Criterion 3: Projects must involve network innovation.

It is sufficiently explained how the Project aims to demonstrate how the gas network can provide an attractive and viable alternative energy vector to provide power for the ultra-rapid EV charging infrastructure. The energy network relevance of the Project is described concisely and clearly.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The applicant has a good understanding of the potential market that could be served by this new offering, and intends to go to market through a joint venture with the Project Partners. The importance of electricity DNOs in the route to market is in contrast with the lack of an electricity network Project Partner in the Discovery Phase. There is no risk to the development of competitive markets, but energy networks should ensure equal access of third parties to procurements of technologies if the concepts progress to business as usual.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The applicants provide a convincing explanation of the innovative aspects of their proposal. A more detailed analysis or comparison with other possible solutions, and in particular more consideration of global approaches to solving the challenges of provision of ultra-rapid EV charging infrastructure would however strengthen this aspect of the proposal. As such, we imposed a Project-specific condition for an assessment of the cost-competitiveness of the Project's proposed solution against other approaches to solving the challenges of providing ultra-rapid EV charging infrastructure.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

There is good participation from a range of stakeholders, although the direct Project participation of an electricity distribution network would be expected given the integrated nature of approaches.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The costs appear reasonable against the scope of the proposed works. Resource costs are competitive and represent good value for money relative to standard market rates. The lack of costs assigned to the gas network lead bring in to question the extent of their involvement and sponsorship of the Project. As such, we have imposed a Project-specific condition seeking clarity on the specific roles, responsibilities and outputs for Southern Gas Networks (SGN) as the Funding Party.

Conversely, it is welcome to see the energy network give access to third parties to explore innovative ideas. In later phases some cost allocations to a gas and electricity distribution network would be expected to enable those organisations to govern the Project fully and put in place internal processes to ensure a swift route to market for successful innovations.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan is defined to a good level of detail. The 5 core work packages are outlined with responsibilities assigned to each Project Partners.

An outline outlined which gives sufficient confidence that the Project can be delivered in a timely manner. The initial risk register is competent, with key risks are highlighted for each work package. The requisite capabilities are represented across the Project Partners. The risk register is good and identifies main risks with mitigations.

Gas Projects not selected for funding

Table 85: [REDACTED]

Table 86: [REDACTED]

Table 87: [REDACTED]

Table 88: [REDACTED]

Electricity Projects selected for funding

Resilient and Flexible Railway Multi-Energy Hub Networks for Integrated Green Mobility

Table 89: Resilient and Flexible Railway Multi-Energy Hub Networks for Integrated Green Mobility Project costs

Total eligible costs	£151,938
Total contribution	£33,158
Total SIF Funding requested	£ 118,780

Table 90: Project Partner funding breakdown for Resilient and Flexible Railway Multi-Energy Hub Networks for Integrated Green Mobility

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
SP Transmission Plc	£5,307.00	£5,307.00	£0.00
University of Leeds	£100,638.56	£10,063.86	£90,574.70
Network Rail Limited	£12,000.00	£12,000.00	£0.00
Ricardo-AEA Ltd	£31,338.79	£3,133.88	£28,204.91
SP Distribution Plc	£2,653.50	£2,653.50	£0.00

Project description

Exploring decarbonised rail as a source of flexibility through integration.

Summary of Expert Assessors' feedback

This is a competent proposal for an initial study of the possibility of developing and networking multi-energy hubs based around railway stations to improve energy efficiency and provide more flexibility to support power grid operation. It is viewed as an innovative idea with sufficient prospects to deliver benefits to energy network consumer/user. The majority of assessors have recommended that this proposal is funded. Some assessors felt that the Project plan could have been more robust, providing more granular detail on the planned activities and outputs of Discovery Phase. Further work to define the expected outputs in more detail, and quantify the potential benefits should be carried out to be presented during assessment in later phases.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
Prior to commencement of the Project, the Funding Party must provide to Ofgem and UKRI details of expected outputs and specific activities under each work package.

Condition 4
Prior to commencement of the Project, the Funding Party must engage with members of the team behind the Project ''A Holistic Hydrogen Approach to Heavy Duty Transport (H2H)" SIF Project to identify common areas of scope and collaboration opportunities. Additionally, the Funding Party must share its end of Project Phase report with the members of the team behind the Project "A Holistic Hydrogen Approach to Heavy Duty Transport (H2H)'".

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The proposal addresses the Innovation Challenge. The ambition is to develop a solution to be deployed at scale nationally to support the decarbonisation of rail. System benefits and multi-modal interactions are also in scope and addresses notable focal areas of the challenge.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

A plausible range of benefits for rail operators and wider potential economic impacts are outlined. Benefits will need to be qualitatively evidenced in more detail in future phases should the Project progress.

Eligibility Criterion 3: Projects must involve network innovation.

The Project summary is clear and sufficient.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

A broadly plausible progression from Project outcomes towards widespread implementation is outlined. The value proposition was described for direct Project participants, but buy-in and delivery of value to other stakeholders seems likely to be pivotal for a successful rollout and scaling commercially. A fuller analysis of the economic and commercial case for this approach would improve the case to progress the proposal in later stages. Overall, the proposal is not viewed as undermining the development of competitive markets.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The applicants have provided a good overview of their relevant past experience. A reasonable range of related past Projects has been given with justification that this proposal is an innovative iteration of previous work. The commercial aspect of innovation has been highlighted as particularly valuable.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The Project involves participation from some key stakeholders, notably Network Rail as the rail infrastructure owner. Direct Project participation from other technology providers and end users for other transport types would be a valuable addition.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs have been assessed to be reasonable and constitute value for money against the planned activities of the Project. An additional contribution of costs towards the Project has been given on top of the SIF cost allowance which enhances the value for money case.

The Project costs are broadly appropriate and the balance of costs between Project Partners seems reasonable given the distribution of the work.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan includes milestones, responsibilities and timings. It has been deemed suitable to give confidence of the ability to deliver in a timely manner, although greater granularity of activities and a more detailed risk register would have improved the

Application. As such, we imposed a Project-specific condition seeking greater detail of expected outputs and specific activities under each work package.

A Holistic Hydrogen Approach to Heavy Duty Transport (H2H)

Table 91: A Holistic Hydrogen Approach to Heavy Duty Transport (H2H) Project costs

Total eligible costs	£139,340
Total contribution	£31,102
Total SIF Funding requested	£108,238

Table 92: Project Partner funding breakdown for A Holistic Hydrogen Approach to Heavy Duty Transport (H2H)

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
SP Transmission Plc	£2,653.50	£2,653.50	£0.00
Ricardo-AEA Ltd	£81,416.04	£8,141.60	£73,274.43
Network Rail Limited	£15,000.00	£15,000.00	£0.00
University of Leeds	£34,964.29	£0.00	£34,964.29
SP Distribution Plc	£2,653.50	£2,653.50	£0.00
Scottish Power Ltd	£2,653.50	£2,653.50	£0.00

Project description

Exploring energy options for decarbonisation of the rail system.

Summary of Expert Assessors' feedback

The Project scope and objectives are viewed positively with all assessors recommending this proposal for funding. The holistic involvement of stakeholders and the analysis of a range of technological solutions. However, it was noted that the fact that the hydrogen solution is referenced in the Project title suggests a bias toward Project outcomes. Assessors felt strongly that the analysis should be approached objectively with all potential solutions being considered on their respective merits. There is a clear driver and benefit opportunity to the decarbonisation of rail which this Project could make a valuable contribution towards.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
Prior to commencement of the Project, the Funding Party Project must engage with members of the team behind the Project "Resilient and Flexible Railway Multi-Energy Hub Networks for Integrated Green Mobility" SIF Project to identify common areas of scope and collaboration opportunities. Additionally, the Funding Party must share its end of Project Phase report with members of the team behind the Project "Resilient and Flexible Railway Multi-Energy Hub Networks for Integrated Green Mobility".

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

This proposal meets the Eligibility Criterion. To expand the holistic approach to rail decarbonisation, the applicants are encouraged to consider the full range of options and technologies that might be deployed during the Discovery Phase. Including the trackside battery or direct connection to local renewables options that are briefly mentioned.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The removal of diesel from rail operation provides an opportunity to reduce carbon emissions associated with transportation. Furthermore, there are benefits to the energy networks and network consumers, particularly rail network infrastructure owners and train operating companies.

Eligibility Criterion 3: Projects must involve network innovation.

The Project is looking at the integration of networks, electricity, railways, and hydrogen and therefore will be addressing energy network innovation.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The Project is not seen to undermine the development of competitive markets. The route to market has been described to a sufficient level of justification, primarily stating that demonstration of preferred solutions following analysis will provide a route to market.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The collaborative approach between a range of network partners and the rail sector is viewed as innovative. The Project has considerable potential for consideration of technological and commercial innovation that supports network innovation. This would be supported by the introduction of innovative technology providers as preferred solutions emerge and analysis of options matures.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

It brings together a range of stakeholders across energy networks and rail. The Project summary is well articulated and provides a clear statement of approach.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs are reasonable for the Discovery Phase activities and are costed at competitive rates. A contribution in kind of 26.2% of Project costs is being provided by Project Partners which represents additional value to the consumer.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The applicant has provided a Project plan that is appropriate to the size of the Project. The Project plan and methodology were viewed as good enough to give confidence of Project delivery. Ratings of risks in the risk register appear optimistic given the nascent stage of many of the innovations under consideration.

Annex 4: Application assessment - Innovation Challenge: heat

Chapter 5 of this document provides detail about the scope of the Innovation Challenge: Heat, as well as summarising the total number of Projects funded and total value of SIF Funding awarded.

This annex details our assessment and decisions on Applications submitted in response to that Innovation Challenge. Our assessment of each Project is set out within:

- Pages 170-180 set out our assessment of each gas Project that has been selected for funding, together with our decision.
- Page 181 sets out our assessment of each gas Project that has not been selected for funding, together with our decision. These tables are however redacted from our published document, in order to protect the IPR and innovations of unsuccessful projects.
- Pages 182-188 set out our assessment of each electricity Project that has been selected for funding, together with our decision.
- As all electricity Projects submitted under this challenge were selected for funding, no electricity Projects were redacted from the published document.

Gas Projects selected for funding

Ch4rge - Emissions Capture

Table 93: Ch4rge - Emissions Capture Project costs

Total eligible costs	£144,782
Total contribution	£0.00
Total SIF Funding requested	£144,782

Table 94: Project Partner funding breakdown for Ch4rge – Emissions Capture

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
National Grid Gas Plc	£16,767.00	£0.00	£16,767.00
Project Environmental Solutions Ltd	£51,660.00	£0.00	£51,660.00
Mott Macdonald Limited	£76,355.00	£0.00	£76,355.00

Project description

Investigating a viable solution for compressor machinery train to capture gas losses from hydrogen for reinjection into the network.

Summary of Expert Assessors' feedback

Methane release reduction has been identified as a key outcome targeted following COP26. The means to achieve this on the National Transmission System are described thoroughly here and the Project presents an opportunity to move forward government objectives. The proposal has been very well prepared, with emissions reduction benefits well understood and a very robust Project plan presented. Assessors unanimously agreed that this Project was worthy of funding, although raised questions about how much continued innovation support was necessary ahead of transitioning solutions into business as usual.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
Prior to the commencement of the Project, the Funding Party must provide to Ofgem and UKRI evidence that the Project does not duplicate any work included in the existing CH4RGE projects (NIA_NGGT0164 and NIA_NGGT0174).

Condition 4
The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The proposal is well articulated, together with a clear indication of the current state of technology development and IP arrangements. On balance the proposal is assessed as meeting the Heat challenge requirements. As this is focused upon the elimination of emissions involved in the transportation of fuels used primarily for heat then it does offer potential for delivering benefits associated with heat.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The potential benefits are clearly defined, and appropriate metrics identified for tracking these benefits through Project development. These are primarily benefitting in emission reductions, although there is potential for some smaller financial benefits to consumers also. The assessment of potential benefits is comprehensive. The qualitative descriptions are appropriate for a Discovery Phase Application, although more quantified analysis will be necessary for progression in later phases. This question has clearly been fully considered by the applicant and the case made here is a good one.

Eligibility Criterion 3: Projects must involve network innovation.

The commentary offers an excellent summary of the objectives in the Project and how they will overcome specific needs in the gas network(s) at a critical time nearing Net-Zero deadlines. The detail is concise and very clear.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The route to market plan is described very clearly and there is sound logic underpinning the structure of the planned roll out of this innovation when proven. The value proposition is clear and makes solid sense and the applicant has a clear appreciation of the participation of all other stakeholders in the roll out phase. The commentary also provides insight to the plans for dissemination and sharing of lessons learnt to peer organisations. This meets the requirements to ensure maintenance of fair competitive markets.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The commentary provides a strong case for the need for this innovation and references the positive impacts it can bring. It also presents a good case for the raised risk levels involved in this proposal. This is a strong response with the main concerns noting that the concepts considered here are well developed. These raise the questions of whether the innovations under assessment could be rolled out as business as usual at an earlier stage. This should be assessed and considered at the Alpha Phase Application.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The organisations, personnel and skills have been clearly identified in the appendices. These provide confidence that the range of required competences are available with suitable stakeholders represented.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The overall cost base for the Project seems fair and balanced. Individual cost items are reasonable and look to be costed competitively. The labour rates quoted are in line with expectations for industry standards. Given the potential reduction in the business carbon footprint, this would seem to deliver value for money.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan and the risk management plan are aligned very well and both give confidence that the Project delivery will progress in a timely manner. There is good detail provided on the description of work packages and responsibilities are appropriate between the Project Partners.

Hydrogen Barrier Coatings for Gas Network Assets

Table 95: Hydrogen Barrier Coatings for Gas Network Assets Project costs

Total eligible costs	£74,706
Total contribution	£0.00
Total SIF Funding requested	£74,706

Table 96: Project Partner funding breakdown for Hydrogen Barrier Coatings for Gas Network Assets

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
National Grid Gas Plc	£11,869.00	£0.00	£11,869.00
Ultima Forma Ltd	£35,843.74	£0.00	£35,843.74
University of Warwick (Warwick Manufacturing Group)	£26,993.00	£0.00	£26,993.00

Project description

Evaluating coating for pipes to prevent accelerated wear and tear from hydrogen transmission.

Summary of Expert Assessors' feedback

The applicants have delivered a proposal that has defined a clear Problem, with potential solutions that could deliver significant emission reductions and potentially cost savings to the consumer. On the whole assessors considered this proposal to be extremely suitable for SIF funding due to the inherent uncertainty and risk associated with investment. The technical challenges to achieving the objectives of the study seem feasible given the expertise of the delivery team.

It is important that consideration is also given to how a successful solution could be deployed at scale, and the costs associated with doing so. Furthermore, close working with policy makers and regulators considering the future use of hydrogen in regulated networks is essential. This Project should consider the development and dissemination of an evidence case as a core output of the Project.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3
Prior to the commencement of the Project, the Funding Party must provide to Ofgem and UKRI evidence that the Project does not duplicate any work included in the existing Network Innovation Competition NGGTGN04 .
Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

Since this Project is likely to develop evidence which will facilitate decision making on the use of hydrogen for heating, addressing one of the core criteria of the heat Innovation Challenge. The application is also clearly articulated with success metrics identified.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

This proposal would start to fill a knowledge gap that is essential to inform the decision making for a hydrogen strategy due in 2026. Although the full benefits of transitioning to a low carbon gas system could not be fully attributed to this Project, successful demonstration of feasibility would enable significant carbon emission savings for consumers.

Eligibility Criterion 3: Projects must involve network innovation.

This is a technically challenging piece of work to deliver and this early-stage study will be critical to the pathway to that delivery. The proposal is clearly focussed upon gas network orientated innovation.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The approach to the route to market plan for a developed solution is set out well here and the commentary describes how a network of stakeholders will become engaged in its delivery. The value proposition is clear and the potential positive impact from the Project could be significant. Greater detail on the investment needs of third parties to bring ideas

to maturity, and to develop a supply chain of market ready products would be a valuable addition. There is applicability of solutions to gas distribution networks, for which the route to market could also be considered. There also appear to be potential international export opportunities by being early developers of these technologies.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

Past and related work in this area has been described comprehensively and gives confidence that this Project is novel and innovative in its scope. The utilisation and applicability of technical solutions proven in other sectors, and applied in novel environments or configurations is welcomed. Awareness and consideration of the challenges faced with scaling the deployment of the solution considered within the Project would be welcome. As such, we imposed a Project-specific condition ensuring no work is being duplicated with an existing Network Innovation Challenge.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The Project team has excellent credentials and seems highly likely to deliver this study very well. Project Partners should ensure adequate engagement and participation from policy makers and regulators throughout the Project. The response provided is considered, thoughtful and concise.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

Overall Project costs are entirely appropriate to the Project's objectives and the individual cost entries are highly competitive. The core benefits of a successful solution are likely to be applied principally to the operation of future gas networks, with the benefits delivering value directly to network consumers. Additional contributions are made outside of the funding request, presenting further value for money to consumers.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan is clear, with accountability for the delivery of each work package assigned to Project Partners. The deliverables from each work package are identified in the attached Project plan and provide confidence that the Project will be managed competently. The level of detail provided on deliverables and outputs is sufficient for Discovery Phase but will

need to be developed in more granular detail for future Phases. The timetable is ambitious, but the capabilities offered by the Project team give confidence that delivery is achievable.

Velocity Design with Hydrogen

Table 97: Velocity Design with Hydrogen Project costs

Total eligible costs	£55,542
Total contribution	£0.00
Total SIF Funding requested	£55,542

Table 98: Project Partner funding breakdown for Velocity Design with Hydrogen Project costs

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
Southern Gas Network Plc	£8,294.10	£0.00	£8,294.10
DNV Services UK Limited	£47,247.96	£0.00	£47,247.96

Project description

Assessing different techniques to improve impacts of hydrogen pressure on the pipe network.

Summary of Expert Assessors' feedback

The need to probe the upper acceptable limits for flow velocity for hydrogen and blends is critical to determining the capacity available on the existing network and the extent to which upgrades will be needed for the delivery of low carbon gases. Policy decisions will be taken on the use and transportation of hydrogen in several years. This is likely to provide evidence for consideration of those decisions but it could be challenged that the delivery of this Project is ahead of need. Whilst the Project would develop valuable insights and outputs, some assessors have questioned the degree of innovation involved in the Project and challenged whether this should be delivered through the SIF.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Condition 4
As part of its end of Project Phase report, the Funding Party must fully evaluate the most appropriate funding options to take forward the project. This must include consideration of continuation of the Project via the SIF Alpha and Beta phases, other re-openers within the RIIO-2 price control, and other possible funding streams such as BEIS innovation funding or private capital.

Condition 5
As part of its end of Project Phase report, the Funding Party must provide evidence of its review of the Network Innovation Competition NGGTGN04's areas of focus and efforts to avoid duplication with that project.

Ofgem assessment of Application
Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The Project aims to generate new knowledge to be openly disseminated to network operators through the development of new standards. These standards would be key enablers for the use of hydrogen in the gas networks for heating (pending policy decisions), therefore this proposal is seen as addressing the Heat Innovation Challenge with the potential for valuable outputs.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The benefits to the network operators from this Project will arise from better planning and cost management. There is justification of benefits to the final consumers, who ultimately bear the costs of network upgrades. Assessment of potential benefits has been given to a sufficient degree for this aspect of the Phase.

Eligibility Criterion 3: Projects must involve network innovation.

A clear Project summary has been provided and the key Project Partner, DNV, have the required capabilities to provide the Project with a good chance of success. The Project is directly focussed on gas network innovation and the development of standards for gas network operation. The Project summary materials have been completed to a good standard.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The route to market has been explained based on the revision of existing industry standards, However, recognition of the support needed from all gas networks, as well as the Health and Safety Executive to drive industry adoption could be clearer. IGEM will be an important stakeholder. The Project is not viewed to undermine the development of competitive markets, though industry acceptance and demonstration that all parties' views on standards have been accounted for will be required ahead of further implementation.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The value of conducting this work is well justified. Based on existing knowledge of this area, this Project was deemed to be a sufficiently novel proposal to meet this Eligibility Criteria. A more extensive literature review will be required for the Alpha Phase assessment to outline other projects in this area internationally. This should support justification of the innovative aspects of this Project and that the planned activities should not be carried out as business as usual by networks.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The Project Partners are deemed adequate for this Phase of the Project.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs are appropriate and should be sufficient to deliver the Project outcomes stated in the Project plan. There is a good balance of the costs between the Project Partners and clear evidence of skills and existing facilities to deliver the Project.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The team have identified four work packages to be delivered in the two-month duration of the Project. There is a good Project plan presented with good milestones explained and breakdown of the activities. The risk register is basic, more detail and mitigating actions could be provided. There do seem to be genuine risks associated with the collection of data, and the acceptance of Project finding by IGEM and other key stakeholders. The Project

delivery methodology is simple but gives sufficient confidence that the Discovery Phase Project can be delivered to plan.

Gas Projects not selected for funding

Table 99: [REDACTED]

Electricity Projects selected for funding

Flexible Heat

Table 100: Flexible Heat Project costs

Total eligible costs	£153,175
Total contribution	£15,317
Total SIF Funding requested	£137,858

Table 101: Project Partner funding breakdown for Flexible Heat Project costs

Project Partner Name	Eligible costs (£)	Project contribution (£)	SIF Funding requested (£)
SP Transmission Plc	£10,614.00	£1,061.40	£9,552.60
Swansea University (Active Building Centre Research Programme)	£32,027.12	£3,202.71	£28,824.41
Connected Response Limited	£23,460.00	£2,346.00	£21,114.00
Delta Energy & Environment Ltd	£34,440.00	£3,444.00	£30,996.00
E.On Energy Solutions Limited	£12,675.00	£1,267.50	£11,407.50
University Of Glasgow	£27,284.16	£2,728.42	£24,555.74
Sunamp Limited	£12,675.00	£1,267.50	£11,407.50

Project description

Assessing different techniques to improve impacts of hydrogen pressure on the pipe network.

Summary of Expert Assessors' feedback

The Application is very well written and has good representation in the Project partnership from a range of organisations with suitable capabilities for delivering the Project scope. Responses were strong throughout the Application, with some improvements noted for the Project plan and delivery methodology.

Greater focus must be given to the implementation of business-as-usual opportunities associated with domestic heat flexibility, and how these assets will be valued through network operation. This is viewed as paramount to the Project, which otherwise risks becoming another interesting study exploring the opportunities of novel heating systems but failing to establish a credible route to market. To mitigate that risk there ought to be economic cost assessments at later phases to assess the alternative approaches to managing electricity demand alongside the heat needs of consumers.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The Project scope has been clearly described and addresses the heat Innovation Challenge criteria well. The Project will investigate the potential value of thermal energy storage in providing flexibility to the electricity networks when deployed alongside electrified heating.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The response was provided in great detail, with the qualitative benefits aligned with expectations, and how they align with competition aims. Positive impacts on consumers have been outlined and the applicant has indicated that quantitative measures will arise from the Discovery Phase of the Project. Benefits include emissions reductions, cost savings, and improved system resilience.

Eligibility Criterion 3: Projects must involve network innovation.

Credible Project Partners are represented with complementary skills and knowledge suitable for the scope of activities proposed. It is clear that this proposal has good focus on

network innovation. Comparison of phase change materials in comparison to alternative technologies would improve the reliability of Project outputs.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The route to market has been described to a reasonable level. An estimation of the market size has been offered. The route to market focuses on the heat equipment manufacturers, a more developed explanation of how the network control and market aspects would be rolled out as business as usual would be expected for Alpha Phase and Beta Phase. The Project is not viewed to create any risks to the development of competitive markets.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

A fairly extensive review of previous research and innovation Projects has been provided. This focuses on studies conducted on the UK energy market and valuable learnings could be integrated from international work, particularly in countries with a high prevalence of heat pump usage. The applicant has justified how use of thermal energy storage for flexibility is novel and innovative as well highlighting what distinguishes this proposal from the other innovations. From the response, this Project appears innovative and may deliver services and products which are novel, fulfilling the SIF Eligibility Criteria of being novel, innovative or risky.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

Partners are deemed sufficient for this stage but inclusion of a vulnerable consumer advocate would strengthen outcomes and improve representation.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs presented seem appropriate to cover the Project activities with a reasonable balance of costs across the Project Partners. The response indicates that this Project’s outputs would be complementary to business-as-usual activity. The Project Partners are providing a voluntary contribution in kind which improves the value for money case.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The response has communicated the work breakdown very concisely with milestones and deliverables clearly stated. The risks identified appear appropriate with reasonable mitigation planned. The Project plan and methodology have been reasonably well thought through and give confidence that the Project team are capable of progressing the plan in a timely manner.

HEAT BALANCE

Table 102: HEAT BALANCE Project costs

Total eligible costs	£139,661
Total contribution	£13,966
Total SIF Funding requested	£125,695

Table 103: Project Partner funding breakdown for HEAT BALANCE

Project Partner Name	**Eligible costs (£)**	**Project contribution (£)**	**SIF Funding requested (£)**
SP Transmission Plc	£10,614.00	£1,061.40	£9,552.60
University of Edinburgh	£30,670.00	£3,067.00	£27,603.00
University of Glasgow	£25,995.00	£2,599.50	£23,395.50
Vattenfall UK	£7,115.38	£711.54	£6,403.84
Erda Energy Limited	£4,182.69	£418.27	£3,764.42
Ramboll UK Limited	£25,450.38	£2,545.04	£22,905.34
Delta Energy & Environment Ltd	£32,800.00	£3,280.00	£29,520.00
Wales & West Utilities Limited	£2,834.18	£283.42	£2,550.76

Project description

Understanding the role large scale thermal storage can provide for heat pump flexibility.

Summary of Expert Assessors' feedback

The evidence base for integrating large scale thermal storage into flexibility markets is lacking for the UK. It is not expected that this will be supported under energy networks business as usual functions. Good arguments have been provided for the potential value of these approaches to consumers, network operation, and to create commercial opportunities for network consumers with suitable assets. The Project proposal was assessed as being robust with many of the suitable stakeholders directly involved. Further detail, particularly on justifying expected benefits will be required, but this was viewed as a strong Application for delivery of a Discovery Phase.

Ofgem funding decision: SIF Funding approved

Ofgem agrees with the Expert Assessor's recommendations and approves SIF Funding, subject to the imposition of the Project-specific conditions below which seek to mitigate areas which were unclear or lacked information in the assessment of the Application:

Condition 3

As part of its end of Project Phase report, the Funding Party must evidence consideration and note details on adaption or changes to relevant regulatory and land use planning legislation required for successful deployment of large scale thermal.

Condition 4

The Funding Party must participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and BEIS during the Discovery Phase.

Ofgem assessment of Application

Eligibility Criterion 1: Projects must address the Innovation Challenge set by Ofgem.

The big idea proposed has been reasonably well articulated. The applicant has identified that large thermal energy storage schemes show promise in areas with suitable geologically characteristics. Investigating the potential of the technical potential of this approach to heat storage, alongside the commercial and regulatory requirements has significant potential at this stage. The proposal clearly addresses the heat Innovation Challenge.

Eligibility Criterion 2: Projects must have clearly identified potential to deliver a net benefit to gas or electricity consumers (whomever is paying for the innovation).

The applicants have clearly described and given justification for potential carbon and cost savings, providing some preliminary quantification. Deferral of network upgrades for heat demand has also been explained, but further articulation of how these benefits will be realised by consumers as business as usual should be provided in future Phases, should the Project progress.

Eligibility Criterion 3: Projects must involve network innovation.

The Project summary is very clear and there is a good balance of Project Partners.

Eligibility Criterion 4: Projects must not undermine the development of competitive markets.

The proposal offers explanation of the value proposition to energy networks, investors and UK energy consumers. A reasonable explanation has been given for how large-scale thermal storage opportunities have the potential to deliver value to the parties referenced. The Project is not viewed as undermining the competitivity of markets.

Eligibility Criterion 5: Projects must be innovative, novel and/or risky.

The case for developing this technology in support of mitigating electricity network management and resilience challenges is well made. There is a good understanding of similar innovations and with explanation of how this Project will build on past research. Thermal energy storage solutions currently do not exist as a flexibility tool for electricity transmission networks in the UK. Investigation of this and forming bettering understanding of how these solutions could be configured within the UK energy system is viewed as innovative and novel.

Eligibility Criterion 6: Projects must include participation from a range of stakeholders.

The Project brings together a good balance of Partners, including representations from academic, utility and commercial organisations. Community or consumer representation could further benefit the Project in future Phases.

Eligibility Criterion 7: Projects must provide value for money and be costed competitively.

The Project costs are justified and appear proportionate to the prosed delivery package in the Discovery Phase. The allocation of costs appears reasonable and contributions in kind have been offered by several of the Project Partners, strengthening the value for money case of funding this Project.

Eligibility Criterion 8: Projects must be well thought through and have a robust methodology so that they are capable of progressing in a timely manner.

The Project plan is very clear and the team is well divided between technical and commercial outcomes. The scope of work appears ambitious for the timelines attributed to them, but the quality of the Project plan and methodology provided sufficient confidence that the team can deliver.