

Northern Gas Networks Limited  
1100 Century Way, Thorpe Park Business Park,  
Colton Leeds,  
LS15 8TU

Direct Dial: 020 7901 7295

Email: [Marzia.Zafar@ofgem.gov.uk](mailto:Marzia.Zafar@ofgem.gov.uk)

Date: 25 September 2023

Dear Northern Gas Networks Limited,

**SIF Project Direction ref: NGN/HyCoRe/SIFIESRR/Rd2 Alpha**

Northern Gas Networks Limited submitted Hydrogen Cost Reduction (HyCoRe ) (the Project) to be considered for funding through the Alpha Phase of round 2 of the Strategic Innovation Fund (SIF). As explained in greater detail below, this Project previously received SIF Funding and completed a Discovery Phase for round 2 of the SIF. In our<sup>1</sup> SIF Funding Decision issued on 22 September 2023, we selected the Project<sup>2</sup> for conditional funding for the round 2 Alpha Phase and as a result we are now issuing this SIF Project Direction to implement that decision.

Northern Gas Networks Limited must comply with the conditions contained in this SIF Project Direction as a condition of the Project receiving funding through the SIF. These conditions can be found in the Schedule to this document.

**Progression through SIF Phases**

The SIF consists of a multi-phase approach for Projects in order to mitigate the risk associated with innovations. The Discovery Phase focuses on feasibility, the Alpha Phase on experimental development, and the Beta Phase on deployment and demonstration.

The Project previously received SIF Funding for the round 2 Discovery Phase<sup>3</sup> and submitted an Application for the Project to be considered for SIF Funding for the round 2 Alpha Phase of the SIF. As stated above, the Project has been selected by Ofgem to receive SIF Funding for the Alpha Phase of round 2.

---

<sup>1</sup> The terms 'we', 'us', 'our' refer to the Gas and Electricity Markets Authority. Ofgem is the office of the Authority.

<sup>2</sup> Unless otherwise specified, defined terms in this SIF Project Direction have the meaning given to them in Appendix 1 of the SIF Governance Document.

<sup>3</sup> The Project Directions for round 2 of the Discovery Phase are available at:  
<https://www.ofgem.gov.uk/publications/strategic-innovation-fund-round-2-discovery-projects-approved-funding>

## **Role of UK Research & Innovation (UKRI)**

As per Chapter 1 of the SIF Governance Document<sup>4</sup> the role of UKRI is to deliver the SIF in line with the SIF Governance Document - administering the funding programme, monitoring the delivery of Projects, collating data from Projects on benefits, making recommendations to Ofgem on operational matters, supporting third-party innovators and, where possible, successful Projects to become 'business as usual' activities. To support the success of the Projects and the SIF programme, we expect that the Funding Party and Project Partners collaborate with Ofgem and UKRI.

## **SIF Project Direction**

Paragraph 5.14 of the SIF Governance Document states that a SIF Project Direction will:

- Set out the Project-specific conditions, to which the Funding Party is committing in accepting SIF Funding.<sup>5</sup>
- Require the Funding Party to undertake the Project in accordance with the commitments made in the Application. Where appropriate, the SIF Project Direction may therefore include extracts from the Application or refer to specific sections of the SIF Application.<sup>6</sup>
- Where applicable, set out conditions (such as Project stage gates) linked to milestones and deliverables, which Projects must meet.<sup>7</sup>
- Set out the SIF Approved Amount for the Project, that will form part of the calculation contained in the SIF Funding Direction issued by the Authority under chapter 7 of the SIF Governance Document.<sup>8</sup>
- Set out the Project budget that the Funding Party must report against and how variations in the Project budget will be reported.<sup>9</sup>
- Where applicable, set out special information sharing requirements applicable to the Project.<sup>10</sup>
- Set out the mechanism for the Funding Party receiving the SIF Approved Amount as set out in the SIF Funding Direction.<sup>11</sup>

All SIF Project Direction requirements are detailed in the Schedule to this SIF Project Direction.

---

<sup>4</sup> <https://www.ofgem.gov.uk/publications/sif-governance-document>

<sup>5</sup> 'Project specific conditions' detailed under Point 3 – 'Condition President' of this SIF Project Direction.

<sup>6</sup> 'Project specific conditions' detailed under Point 3 – 'Condition President' of this SIF Project Direction.

<sup>7</sup> 'Project specific conditions' detailed under Point 3 – 'Condition President' of this SIF Project Direction.

<sup>8</sup> 'SIF Funding Amount' detailed under Point 5 – 'Condition President' of this SIF Project Direction.

<sup>9</sup> Annex 1 – Project Budget.

<sup>10</sup> 'Project specific conditions' detailed under Point 3 – 'Condition President' of this SIF Project Direction.

<sup>11</sup> 'SIF Funding Amount' detailed under Point 5 – 'Condition President' of this SIF Project Direction.

## **Decision**

Provided the Funding Party complies with the SIF Governance Document and with the Schedule to this SIF Project Direction, the Project is deemed to be an Eligible SIF Project<sup>12</sup>.

This SIF Project Direction constitutes notice pursuant to section 38A (Reasons for decisions) of the Gas Act 1986.

**Marzia Zafar**

**Deputy Director, Decentralisation & Digitalisation**

**For and on behalf of the Authority**

---

<sup>12</sup> The meaning 'Eligible SIF Project' is described in Chapter 2 of the SIF Governance Document.

## Schedule to SIF Project Direction

### 1. PROJECT DETAILS

SIF Project Direction reference: NGN/HyCoRe/SIFIESRR/Rd2\_Alpha

Application number: 10079341

Project title: Hydrogen Cost Reduction (HyCoRe )

Innovation Challenge/Project Phase: Improving energy system resilience and robustness  
/ Alpha Phase round 2

Project start date: 01 October 2023

Project end date: 31 March 2024

SIF Approved Amount for SIF Funding: £499,787.00

### 2. PREAMBLE

This SIF Project Direction is issued by the Gas and Electricity Markets Authority (the "Authority") to Northern Gas Networks Limited (the "Funding Party") pursuant to the SIF Governance Document issued pursuant to Special Condition 9.13 of the Gas Transporter Licence (the "Licence"). It sets out the conditions to be complied with in relation to Hydrogen Cost Reduction (HyCoRe ) (the "Project") as a condition of it being funded under the SIF Funding Mechanism.<sup>13</sup>

Unless otherwise specified, defined terms in this SIF Project Direction have the meaning given to them in the Licence or Appendix 1 of the SIF Governance Document.

References to specific sections of the Funding Party's Application in this SIF Project Direction are, for ease of reference, made by referring to the section number in the Funding Party's Application.

### 3. PROJECT SPECIFIC CONDITIONS

In accepting funding for the Project, the Funding Party is subject to the following Project-specific condition(s):

#### ***Condition 1***

The Funding Party must not spend any SIF Funding until contracts are signed with the Project Partners named in Table 1 for the purpose of completing the Project.

---

<sup>13</sup> The SIF Funding Return Mechanism is defined in the SIF Governance Document.

**Table 1. Project Partners**

CARBON TRUST ADVISORY LIMITED
KINEWELL ENERGY LTD
NORTHERN POWERGRID (NORTHEAST) LIMITED
OVE ARUP & PARTNERS LIMITED
NEWCASTLE UNIVERSITY
UNASYS LIMITED
LHYFE UK LTD
OFFSHORE RENEWABLE ENERGY CATAPULT
NATIONAL GAS TRANSMISSION PLC

### **Condition 2**

The Funding Party must report on the financial contributions made to the Project as set out in its Application. Any financial contributions made over and above that stated in its Application should also be reported and included within the Project costs template.

### **Condition 3**

The Funding Party must make reasonable endeavours to participate in all meetings related to the Project that they are invited to by Ofgem, UKRI and DESNZ during the Alpha Phase.

### **Condition 4**

The Funding Party must provide to its monitoring officer by the end of the Alpha Phase a summary of how existing and ongoing UK-based academic research is being incorporated and considered by the Project. The Funding Party may wish to also include academic research outside of the UK as part of its summary.

### **Condition 5**

The Funding Party must provide to its monitoring officer by the end of the Alpha Phase an explanation of how it will manage deployment of its proposed solution with its main identified end users (gas and electricity system operators). As part of this, the Funding Party must also provide a clarification as to if and how the Project's proposed solution will link with the business case of off taking hydrogen in addition to the Project's focus on producing hydrogen.

#### **4. COMPLIANCE**

The Funding Party must comply with Special Condition 9.13 of the Gas Transporter Licence (the "Licence"), the SIF Governance Document and with this SIF Project Direction.

#### **5. SIF APPROVED AMOUNT**

The SIF Approved amount of £499,787.00 (as detailed under Section 1: Project details of this Project Direction) will be recovered by National Gas Transmission from GB customers and transferred to the Funding Party. The Funding Party is responsible for notifying National Gas Transmission of the bank account details to which transfers must be made, in addition to completing Annex 2 of this SIF Project Direction. If a Funding Party is required to return funding to National Gas Transmission, the reverse applies. The Funding Party must provide bank account details to National Gas Transmission within two weeks of accepting this SIF Project Direction.

#### **6. PROJECT BUDGET**

The Project Budget is set out in Annex 1 of this SIF Project Direction.

The Funding Party must report on expenditure against each line under the category total in the Project Budget and explain any projected variance against each line as part of its detailed report which will be provided, in accordance with Chapter 7 of the SIF Governance Document. The Funding Party must report variations in the Project budget as outlined in Chapter 6 of the SIF Governance Document.

#### **7. PROJECT IMPLEMENTATION**

The Funding Party must undertake the Project in accordance with the commitments it has made in the Application and with the conditions of this SIF Project Direction. These include (but are not limited to) the following:

- (i) undertake the Project in accordance with its Application,
- (ii) complete the Project on or before the Project completion date as detailed under section 1 of the schedule of this SIF Project Direction, and
- (iii) disseminate the learning from the Project at least to the level described in chapter 3 of the SIF Governance Document. Dissemination of learning must be carried out whether the Project was concluded successfully or otherwise.

## **8. REPORTING**

Ofgem and UKRI may issue guidance (and amend it from time to time) about the structure and content of the Project reporting required by Chapter 6 of the SIF Governance Document. The Funding Party must follow this guidance in preparing the reports.

As set out in chapter 6 of the SIF Governance Document, the Funding Party may be required to submit an end of Phase report to the UKRI monitoring officer for the round 2 Alpha Phase. An end of Phase report is required for the round 2 Alpha Phase if the Project is not planning on submitting an Application to the round 2 Beta Phase and, if the Funding Party submits an Application for the Project for the round 2 Beta Phase but is not successful. Within this report, the Funding Party must submit information related to questions on Project delivery as detailed in chapter 6, table 6 of the SIF Governance Document.

## **9. MONITORING**

The Funding Party must comply with any reasonable request for information by its monitoring officer at UKRI and related deadlines. Ofgem, with the support of UKRI, will together monitor Project delivery, impacts and benefits. Throughout the term of the Project, progress is monitored by UKRI through a monitoring officer. The monitoring officer is the first point of contact for official notifications, queries and correspondence with UKRI and the Authority, unless otherwise required by this SIF Project Direction.

As detailed in Chapter 6 of the SIF Governance Document, meetings with the monitoring officer will take place at regular intervals, as advised by Ofgem or the monitoring officer during the delivery of the Project, and at the end of each Project Phase.

## **10. EVALUATION**

The Funding Party has acknowledged when it submitted its Application for this Project, that reporting information and data gathered during the Project's timescales (as detailed in Section 1 of this SIF Project Direction) will be used to evaluate Project performance. In addition, the Funding Party may be required to provide requested information outside of the Project timescales and, in particular, for the period from the Project end date to the end of the SIF Programme. Further data and reporting information may be requested (frequency and method based on requirement) outside of standard monitoring and reporting requirements as deemed necessary. Further data and information requirements must be complied with by the Funding Party and Project Partners.

## 11. DATA SHARING

As set out in Chapter 3 of the SIF Governance Document, the Funding Party must follow Data Best Practice Guidance with regards to all data gathered or created in the course of a Project. We expect the Funding Party to document any reasons, such as commercial sensitivities, for desensitising data. As defined by, and in accordance with, Data Best Practice Guidance, Funding Parties must have a data triage process. Where multiple Project Partners are collaborating on a Project, the consortium must adopt a consistent Open Triage Process for the data related to the Project. Ofgem may require that Project information and data is also shared with other specified parties, such as parties working on complementary innovation funding programmes (subject to redaction of sensitive data).

## 12. CYBER SECURITY

It is the responsibility of the Funding Party and all Project Partners to implement and maintain appropriate security measures to protect personal data in accordance with The GDPR (General Data Protection Regulation)<sup>14</sup> and DPA (Data Protection Act) 2018<sup>15</sup>. Protection of computer systems from unauthorised access or being otherwise damaged or made inaccessible must be in place alongside effective working practices. These must be maintained in line with the Funding Party's IT Management Strategies and policies.

## 13. PROJECT MILESTONES

The Funding Party must provide an outline in its end of Project Phase meeting with its UKRI monitoring officer that verifies the Project milestones have been achieved or explains why they have not.

Project milestones are outlined below in Table 3, based upon details contained within Question 7 and Appendix Question 9 in the Funding Party's.

<sup>14</sup> [https://ec.europa.eu/info/law/law-topic/data-protection/data-protection-eu\\_en](https://ec.europa.eu/info/law/law-topic/data-protection/data-protection-eu_en)

<sup>15</sup> <https://www.legislation.gov.uk/ukpga/2018/12/contents/enacted>



**Table 3. Project milestone<sup>16</sup>**

Reference	Project milestone	Deadline	Overall objectives and key tasks	Summary of milestones	SIF Funding Request
Milestone 1	Project Management and coordination	31 March 2024	Overall Work Package Objectives: OREC will lead the project according to ISO9001 and 14001 accredited procedures. The PM, Michelle Hitches, will chair weekly virtual meetings between the project partners: NGN, OREC, Kinewell, Arup, Newcastle University, Unasys, National Grid Gas, Northern Powergrid, Carbon Trust and Lhyfe, to review progress and spend against the Gantt chart; update the project plan as required; review risks and IP; review project benefits and co-ordinate reporting. Corrective action will be applied for minor deviations from the plan. Major deviations with proposed action will be communicated to the	M1: Project completion (£28,463.00).	£28,463.00

<sup>16</sup> As outlined in in the Application or Project Plan appendix.

			<p>funder for review and agreement. Project progress will be monitored against baseline plan and achievement of milestones.</p> <p>Key Tasks:</p> <ol style="list-style-type: none"> <li>1. Organise and record project update meetings</li> <li>2. Collation of reports and liaising with funder</li> <li>3. Coordination of WP tasks and team communication</li> <li>4. IP monitoring and management</li> <li>5. Risk monitoring and management</li> <li>6. Impact Assessment</li> <li>7. Final reporting</li> </ol>		
Milestone 2	Offshore and onshore zone considerations	31 March 2024	<p>Overall Work Package Objectives:</p> <p>The aim of this work package is to understand the areas of Great Britain (onshore and offshore) that are most likely from a strategic perspective to be high potential hydrogen-from-offshore-wind zones, delivering more economically</p>	<p>M1: Baseline hydrogen from offshore wind zones identified (£46,686.80).</p> <p>M2: Onshore and offshore hydrogen from offshore wind</p>	£232,037.20

		<p>efficient outcomes for consumers and de-risking delivery of net zero. This will enable greater understanding of the viability of green hydrogen for the regions of GB. This will involve:</p> <p>1. Conducting national modelling to help identify those high potential areas across GB where offshore wind for hydrogen production have the most significant potential, considering offshore and onshore constraints and opportunities, which will involve:</p> <p>Identification of potential offshore zones. Arup will identify and collate the datasets required for LCOH calculation in SCALE and the geospatial constraints datasets that need to be defined for the combined LCOH and geospatial constraints optimisation, if the dataset is openly (and publicly) available, with license terms permitting commercial use, free of charge. We will agree project-specific</p>	<p>zones identified (£77,753.00).</p> <p>M3: Regional modelling complete (£50,280.00).</p> <p>M4: Regional digital forward mapping in place (£40,200.00).</p> <p>M5: WP2 report and outputs (£17,117.40).</p>	
--	--	--	---	--

			<p>assumptions to create a baseline map of most favourable zones for hydrogen from offshore wind production.</p> <p>Onshore zone considerations. Building on the baseline map of most favourable zones developed by Arup, OREC, supported by NCL and Unasys will review the regional onshore opportunities and constraints including hydrogen offtakes, congested/difficult areas for electrical grid connectivity, uncongested/easy areas for gas connectivity, existing onshore infrastructure, existing and projected hydrogen demand, water constraints, and hydrogen storage capabilities.</p> <p>Integrating onshore considerations into national model . Building on OREC findings re. onshore opportunities and constraints, Arup will use SCALE to inform zone identification around GB that are best able to support the production of hydrogen. This will take in to account</p>		
--	--	--	---	--	--

			<p>factors such as likely LCOE and onshore network constraints that are likely to impact on the timing of connections to the electricity transmission network. Performing a sensitivity analysis. Arup will work with the partners to define a shortlist of sensitivity analyses tailored to the project's objectives. The number of sensitivities will be agreed and will take into account the effort required to integrate the onshore considerations. These could include examples such as assessing the impact of different treatment of 'hard' or 'soft' geospatial constraints presenting the balance between LCOH and geospatial considerations (environment, marine activity etc.); time domain targets (e.g. lease auctions profiled between 2035-2050); hydrogen connection approach (e.g. connections in GB, Europe or coordinated hydrogen hubs); and hydrogen transmission costs and pipeline</p>		
--	--	--	---	--	--

			<p>costs (e.g. the impact of utilising existing transmission pipelines).</p> <p>2. As a case study, analyse and model a regional specific solution to help better understand the infrastructure solutions that will provide connectivity between offshore wind production areas and energy consumers/ gas network.</p> <p>Kinewell Energy will carry out project specific modelling for the shortlisted zones identified by Arup through the national modelling activity. This project specific modelling will utilise Kinewell Energy's software solutions, including KLOC, KDOTS and KWOTA, to determine the inter-array layout and export system technologies required.</p> <p>3. Digital mapping of regional onshore infrastructure. The complexity of existing regional industrial infrastructure will bring challenges to the safe and resource-efficient project management of the design, construction, tie-in, safe</p>		
--	--	--	--	--	--

			<p>operation and maintenance of new Hydrogen transport lines and infrastructure. An integrated approach is necessary when seeking to decarbonise various energy sectors with reducing carbon emissions, controlling scope and cost, and ensuring the effective use of both on and offshore space. Having the ability to quickly incorporate informational changes from multiple sources in an environment which is intuitive to use with multiple layers of details, is a uniquely invaluable tool and becomes a conduit to extract additional value. This is particularly important in integrating developing/emerging new markets such as green hydrogen into an existing and established infrastructure, operating and delivery model. Having the ability to assess, optimise and resolve questions such as cable or pipeline, electrolyser location, storage and repurpose/new build decisions are at the</p>		
--	--	--	---	--	--

		<p>heart of the problem to ensure cost effective delivery and roll out. With this in mind, Unasys will build upon their existing Digital North Sea Platform to provide an overarching interactive 3D representation of the industrial landscape and infrastructure in a region of focus identified by Arup in 1, which will involve:</p> <ol style="list-style-type: none"><li>1. Preparing regional onshore infrastructure framework model. Adapting existing digital platform in preparation for additional model integration.</li><li>2. Developing the regional digital model. Developing regional specific model and interfacing with the National Underground Asset Register and infrastructure networks, to understand land ownership, regulation and planning issues.</li><li>3. Mapping the onshore asset dependencies. Development of a process</li></ol>		
--	--	---	--	--



		<p>flow diagram to understand the future energy needs of the region and asset interdependency issues.</p> <p>4. Developing a timeline for and map of the proposed onshore infrastructure changes. Digitally mapping proposed infrastructure changes in the context of land ownership, operations, regulations, planning, etc., and integrating a timeline, providing capability to show a full audit trail of infrastructure changes, which will be a valuable tool for organisations such as Regulatory Bodies, Marine Maritime Organisation, Carbon trust, The Crown Estate, etc. going forwards.</p> <p>Key Tasks:</p> <ol style="list-style-type: none"> <li>1. National modelling of offshore zone considerations</li> <li>2. Onshore zone considerations (to feed into T2.1)</li> <li>3. Regional modelling of infrastructure solutions</li> </ol>		
--	--	--	--	--

			4. Digital mapping of regional onshore infrastructure. 5. WP2 reporting		
Milestone 3	Technical challenges to hydrogen project delivery	31 March 2024	<p>Overall Work Package Objectives:</p> <p>While many techno-economic analysis on electrically integrated wind turbine electrolyser systems have been conducted, these have generally been relatively high level. In this work package, we propose to go into more technical detail, and perform additional economic studies, which account for added value, in addition to costs. This will involve:</p> <p>1. Identifying the technical integration challenges of connecting wind turbines and electrolysers for all configurations (offshore decentralised, offshore centralised, onshore centralised). This will focus on system integration aspects as well as electrical engineering aspects, like response times, black starts and energy storage to supply standby power</p>	M1: Key technical challenges associated with delivering a hydrogen from offshore wind project determined (£52,360.10).	£52,360.10

		<p>draw. This will be informed by our experience in commissioning a small scale hydrogen system at OREC's Blyth site, and our experience owning/operating a 7MW offshore wind turbine.</p> <p>2. Considering the supporting infrastructure of the integrated turbine – electrolyser systems, along with a cost reduction analysis. This would include additional/reduced costs of offshore platforms and turbine jackets, balance of plant such as the power supply, desalination, gas drying and energy storage for balancing the electrical system, black start capability and covering standby/idle periods.</p> <p>3. Exploring technical aspects around compression, including its energy requirement and hydrogen supply requirement, and the implications for low pressure hydrogen buffer storage. This will include a review of outputs from</p>		
--	--	---	--	--

		<p>previous hydrogen compression projects, such as those undertaken by Tractable and the Southwest Research Institute, and will build on existing knowledge.</p> <p>4. Identifying maintenance requirements for offshore hydrogen technology, including electrolysers, pipelines and compressors. We will link planned and unplanned maintenance to resilience. This task would cover points such as embrittlement, leak and fatigue checks.</p> <p>5. Performing a literature review on repurposing existing pipeline and gas storage facilities for hydrogen use. This will include potential complications, such as possible reductions in hydrogen purity, as well as how to conduct analysis of possible impurities and purification technologies.</p> <p>6. Assessing and quantifying the improvements to resilience and robustness that hydrogen technology deployment enables. This will include</p>		
--	--	--	--	--

			<p>failure rates of different parts of the system.</p> <p>Key Tasks:</p> <ol style="list-style-type: none"> <li>1. Analysis of turbine-electrolyser integration challenges.</li> <li>2. Integrated turbine-electrolyser supporting infrastructure requirements analysis.</li> <li>3. Hydrogen compression requirements analysis.</li> <li>4. Offshore hydrogen maintenance requirements analysis.</li> <li>5. Review of challenges associated with repurposing existing pipelines and gas storage facilities for H2 use.</li> <li>6. Resilience/robustness improvement assessment and quantification.</li> </ol>		
Milestone 4	Validation and demonstration infrastructure optimisation	31 March 2024	<p>Overall Work Package Objectives:</p> <p>As a result of the work completed in WP2 and WP5 of the Discovery phase of the HyCoRe project, gaps were identified in the test and demonstration facilities</p>	M1: Test facility design and proposed test plans finalised (£33,945.80).	£33,945.80

			<p>required to integrate hydrogen systems, e.g., electrolyzers, with both the electrical grid and with wind turbines/farms. Such test and demonstration facilities are critical to increasing the reliability and reducing the risk associated with deploying hydrogen systems , which, in turn, are important to improve the resilience, robustness and performance of future energy systems to which electrolyser systems will connect.</p> <p>Both NGN, through their hydrogen production facilities at the Low Thornley site and their involvement in projects like HyDeploy and Hydrogen Homes, and ORE Catapult, through their 18 MVA and 2 MVA grid emulation and hardware-in-the-loop facilities, their 5 kW HyFi electrolyser facility and their 7 MW Levenmouth Demonstration Turbine, have technical and testing capabilities</p>		
--	--	--	--	--	--

		<p>that could be used to fill some of these gaps. This will involve:</p> <ol style="list-style-type: none"> <li>1. Conducting a market study. OREC will develop a matrix of existing Hydrogen System Test and Validation facility capabilities focusing primarily in the UK. A second matrix of the project partner's facilities will also be compiled to explore their potential to exploit and fill areas not yet covered or poorly covered in industry currently. Finally OREC will identify and engage with potential users of such facilities to determine industry's perceived needs.</li> <li>2. Developing a facility design. Building on the gap analysis and market engagement activities described above, OREC will identify technology validation requirements and propose test plans to meet these requirements. These will then be used to evaluate what, if any, enhancements would be required to allow</li> </ol>		
--	--	--	--	--

			<p>one or more of the project partners to perform these tests (including virtually connecting partner facilities using hardware in the loop) , fulfilling a market need.</p> <p>3. Estimating facility costing. Costs associated with the hardware and software requirements identified in the facility design will be estimated. These costs, combined with the findings from the market study, will allow a prioritisation to be made for each option identified based on the cost of any enhancements and market need for such a service.</p> <p>Key Tasks:</p> <ol style="list-style-type: none"> <li>1. Market study</li> <li>2. Facility specification</li> <li>3. Facility costing</li> </ol>		
Milestone 5	Routes to market considerations	31 March 2024	Overall Work Package Objectives:	M1: Optimal storage capacity identified (£31,520.00).	£97,089.00



		<p>HyCoRe Discovery identified a number of key challenges around routes to market. The critical challenges with potential to impact on long term project success are resilience, market and regulatory barriers, and supply chain maturity. This work package will aim to better understand these challenges and propose options to overcome them. This will include:</p> <ol style="list-style-type: none"> <li>1. Conducting a resilience study via development of resilience models and analysis. To better understand the role of gas storage in potentially increasing the overall energy delivered due to reduced curtailment, and potentially increasing the value achieved for the energy due to time-of-use flexibility, Kinewell will perform stochastic temporal analysis of likely offshore wind farm generation relative to hydrogen demand for different sizes of hydrogen zones. The level of</li> </ol>	<p>M2: Regulatory Workshop (£27,667.80).</p> <p>M3: Barriers and solutions with existing frameworks identified (£18,645.20).</p> <p>M4: Supply chain analysed (£19,256.00).</p>	
--	--	---	---	--

		<p>storage required can be compared against the storage available within different sized gas networks, leading to an understanding of the optimal size of hydrogen zone for the required level of resilience.</p> <p>2. Conducting a market and regulatory review. There are separate regulatory and market frameworks for electricity and hydrogen. Both of these frameworks are complex and have their own nuance. There may be barriers in one regulatory framework to the development of industrial scale hydrogen production from offshore wind (whether that hydrogen is produced onshore or offshore). The regulatory review within this workstream will involve:</p> <p>Reviewing and summarise the current regulatory and market frameworks . A complex set of documents set out the market and regulatory frameworks for</p>		
--	--	--	--	--

		<p>electricity and hydrogen. These include the network codes, and licences. Arup will summarise the documents relevant to the technical solutions being considered within the other work packages.</p> <p>Identifying the regulatory barriers to technical solutions being considered. Depending on the technical solutions different barriers may come to light. For example, it may be more economically efficient to transfer power to shore through a dedicated cable and produce hydrogen on shore. However, a dedicated cable at transmission voltages is likely to require the operator to be licenced whereas the operator of a high pressure gas pipe does not always need an economic licence.</p> <p>Identifying solutions to the regulatory barriers identified. Arup will identify options for addressing the barriers identified and note whether these could</p>		
--	--	---	--	--

		<p>be achieved through changes to codes, licences or primary legislation. It will also be considered whether derogations may be required for the BETA phase.</p> <p>3. Supply chain The discovery phase of the project indicated that off-grid wind farms integrated with hydrogen electrolyzers will play a key part in achieving net zero. The proposed topologies all include new auxiliary systems (electrolyzers, pipelines, compressors etc.) that have not previously been deployed in offshore wind development projects. Given the complexity of these new arrangements, the UK based supply chain maturity needs to be analysed and understood. Previous supply chain work has focused on either the Hydrogen industry or the offshore wind industry. ORE Catapult will analyse the maturity of the UK based supply chain for the new topologies,</p>		
--	--	---	--	--

			<p>aiming to highlight the key supply-based issues that will need to be overcome when deploying large scale off-grid wind farms with hydrogen electrolyzers. This will be achieved by performing a high-level analysis of all the major components required for the proposed topologies, which will be informed by ORE Catapult's extensive prior experience in supply chain analysis in both the hydrogen and offshore wind sectors.</p> <p>Key Tasks:</p> <ol style="list-style-type: none"> <li>1. Resilience models development and analysis</li> <li>2. Identify regulatory barriers and solutions</li> <li>3. Supply chain analysis</li> <li>4. Report writing</li> </ol>		
Milestone 6	Combining all zone considerations	31 March 2024	<p>Overall Work Package Objectives:</p> <p>The objectives of this work package are to:</p>	M1: Vision Workshop (£15,322.50).	£27,790.00

		<ul style="list-style-type: none"> <li>- Bring together the key conclusions and findings from the Alpha phase project work packages in a short summary report to support wider dissemination of the work, and</li> <li>- create a vision and route map setting out the regulatory and technical pathways by which green hydrogen production from offshore wind can support net zero ambitions.</li> </ul> <p>The vision/route map will set out the key market, policy, regulatory and technical workstreams and priorities necessary to address to realise the potential for industrial scale green hydrogen production. The route map will identifying the no and low regrets activities required in the next decade, and identify key decision points for government and regulators to enable scale up of deployment. This will include the priorities for demonstration at the</p>	<p>M2: Vision Report (£12,467.50).</p>	
--	--	---	--	--

			<p>SIF's beta phase as well as changes to the economic regulatory framework and technology demonstration pathways. It will show how the changes to the regulatory framework, technology development and concept demonstration could be phased in a journey towards industrial scale rollout of hydrogen production from offshore wind.</p> <p>Key Tasks:</p> <ol style="list-style-type: none"> <li>1. Workshop with project partners to agree the key findings from the workstreams and to map out the vision / route map</li> <li>2. Production of vision/route map document.</li> </ol>		
Milestone 7	Stakeholder engagement, dissemination, and Beta bid planning	31 March 2024	<p>Overall Work Package Objectives:</p> <p>For industrial scale hydrogen from offshore wind to supply the gas network and deliver benefits to customers, the whole industry and its supply chain must be engaged. This work package aims to</p>	<p>M1: Public webinar delivery (£6,632.00).</p> <p>M2: White paper published (£9,354.00).</p>	£28,099.00

			<p>engage with the offshore wind industry and the associated supply chain to acquire knowledge/insight that could influence the direction of the work, and to support dissemination of project outcomes, which will encourage investment and create the market, accelerating business-as-usual adoption post-Beta. This will involve:</p> <p>1) Advisory team engagement. The project team members acting as advisors (Northern Powergrid, Carbon Trust, UKPN and Lhyfe) will be engaged at regular intervals throughout the Alpha phase, including via a number of pre-planned virtual meetings to: discuss detailed project plans (month 1); present preliminary findings (month 2); present further findings and acquire input into Beta planning (month 4); present Alpha phase outputs/Beta phase plans in detail to ensure end-user buy-in (month 6).</p>	<p>M3: Beta phase plan finalised (£12,113.00).</p>	
--	--	--	---	--	--



		<p>2) Wider stakeholder engagement. The project team will leverage their extensive network of energy sector contacts to disseminate project outputs in a targeted way. Carbon trust will facilitate engagement with the offshore wind developers involved in their R&amp;D programmes, including the Integrator programme, which is designed to examine the interplay between offshore wind, existing infrastructure, and other technologies and developments to identify opportunities to innovate and put offshore wind at the forefront in the energy transition. Carbon Trust will support ORE Catapult to arrange a virtual workshop with the Integrator partners at the project outset, the aim of which will be to discuss the planned scope and acquire feedback from the Integrator partners.</p> <p>Project partner Professor Sara Walker, Director of The Centre for Energy at</p>		
--	--	---	--	--

			<p>Newcastle University, is coordinator for the UKRI funded Hydrogen Integration for Accelerated Energy Transitions (HI-ACT) project, which aims to deliver a fundamental shift in critical lifecycle analysis for optimisation of operational and planning decision support for the integration of hydrogen and alternative fuels into the UK energy landscape. Prof. Walker will facilitate engagement with, and promote HyCoRe outputs to, existing HI-ACT stakeholder groups, and use that intelligence gathering as general input to HyCoRe.</p> <p>3) Public dissemination. ORE Catapult will lead a public dissemination programme, which will include at least one website article published, with associated PR via LinkedIn, Twitter, etc., and facilitation of at least one open access webinar, which will be promoted via social media (42,000 LinkedIn followers, 3500 newsletter subscribers, etc.).</p>		
--	--	--	---	--	--

		<p>4) Publication of a public white paper. A publicly available white paper will be created summarising final results that the project team feel relevant and appropriate to publish.</p> <p>5) Beta phase planning. As the project progresses, the project team, supported by external stakeholders, will conduct a road mapping exercise with the aim of fully defining the scope of the Beta phase project.</p> <p>Key Tasks:</p> <ol style="list-style-type: none"> <li>1. Engaging project advisory team members.</li> <li>2. Wider stakeholder engagement.</li> <li>3. Public event/webinar preparation and delivery.</li> <li>4. Public white paper preparation</li> <li>5. Beta phase planning.</li> <li>6. Document outputs in project report chapter</li> </ol>		
--	--	---	--	--

#### **14. USE OF LOGO**

The Funding Party and the Project Partners, External Funders and Project Supporters or subcontractors<sup>17</sup> must not use the Innovate UK/UKRI and/or Ofgem logo for purposes associated with the Project in any circumstances.

As an alternative for use of both Ofgem and UKRI logos, all external Project communications must include the following standard form of wording:

- (i) "this project is funded by network users and consumers under the Strategic Innovation Fund, an Ofgem programme managed in partnership with UKRI."

For additional guidance, refer to the communications and media guidelines for competition winners, detailed as part of your delivery pack. These guidelines are designed to help with some suggestions and encourage you to take a proactive approach to communicating about your Project.

#### **15. SHARING OF LESSONS LEARNED**

The Funding Party is required to ensure that the sharing of lessons learned and the facilitation of knowledge transfer is conducted as effectively as possible, to ensure that all parties, and therefore all consumers including future consumers, can benefit from Projects.

As contained within Chapter 3 of the SIF Governance Document, we require the Funding Party to work collaboratively to maintain the ENA Smarter Networks Portal so that all reporting and dissemination of learnings on Projects (as required by chapter 6 of the SIF Governance Document) is available via the ENA Smarter Networks Portal.

#### **16. COLLABORATION**

The Funding Party must collaborate with third-party innovators as Project Partners, as well as work closely with other parties in the energy supply chain, as set out in Chapter 3 of the SIF Governance Document.

The Funding Party must collaborate with other parties and with UKRI to organise an annual conference in a format appropriate to enabling the building of consortiums and disseminating learning widely. The conference may be a single event for gas and electricity, or more than one event, as appropriate.

---

<sup>17</sup> As detailed in the Application.

## **17. AMENDMENT OR REVOCATION**

As set out in Chapter 7 of the SIF Governance Document, this SIF Project Direction may be amended or revoked under the following circumstances:

- (i) if the Funding Party considers that there has been a material change in circumstance that requires a change to the SIF Project Direction, and the Authority agrees; or
- (ii) to reflect amendments made to the Licence.

## **18. HALTING OF PROJECTS**

This SIF Project Direction is subject to the provisions contained in Chapter 7 of the SIF Governance Document relating to the halting of Projects. By extension, this SIF Project Direction is subject to any decision by the Authority to halt the Project to which this SIF Project Direction relates and to any subsequent relevant SIF Funding Direction issued by the Authority pursuant to Special Condition 9.13 of the Gas Transporter Licence (the "Licence").

Further to the requirements in Chapter 7 of the SIF Governance Document, in the event the Authority decides to halt the Project, to which this SIF Project Direction relates, the Authority may issue a statement to the Funding Party clarifying the effect of that halting decision as regards to the status and legal force of the conditions contained in this SIF Project Direction.

## **NOW THEREFORE:**

In accordance with the SIF Governance Document issued pursuant to Special Condition 9.13 of the Gas Transporter Licence (the "Licence") of the Licence the Authority hereby issues this SIF Project Direction to the Funding Party in relation to the Project.

This constitutes notice of reasons for the Authority's decision pursuant to section 38A (Reasons for decisions) of the Gas Act 1986.

Failure to comply with the conditions of this SIF Project Direction means that Ofgem may treat all or part of the SIF Approved Amount received by the Funding Party as SIF Disallowed Expenditure.

## ANNEX 1: PROJECT BUDGET

SIF Project Direction costs	
Cost Category	Total Project costs (£)
Labour	579,709
Materials	13,424
Subcontracting	0
Travel and subsistence	1,000
Other costs	5,003
<b>Total</b>	<b>£593,133.00</b>

Project Partner	Total project costs (£)	Project contribution (£)	Total SIF Funding requested (£)	Project contribution (%)
NORTHERN GAS NETWORKS LIMITED	£11,759.00	£1,069.00	£10,690.00	
CARBON TRUST ADVISORY LIMITED	£3,001.00	£3,000.00	£1.00	
KINEWELL ENERGY LTD	£90,600.00	£10,000.00	£80,600.00	
NORTHERN POWERGRID (NORTHEAST) LIMITED	£2,001.00	£2,000.00	£1.00	
OVE ARUP & PARTNERS LIMITED	£182,766.00	£18,277.00	£164,489.00	
Newcastle University	£25,168.00	£-	£25,168.00	
UNASYS LIMITED	£74,900.00	£30,000.00	£44,900.00	
LHYFE UK LTD	£4,001.00	£4,000.00	£1.00	
OFFSHORE RENEWABLE ENERGY CATAPULT	£193,957.00	£25,000.00	£168,957.00	
National Gas Transmission PLC	£4,980.00	£-	£4,980.00	
<b>Total</b>	<b>£593,133.00</b>	<b>£93,346.00</b>	<b>£499,787.00</b>	<b>19%</b>

**ANNEX 2 TO SCHEDULE: TEMPLATE OF BANK ACCOUNT DETAILS TO BE PROVIDED TO EITHER NGT ([BOX.GSOSETTLEMENTS@NATIONALGRID.COM](mailto:BOX.GSOSETTLEMENTS@NATIONALGRID.COM)) OR NG ESO ([revenue.invoice@nationalgrideso.com](mailto:revenue.invoice@nationalgrideso.com))**

**Company name:**

**Primary Contact Details (only one contact permitted)**

First Name:

Last Name:

Email address:

Mobile phone number:

Work phone number:

**Address details**

Address name:

Street address:

City:

State / region:

Post code:

PO box: (if applicable)

PO box post code: (if applicable)

**Banking details**

These should be evidenced in non-editable format. The evidence provided must show company name and bank details and it should be dated within the last 6 months.

Any of the below documents will suffice:

- Bank statement (scanned document)
- Void cheque
- Paying in slip
- Screenshot of online banking (showing a logged in account with bank account and sort code, with browser visible)

### **ANNEX 3: ALTERNATIVE INTELLECTUAL PROPERTY RIGHTS**

In accordance with paragraph 9.2 of the SIF Governance Document, we have considered and approved alternative IPR arrangements for Project Hycore.

We have approved two modifications to the default IPR arrangements in the SIF Governance Document. The first modification is to the definition of "Background IPR" and the second is to paragraph 9.10.

The terms of these modifications are as detailed in the alternative arrangement proposal submitted by Northern Gas Networks in its round 2 Alpha Phase Application which was submitted by the 5 July 2023 submission close.