

SIF Alpha Project Registration

Date of Submission

Sep 2022

Project Reference Number

10037143

Project Registration

Project Title

INCENTIVE – Innovative control and energy storage for ancillary services in offshore wind

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10037143

Project Licensee(s)

Scottish and Southern Electricity Networks Transmission

Project Start

Aug 2022

Project Duration

6 Months

Nominated Project Contact(s)

simon.stromberg@sse.com

Project Budget

£495,408.00

Funding Mechanism

SIF Alpha - Round 1

SIF Funding

£360,608.00

Strategy Theme

Whole energy systems

Challenge Area

Whole system integration

Project Summary

SIF Innovation Challenge: whole systems integration. INCENTIVE will meet the aims of this challenge as set out in the answer below.

INCENTIVE will enable low-cost future-fit networks that support net zero goals, by seeking to bring innovative “INCENTIVE solutions” to market.

Discovery found that doing so requires a whole-systems approach to the innovation. INCENTIVE is improving coordination between networks, generators, suppliers, policy makers and regulators, by collaboratively investigating INCENTIVE solutions, with a view of developing a path to commercialisation. The large consortium (including nine Offshore Wind Farm (OWF) developers and networks) and the range of INCENTIVE solutions proposed provides an optimum approach avoiding duplication of this work. Technology requirements are being developed that will reduce variation in the INCENTIVE solutions’ capabilities. Complexity and bureaucracy for the INCENTIVE solutions are being reduced by studying regulation, whilst barriers to entry are being reduced by studying their value to the consumer and technical capabilities.

Discovery has evolved our understanding by finding a range of innovative solutions that could be used to strengthen the stability of the network. These are the following, located at the point of grid connection of an OWF. The technologies, combined with their implementation at the point of OWF connection, are termed “INCENTIVE solutions” in this application:

- grid-forming battery energy storage systems (BESS). This would replace a traditional STATCOM at the onshore substation of an OWF. Some grid-forming BESSs have been deployed before on the GB grid; however, their implementation as a replacement of the STATCOM of an OWF (which has commercial and technical complexity) has not yet been demonstrated;
- grid forming STATCOM (including super capacitor energy storage). This would replace a traditional STATCOM at the onshore substation of an OWF. This is novel technology that has not yet been used at the connection of OWFs to the onshore GB network;
- synchronous condenser. This could be placed at the onshore substation of an offshore wind farm. Synchronous condensers are not novel technologies. However, their use at the onshore points of connection of an offshore wind farm (which has commercial and technical complexity) needs to be evaluated, to ensure that the more innovative technologies demonstrate clear benefits;
- updated HVDC terminal capable of providing inertia. This would replace a standard HVDC terminal (not updated, not capable of providing inertia) at the onshore connection point of an HVDC-connected OWF. This is novel technology that has not yet been used at the connection of OWFs to the onshore GB network.

Discovery has:

- shown commercial potential for INCENTIVE solutions;
- developed testing requirements to prove INCENTIVE solutions' capabilities; and
- identified knowledge gaps regarding the commercial and technical implementation of INCENTIVE solutions, which need to be examined further before INCENTIVE solutions can be commercialised.

Partners

Discovery found that, to address the needs of all INCENTIVE solution users, market, technical, regulatory, commercial and market innovation is required to happen simultaneously. INCENTIVE therefore needs cooperation between network companies, generators and technical experts. The partnership brings together all these necessary stakeholders through SSEN-T, NGESO, Strathclyde University, and Carbon Trust (representing the nine OWA developers). By developing simple regulatory, commercial and market frameworks for OWFs to provide stability services, INCENTIVE will benefit the whole system and all stakeholders in the energy system.

Users

Network owners will use INCENTIVE solutions to facilitate stable connection of offshore wind farms to their networks. System Operator (ESO) will procure INCENTIVE solutions to provide stability services. INCENTIVE solution owners will use INCENTIVE solutions to reduce OWF curtailment. Consumers will also benefit from the integration of INCENTIVE solutions through the increased access to fossil-fuel free generation.

Project Description

With the urgent need for decarbonisation, the capacity of offshore wind is planned to increase dramatically. Innovation is required to facilitate the rapid roll-out of this non-synchronous generation and stability challenges that the existing synchronous generator-dominated system inherently avoids. Without new solutions, the GB grid will become weaker, which will lead to issues in system operation. These issues include:

- increasing the likelihood of severe instability events (such as the 9 August 2019 black-out event);
- increasing the need for imported energy, due to slower, more costly deployment of UK renewable generation and increased curtailment of operational UK renewable generation; and
- maintaining reliance on synchronous fossil fuel generators on stand-by with exposure to fuel cost volatility.

All of these will lead to price increases for GB energy consumers and slowing down the energy transition, leading to adverse impacts on the environment.

This creates an opportunity for the GB energy industry and ultimately consumers. Throughout 2021, previous work was carried out in the Offshore Wind Accelerator (OWA) programme, the "BAT-STAT" project*. It hypothesised that there is an opportunity to enable offshore wind farms to play a role in stabilising the GB network through the use of innovative solutions that provide voltage, current and

frequency control to the grid. Implementing these solutions will require simultaneous technical, regulatory, commercial and market innovation.

The Discovery Phase of INCENTIVE confirmed this hypothesis from the previous work and has identified a wide range of “INCENTIVE solutions” which can be used. These are listed below, and are being studied at the point of connection (the onshore substation) of an offshore wind farm to the grid:

- grid-forming battery energy storage systems;
- grid forming STATCOM (including super capacitor energy storage);
- synchronous condenser;
- HVDC terminal.

However, Discovery has found that commercial and technical risks remain that need to be addressed in Alpha and Beta.

INCENTIVE aims to seize the opportunity by studying and demonstrating how these innovative INCENTIVE solutions can allow offshore wind farms to provide stability services to the grid. INCENTIVE will continue to address the commercial and technical risks discovered in Discovery. Doing so will help to accelerate the fast-paced roll-out of offshore wind in GB to support delivery of the energy transition at best value to the consumer.

*<https://www.carbontrust.com/resources/energy-storage-for-offshore-wind-with-innovative-converter-control>

Add Preceding Projects

10024879 - INCENTIVE - Innovative Control and Energy Storage for Ancillary Services in Offshore Wind

Nominated Contact Email Address(es)

transmissioninnovation@sse.com

Project Approaches And Desired Outcomes

Innovation Justification

The fundamental problem INCENTIVE aims to address is decarbonising the energy system in a low-cost manner. Specifically, INCENTIVE is seeking to address the problem of maintaining network stability following the replacement of traditional fossil fuel synchronous generators with non-synchronous renewable generators (such as OWFs). Solving this problem is of great importance to the energy sector, as it will help to unlock future renewable development by enabling them to provide services that traditionally have not previously been possible from non-synchronous generators. INCENTIVE aims to deliver value to all users, by enabling lower cost connection of renewable generators with increased capabilities in comparison to business as usual (BAU), see next question for more details on benefits.

In previous work (prior to INCENTIVE), compelling opportunities were found to address the above problems, through the innovative implementation of technologies deployed at the point of OWF connection to the onshore network. However, there are significant risks in the implementation of these technologies, inhibiting their deployment. It is these risks that INCENTIVE is aiming to resolve.

This previous work was further developed in Discovery, which found that commercial uncertainty (e.g. around technology costs, revenues and regulation of INCENTIVE solutions) exists. Further, Discovery found that technical uncertainty (e.g. the performance of INCENTIVE solutions on the network) exists.

These risks need to be addressed in Alpha and Beta to allow INCENTIVE solutions to become commercial realities. The complex technical, commercial and regulatory barriers result in too much uncertainty for this technology to be invested in as BAU for OWF developers or elsewhere in the price control for networks. Currently, some INCENTIVE solutions simply cannot be procured since technical innovation is required, whilst some INCENTIVE solutions cannot be procured due to uncertainty in ownership restrictions. Innovation funding is therefore required to take a whole system integration approach, by maturing the technology in parallel with commercial and regulatory aspects.

Without INCENTIVE continuing to Alpha and Beta, INCENTIVE solutions will risk not being brought to market in the accelerated manner necessary to meet the 2030 50GW offshore wind targets. This will in turn mean that the connection of new renewable generators (such as OWFs) is more costly, or in the extreme may not be possible, and may require additional gas turbines to be deployed to provide system stability. This will increase the cost of, and slow down, the energy transition, and increase the UK's reliance on energy imports.

Benefits

INCENTIVE has the aim of delivering system stability at lower cost than BAU. Whilst ambitious, this is achievable by focussing the project on bringing novel INCENTIVE solutions to the market. By assessing a range of options under the umbrella of a single project, INCENTIVE aims to identify and address common technical, regulatory, and commercial barriers to adoption of these grid stability providers. This coordination will reduce duplicated effort, thereby accelerating the adoption of INCENTIVE technologies as BAU stability providers.

The benefits of successful development and marketing of INCENTIVE solutions have been assessed in Discovery. Using a metric aligned with financial benefit to the consumer, this work found that all INCENTIVE technologies have positive business cases in comparison to BAU.

In BAU, grid stability is predominantly provided by combined cycle gas turbine (CCGT) generators - which often run out of merit at the expense of curtailing cheaper, zero-carbon renewable generation such as wind. The introduction of INCENTIVE solutions can reduce the reliance on CCGTs and reduce renewable curtailment. The benefits of non-emitting stability provision, such as INCENTIVE solutions, include:

- Savings on consumer energy bills: NGESO estimates that use of out-of-merit CCGT will cost around £470m a year by 2026 without mitigating action. Some reduction in this is likely in the medium-term as NGESO's Pathfinder project introduces new types of stability provider, but beyond a 5-year timeframe, significant additional sources of stability need to be developed to support continued growth in renewable generation.
- Helping meet UK government CO2 reduction targets: INCENTIVE will drive large reductions in CO2 emissions, both directly through eliminating use of CCGTs as stability providers, and indirectly through facilitating higher penetrations of renewable generation. INCENTIVE solutions will be an essential component in achieving 50GW offshore wind by 2030, 100% decarbonised power system by 2035 and net zero by 2050.

- Increase UK energy independence: by supporting provision of adequate stability reserves, INCENTIVE technologies will reduce the need for energy imports and assist with local and national energy supply resilience.

Discovery Phase business case assessment investigated the net present value (NPV) of individual INCENTIVE solutions. The assessment assumed that the grid is agnostic to the technology that is providing the stability, and that the appetite for avoiding the significant disbenefits to the UK of weak system stability remains unchanged going forward. Project lifetime costs were compiled from estimates of capital investment and running costs. Benefits have been monetised by approximating their value using market price information emerging from the NGENO Pathfinder tenders.

In Alpha, the scope of costs and benefits considered quantitatively will be expanded to include assessment of relative environmental impacts of INCENTIVE options, benefits to the ESO (financial and system reliability) and the financial benefits that would accrue to INCENTIVE technology asset owners. This will include an examination of the impact that regulation and ownership will have on investment attractiveness.

Full details of the relative benefits of different INCENTIVE options can be found in the Discovery WP1 report, which is a business case report for various technologies and is included as an appendix to support this answer. The Discovery CBA model can also be provided if required by assessors.

Risks And Issues

Discovery has found that the key risks in achieving INCENTIVE's aim of bringing INCENTIVE solutions to market lie in commercial (including financial and regulatory) and technical uncertainty.

Commercial uncertainty – INCENTIVE needs to clarify that workable commercial models exist, including viable ownership models (allowed by regulation) and that for each ownership model there is a positive business cases for all users.

- Risk identified in Discovery – Discovery has found that the regulatory and market landscapes (which will drive the commercial model development) are rapidly changing, with Ofgem, BEIS and NGENO currently considering changes that will impact the commercial models for INCENTIVE solutions. This poses a risk to INCENTIVE achieving practical commercial models that will be of relevance in the future. Negative environmental impacts of some INCENTIVE solutions were also identified as an area of uncertainty.

- Mitigation activities planned in Alpha – To reduce this risk, and to identify any further unknown risks, Alpha has been scoped to include further engagement with all key stakeholders to understand the likely changes in the commercial landscape in the future, and hence to produce future-proofed commercial models for INCENTIVE solutions.

Technical uncertainty - INCENTIVE needs to clarify the capability and impact of INCENTIVE solutions on the network.

- Risk assessment in Discovery – Discovery has devised a testing plan for INCENTIVE solutions, which starts generic (to give a solid overview of INCENTIVE technology performance) and gets more specific (to give deep insight into the performance and effects of INCENTIVE solutions). Discovery has found that, in order to undertake specific testing, inputs (such as simulation models and human resource) from INCENTIVE technology suppliers and OWF developers will be of benefit. In Discovery, there were excellent levels of engagement with suppliers and developers, many showing interest in supporting Alpha and Beta. However, it became clear that, due to the innovative nature of INCENTIVE solutions, there will be strict confidentiality and IP requirements for any supplier or OWF developer providing models and other commercial information / data to INCENTIVE. Suppliers and developers work in highly competitive sectors and spend many £millions developing technologies and models. Receiving such input as Background IP will therefore be challenging. Further, the agreeing the disclosure of Foreground IP built upon such Background IP will also be challenging.

- Mitigation activities planned in Alpha - These risks are already being mitigated to an extent through stakeholder engagement. We will continue to mitigate these risks prior to Alpha kick-off and throughout the remainder of INCENTIVE through the use of NDAs / contracts, which are already being discussed with suppliers and developers. There may also be a need to develop an exclusive relationship with one technology supplier (for the Beta phase).

Other technical, political, commercial, managerial, and environmental risks have been identified. Full details of all risks can be found in the attached risk assessment.

Risk identification and mitigation has been a key focus of Discovery and will continue to be a core part of the Alpha and continue to evolve throughout the project. Alpha plans two formal risk assessment re-evaluations to be performed at the mid-point and at the end of Alpha.

Project Plans And Milestones

Project Plans And Milestones

Discovery found compelling opportunities to bring INCENTIVE solutions to market, but that various commercial and technical uncertainties are creating barriers to commercialisation. Alpha will reduce these barriers through three aligned workstreams, which will deliver key project milestones during Alpha:

- Commercial assessment – develop the Discovery CBA with more granular and robust cost assumptions, specific to the ownership and operating model being assessed. This will include expected revenues, e.g. from a regulated asset vs competitive markets and additional costs such as land leasing and warranties.
 - o Milestone success criteria: an assessment of the optimal commercial models for the ownership and operation of various INCENTIVE solutions, which will be produced by combining the business case and ownership models.
- Technical assessment – commence testing of INCENTIVE solutions that was planned in Discovery. The assessment will be initially based on generic (non-site-specific, non-supplier-specific) simulation of the technologies to give a broad understanding of the technologies. The assessment will then become more specific, the level to which this goes will be determined as the test programme progresses – we are deliberately keeping flexibility in the scope of the technical assessment at this stage, as the early technical assessments and the commercial assessment will inform the more detailed technical assessments later in Alpha and Beta.
 - o Milestone success criteria: understanding the capability and impact of INCENTIVE solutions on the network, and ultimately de-risking their implementation.
- Beta scoping – plan the work scope for Beta. Currently, it is envisaged that Beta will involve more detailed simulation testing of INCENTIVE solutions, building towards a comprehensive testing programme (which may include a physical demonstration such as hardware in the loop testing, scaled lab-based physical testing, or full-scale field trial on the GB network). We will maintain flexibility on Beta scope to ensure the optimal scope is devised for Beta, informed by all Alpha outputs.
 - o Milestone success criteria: understanding of requirements for Beta scope by creating a cohesive plan to demonstrate the final stages of commercial and technical confidence.

Inputs (such as simulation models and human resource) from suppliers of INCENTIVE solutions would be beneficial. We have had strong engagement with five suppliers (AMSC, Fluence, GE, Hitachi, Mitsubishi) of INCENTIVE solutions in Discovery and are seeking their input for Alpha at the time of application. We will continue this engagement prior to and after Alpha kick-off. Similarly, models of OWFs and the GB network would provide benefits to the later stages of the INCENTIVE project. We are also in discussions with OWA developers and the ESO to use their models and data sets.

To support the Alpha application, we have received letters of support from AMSC, Fluence, Hitachi and Mitsubishi. These are included as attachments to this application. This shows strong commitment to the project from key INCENTIVE solution vendors.

At the time of writing, there are no confirmed changes to the project partners between Discovery and Alpha. However, in Discovery, Carbon Trust approached Scottish Power Transmission regarding a potentially related SIF project they are running – FastFlex. The purpose was to explore possible synergies between the projects, to ensure no duplication was happening, and to explore possible collaboration. Some synergies were found between each project; however, they are complementary and not duplicative so it was decided at this stage it would be inappropriate to combine the projects. During Alpha, we will continue these discussions and may seek to bring SPT in as a partner on INCENTIVE, to improve knowledge sharing and dissemination.

Regulatory Barriers (Not scored)

In Discovery, no show-stopper regulatory barriers to implementing INCENTIVE solutions have been found. However, regulation does place constraints on ownership and operation of the various INCENTIVE solutions, and hence impacts the commercial models that may be developed and trialed in Beta. The Discovery WP2 report sets these constraints out in detail and these constraints will be further examined in Alpha.

There are three core issues that affect which ownership models may be taken forwards:

- Asset classification: The classification of assets as electricity storage or network infrastructure dramatically impacts the licensing regulations, market access method and remuneration they are subject to. This classification was not designed for the solutions being

considered in this project, so their treatment is currently highly uncertain. For example, Ofgem recently stated that the interpretation of synchronous generators as “electricity storage” is currently under review and being discussed with BEIS.

- Grid code compliance: questions remain over whether the grid code allows an INCENTIVE technology asset owned by one party to be located “behind” the grid connection of another party.
- Metering: uncertainty remains on the impact that colocation of INCENTIVE solutions behind the same meter as an offshore wind farm has on subsidy support payments, such as CfDs and ROs and the metering arrangements that would be required.

Longer term regulatory barriers

The issue of storage asset classification and the circumstances in which transmission licensees may own and operate storage assets is assumed to continue to be an issue that will influence how the INCENTIVE technologies are deployed in the longer term.

Additionally, ESO is developing new stability markets for procuring a range of stability services. The form of these markets and the ability of different market players to participate and be remunerated in them will affect the CBA and hence the longer term deployment of these technologies into BAU.

Policy considerations

The outcomes of the OTNR could significantly change the role that developers, OFTOs, transmission operators and the ESO have in designing and building the offshore network infrastructure and hence the costs and opportunities that might be available to them in installing INCENTIVE solutions. As consultation is still going across OTNR’s four workstreams, further investigation is required into the likely future impact it will have.

Approach in Alpha

Alpha has been scoped to ensure the views of all relevant stakeholders on the future of regulation and policy relevant to INCENTIVE solutions is included in the commercial assessment workstream. This includes BEIS, Ofgem, LCCC, ESO and wider industry stakeholders. Additionally, reviewing the outcomes of the OTNR and further analysis of existing grid code requirements has been budgeted for.

Business As Usual

A key aim of INCENTIVE is to ensure that INCENTIVE solutions are adopted as business as usual (BAU) across GB. The multi-staged SIF project process will allow INCENTIVE to progressively achieve this aim.

In Discovery, INCENTIVE investigated the current feasibility of INCENTIVE solutions to understand where uncertainties exist. In Alpha, INCENTIVE will work to reduce these uncertainties, giving greater commercial and technical understanding of INCENTIVE solutions. Finally, in Beta, INCENTIVE will de-risk INCENTIVE solutions by providing firm recommendations and demonstrating how INCENTIVE solutions can be brought into BAU, such as by highlighting the need for changes to best practice, technology, regulation, markets and grid codes.

After INCENTIVE concludes, it is expected that prospective owners of INCENTIVE solutions will adopt INCENTIVE solutions by using the findings and recommendations of INCENTIVE to develop business cases for their commercial investment into INCENTIVE solutions and to install them on the GB network.

INCENTIVE is considering a wide variety of possible INCENTIVE solutions. This creates a systematic approach to integrating INCENTIVE solutions, rather than focusing on one technology, which increases the likelihood of introducing INCENTIVE solutions into BAU.

INCENTIVE is seeking routes to BAU for GB networks (onshore and offshore transmission owners). It is also considering international implementation. Further, it is seeking ways that private third parties (such as OWF Operators) can invest in and operate INCENTIVE solutions. Including consideration of network companies and private third parties increases the chances of finding workable BAU solutions for the future.

For both network companies and private third parties to incorporate INCENTIVE solutions as BAU, the value proposition and exploitation strategy needs to be understood. In Alpha, CBA will be conducted for a range of possible owners of INCENTIVE solutions, to find and demonstrate commercial models with positive investment cases, which in turn will allow INCENTIVE solutions to become BAU. To undertake these CBAs, consideration will need to be given to the markets in which INCENTIVE solutions will operate. These CBAs will in turn inform the exploitation strategy for INCENTIVE solutions.

The project partnership has also been carefully and intentionally formed to ensure INCENTIVE solutions become BAU. The OWA programme consists of nine leading OWF developers, and it has a strong track record of setting best practice and standards in the offshore wind industry: where the OWA developers incorporate novel approaches into their BAU, the rest of the global industry follows. Therefore, by including the OWA developers in the project, and having the relevant technical experts from each of the OWA developers scope and track the project, the outcomes of INCENTIVE will be taken up within the OWA developers' BAU, and then by the wider offshore wind industry.

Having NGESO in the consortium enables key inputs, such as relevant future market arrangements to be fed into the project. It also allows NGESO to learn first-hand how they can procure services from INCENTIVE solutions, which will assist in their uptake into BAU.

Having SSEN-T lead the project and provide a wide range of technical expertise to the project, particularly through the technical testing of INCENTIVE solutions, will allow SSEN-T (and other GB network companies) to understand how INCENTIVE solutions perform to improve the stability of the network, and hence will lead SSEN-T to have confidence in having INCENTIVE solutions provide stability to its network.

To ensure INCENTIVE solutions are factored into BAU widely, dissemination of the results is planned through the SIF webinars and the stakeholder engagements planned in the Alpha Project Plan.

Commercials

Commercialisation

A key aim of INCENTIVE is to ensure that INCENTIVE solutions are commercialised following the completion of the SIF project. Commercialisation strategy is therefore at the heart of INCENTIVE, and the Alpha scope.

Alpha includes an entire workstream dedicated to understanding the commercial aspects of implementing INCENTIVE solutions. In this workstream, the project team will assess commercial models (including ownership, business case, and other commercial considerations). It will also identify remaining areas of risk and uncertainty that are preventing commercialisation of INCENTIVE solutions.

INCENTIVE is promoting a competitive stability market. It is doing so by developing commercial assessments for a wide range of INCENTIVE solutions, and hence technology suppliers, and seeking business cases for various possible INCENTIVE technology asset owners. Bringing a wide range of technologies to market will greatly increase the competitiveness of the market, which is currently limited.

Discovery has found a positive CBA for a range of INCENTIVE solutions, from the whole system perspective. Alpha will develop this further, by coupling the CBA and ownership model workstreams, to understand the value proposition to various owners and users of INCENTIVE solutions. This more granular CBA will allow commercial considerations such as expected profit and market growth to be understood, which will be relevant for suppliers, owners and users of INCENTIVE solutions. INCENTIVE also will allow operational efficiencies to be achieved, by studying the cooperation of INCENTIVE solutions with other co-located assets (e.g. the OWFs).

Discovery has found that INCENTIVE solutions can be owned by regulated network companies or private third parties. However, the optimal ownership model varies for each respective INCENTIVE technology, and will be examined in more depth in Alpha, with a view of potential future changes to regulation and market requirements.

The OWA is an internationally-focused R&D programme, and INCENTIVE plans to consider in more detail how the learnings from INCENTIVE can be applied outside of GB. To do this, strong international stakeholder engagement and dissemination of the project findings are planned.

For the first trials or commercial implementation of INCENTIVE solutions, partnerships with INCENTIVE technology suppliers will be key. INCENTIVE is working closely with suppliers (such as AMSC, Fluence, GE, Hitachi Energy, Mitsubishi Electric) and is building relationships with a view of Beta and beyond.

At this stage, no partners require additional investment.

Intellectual Property Rights (Not scored)

For Alpha, the majority of the IPR arrangements will follow the default recommendations of Chapter 9 SIF Governance Document.

There may be some Background IPR and some Foreground IPR that fall within the exemptions of Clause 9.2 and 9.14 of the SIF Governance Document.

At the time of drafting this application we are unable to provide specific pieces of Background IPR and Foreground IPR that we would request to be exempt from the default treatment as we are still in talks with third parties. However, an explanation of the situation is provided below.

In Alpha (and Beta), INCENTIVE will greatly benefit from input from INCENTIVE technology suppliers and developers. This input could involve provision of models, data or other information. In Discovery, we have already discussed this possibility with a wide range of suppliers and developers. These parties have flagged that, due to the innovative nature of the technologies in question, the requested inputs are commercially sensitive and that sharing would only be possible under suitable confidentiality conditions. We plan to put in place suitably defined non disclosure agreements (NDAs) to facilitate this exchange. It is likely that at least some of the inputs and outputs will be necessarily confidential between SSENT and the supplier / developer, meaning that these inputs and outputs cannot be fully shared with project partners or anyone outside the INCENTIVE project.

If no such NDAs are put in place, it is likely that no input will be provided, or input will be greatly restricted, which will be to the major detriment of INCENTIVE and hence the consumer. Or phrased the other way – these NDAs will allow INCENTIVE to provide significantly more benefit to the consumer.

We will continue to work with suppliers and developers prior to Alpha kick-off and during Alpha to set up these arrangements in good time to enable receipt of their inputs when required.

To ensure clarity is provided to the project partners, the third party INCENTIVE technology suppliers, OWA developers, UKRI and Ofgem regarding the IP landscape of the project, the project is using an IP register to track the Background IP provided to the project, the Foreground IP the project generates, and the use and access rights to all this IP. The main contract governing the project (the Collaboration Agreement) will include detailed, mutually agreed terms governing IP that are in line with the SIF Governance Document.

Costs and Value for Money

The total project cost for Alpha phase is £495,408.

The project is requesting £380,606 of funding (77% of the total cost), with the remaining £114,802 (23%) being provided by project partners. This level of funding will lead to outcomes that provide value to the consumer. In Discovery, the cost assessment found that INCENTIVE solutions could provide a financial benefit for a baseline case of between £5 - £25 million for a single OWF. This is compared to the counterfactual option. Scaled up, we believe that the financial benefits for the consumer could be in the region of hundreds of millions.

The £114,802 (23%) of the total cost that is being contributed to the project by private funds (including £50,000 in cash from the OWA programme, via the Carbon Trust) is more than double the minimum 10% compulsory contribution giving excellent leverage of SIF funds.

SSEN-T is contributing £14,236. INCENTIVE complements and is additional to SSEN-T's BAU activity. In BAU, SSEN-T investigates, plans and executes optimal network connections and upgrades for accommodating renewable generation such as offshore wind onto its network. INCENTIVE offers a potential disruptive technology to add to and complement this BAU work. INCENTIVE solutions will help to enable cheaper connection of offshore wind, whilst reducing the need for BAU network upgrades.

Carbon Trust is providing £50,000 in cash to the INCENTIVE project in its function as Programme Representative of the OWA programme, which is an industry-led RD&D initiative 100% privately funded by nine OWF developers. The £50,000 contribution comes directly from the OWA programme budget which is reserved for high-priority RD&D projects. The OWA is also contributing £46,566 of human resource (technical expertise within each developer company). The allocation reflects the OWA Parties' commitment to INCENTIVE and highlights the importance of the research subject.

Strathclyde is providing £4,000 for use of its modelling software and hardware.

There is one sub-contractor to the project, Frazer-Nash Consultancy (FNC), who are included under sub-contract to Carbon Trust / the OWA programme. FNC will lead the development of business cases and have been selected for this role since FNC successfully lead the delivery of the precursor BAT-STAT project and the business case work in Discovery. Therefore, from its previous work, FNC is a leading authority on INCENTIVE solutions and is ideally placed to continue to efficiently deliver the CBA work in Alpha. FNC is included as a subcontractor rather than a partner as this is the most appropriate relationship for them to the project: the ownership of the project and its outcomes sits with networks and OWF developers involved in the project; FNC is included to provide their unique expertise to guide the networks and OWF developers.

It should be noted that the £495,408 total cost includes a £40,000 provision that has been ring-fenced for subcontracts to INCENTIVE solution suppliers. Their input into the project is key. Whilst we have received letters of support from several key suppliers offering

their support to INCENTIVE free of charge, we want to make sure we have funds available to procure their services in Alpha, should it become necessary to do so or go beyond what can be freely supplied. For instance, they may require funding to provide their models or human resources to the project. If required, we will secure this input early in Alpha by sub-contract using SSEN-T's procurement processes including value for money and performance checks.

Supporting Documents

Documents Uploaded Where Applicable

Yes

Documents:

- Appendix Q3-1 - Quantified Business Case.pdf
- Appendix Q4-1 - Project Plan.pdf
- SIF Alpha Project Registration 2022-09-30 1_29
- SIF Alpha Project Registration 2023-04-11 10_18
- 10037143 SIF Alpha Close Down Report 2023-04-11 10_18
- SIF Alpha Project Registration 2024-02-20 10_26

This project has been approved by a senior member of staff

☒ Yes