Scottish & Southern Electricity Networks
TRANSMISSION

SIF Round 3 Project Registration

Date of Submission

Mar 2024

Project Reference Number

10102926

Initial Project Details

Project Title

BluePrint - Building Industry Collaboration and Methodologies for Developing Offshore Wind Behind Constraint

Project Contact

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Challenge Area

Whole system network planning and utilisation to facilitate faster and cheaper network transformation and asset rollout

Strategy Theme

Data and digitalisation

Lead Sector

Electricity Transmission

Other Related Sectors

Electricity Transmission

Project Start Date

01/03/2024

Project Duration (Months)

3

Lead Funding Licensee

SSEN - Scottish Hydro Electric Transmission

Funding Licensee(s)

SSEN-T - Scottish and Southern Electricity Networks Transmission

Funding Mechanism

SIF Discovery - Round 3

Collaborating Networks

National Grid Electricity System Operator

National Grid Electricity Transmission

Technology Areas

Active Network Management

Commercial

Low Carbon Generation

Demand Response

Network Automation

Demand Side Management

Network Monitoring

Electricity Transmission Networks

Energy Storage

Energy Storage and Demand Response

Storage

Project Summary

The Blueprint project is seeking to identify key risks and uncertainties for the connection of offshore wind farms into currently constrained areas of the GB network, and to devise innovative and collaborative solutions to mitigate those risks. The solutions of interest include novel, collaborative connection methodologies and approaches to accelerate infrastructure development.

Add Third Party Collaborator(s)

The Carbon Trust

Project Budget

£167,891.00

SIF Funding

£147,090.00

Project Approaches and Desired Outcomes

Problem statement

This project will develop solutions that facilitate the connection of new low-carbon energy to already-constrained areas of the GB network (such as northern Scotland in SSEN-T's network area) as quickly as possible, and to maximise energy export once connected by avoiding constraint-driven curtailment.

Progress is being made to alleviate such constraints inhibiting offshore development through the Holistic Network Design (HND) processes. However, even with this progress, innovative and collaborative development approaches are required. These are needed to add granularity to the HNDs, to explore the most efficient ways to deliver the HNDs, and to mitigate risks of delayed HND development.

Blueprint will address this by conducting a collaborative gap analysis between desired outcomes and the risks of developing OWFs in constrained areas, with a focus on innovative solutions to address the gaps. This analysis will prioritise the issues from a Transmission Owner (TO), System Operator (ESO), and offshore wind farm (OWF) developer perspective, and will identify innovative, collaborative solutions (see Qn3) to address those key issues.

Blueprint addresses the 'Whole system planning for faster asset rollout' SIF Challenge. Discovery brings together TOs, ESO, and OWF developers to develop an improved, collaborative understanding of the key risks of developing behind constraint. This will improve whole systems cross-industry planning. It will also improve understanding of how innovative solutions can accelerate the development of the HND network and optimise the use of the existing network, and hence accelerate OWF rollout in currently constrained areas.

The project will understand how novel, collaborative approaches to data and commercial arrangements can be used to deliver the HND and mitigate the risks in its delivery, fully aligned with SIF's Innovation Challenge focus Theme 2. The project is also relevant to Theme 3, as novel, collaborative, flexible arrangements between demand and generation will be considered as a possible solution for mitigating the risks in delivering the HND. Linked to Theme 4, hydrogen generation will be considered as a possible solution.

The users of the innovation are TOs, ESO, and OWF developers. Demand and storage developers may also be users, depending on the outcomes of the Discovery gap analysis. It addresses their needs by developing a cross-industry understanding of the underlying risks of developing behind constraint and collaborative, innovative solutions to address those risks. This will assist TOs, ESO, and OWF developers to deliver more offshore wind sooner, at value for GB consumers.

Video Description

https://www.youtube.com/watch?v=ox7__z2Dqwg

Innovation justification

The state of the art is ESO's HND processes, which represent a step forward in network planning, see Appendix_Q3-Figure_1. However, the delivery of the HNDs comes with commercial, regulatory, and technical risks. Without Blueprint, the counterfactual is that each infrastructure developer (TO and OWF developer) would face addressing these risks themselves, without collaborative, innovative solutions being developed.

The key innovation in the Discovery Phase is to provide a collaborative platform for the key parties (TOs, ESO, OWF developers) to explore the problem and seek innovative solutions that add granularity and specific solutions that mitigate the risks of delivering HND. This collaborative approach is itself an ambitious innovative approach, uncommon in BAU due to the traditional structure of the industry, and reflects the recommendations of the Electricity Network Commission Report (ENCR) 2023.

In Discovery, the following innovative solutions shall be considered in the context of SSEN-T's network in the Northeast of Scotland, see Appendix_Q3-Figure_2:

- collaborative planning and design processes and tools
- collaborative development processes, including collaborative community engagements and consenting, and co-development of

generation and demand
- data sharing (spatial, environmental, economic, social, technical, commercial)
- flexible connection agreements for generation/demand/storage (including hydrogen)
- developing accounting for active network management, improved locational signals, changes to TNUoS forecasts
- novel approaches to ownership/operation

The Discovery Phase naturally lends itself to bringing the key stakeholders together to take a strategic, non-BAU view. The innovative, risky solutions prioritised in Discovery, will then be developed in one or more Alpha projects and implemented in Beta. This will be done using the SSEN-T network and its associated OWF pipeline as a case study for de-risking transmission and generation asset rollout in constrained areas. Based on this Alpha case study, we will define "blueprint" methodologies, that can be used to inform ESO, Ofgem, UK Government, Scottish Government, other TOs, and other OWF developers to evidence improved strategic infrastructure development initiatives (ESO's Strategic Spatial Energy Plan (SSEP) and Centralised Strategic Network Plan (CSNP); Ofgem's Accelerating Strategic Transmission Investment (ASTI); UK Gov's Connections Action Plan; TO projects; OWF developer projects; and ENCR's 2023 report).

This work has few progression pathways in the price control or BAU, and a new focussed platform to gather this cross-industry consortium and conduct this collaborative, innovative exercise is highly beneficial.

Regarding IRL, CRL, and TRL, these will vary for the various solutions identified and will be specified in Discovery.

Appendix Q3 - Blueprint.pdf (opens in a new window) (/application/10102926/form/question/36550/forminput/99615/file/630446/download).

Impacts and benefits selection (not scored)

Financial - future reductions in the cost of operating the network

Financial - cost savings per annum on energy bills for consumers

Financial - cost savings per annum for users of network services

Environmental - carbon reduction – direct CO2 savings per annum

New to market – processes

Impacts and benefits description

Financial - future reductions in the cost of operating the network.

- Baseline: delays in HND development will delay OWF connections. The delays in providing capacity could discourage investment in projects leading to delayed decarbonisation of energy.
- Qualitative benefits: reduction in time to connect OWFs whilst minimising constraints, reduction in cost for system operation.
- Metrics: time to connect OWFs whilst minimising constraints, reduction in the amount of transmission infrastructure required to connect same OWF capacity, cost to GB ESO.

Financial - cost savings per annum on energy bills for consumers.

- Baseline: delays in HND development will increase the costs of financing for OWFs if there is investor uncertainty in connection time, and delay value-formoney offshore wind power being provided to consumers.
- Qualitative benefits: reduction in time to connect OWFs, possible reduction in cost and time for transmission assets required to connect same OWF capacity, reduction in cost of energy
- Metrics: time to connect OWFs whilst minimising constraints, reduction in the cost of transmission infrastructure, cost to GB consumer

Financial - cost savings per annum for users of network services.

- Baseline: the long connection queue times for OWFs in the SSEN area under the HND risks increasing the cost of finance for OWFs. Other countries with lower OWF capacities do not have such long connection queues, and so may attract cheaper finance (this is an international market). Further, there is a risk that inflation will push up prices for OWF development. Delays to OWFs

projects due to HND delays/risks could push up prices for OWF developers (Capex and Devex).
- Qualitative benefits: reduction in time to connect OWFs, reduction in Capex and Devex for OWFs
- Metrics: time to connect OWFs, cost of OWFs

Environmental -- carbon reduction -- direct CO2 savings per annum.

- Baseline: delays to the HND network development will delay OWFs replacing fossil fuel generators on the GB system
- Qualitative benefits: OWFs displacing fossil fuel generators more quickly, reduction in CO2 for GB energy system
- Metrics: time to connect OWFs whilst minimising constraints, CO2 / MWh for GB energy system

New to market -- processes

- Baseline: bilateral discussions between ESO and OWF developers.
- Qualitative benefits: new processes developed for efficient, collaborative design, planning, and development work.
- Metrics: one or more new "blueprint" processes for use in accelerating OWF connection in constrained areas.

Teams and resources

Project Partners

SSEN-T, NGET, NGESO and Carbon Trust have been selected as relevant to identify the issues of network constraints driven by OWFs. The Discovery phase will identify other partners who might be relevant to Alpha Phase. They all have strong previous working relationships with each other from previous innovation projects, HND and ASTI projects. These partners meet the requirements of the selected Innovation Challenge Focus Theme. Appendix_Q7 contains the Organogram (Figure_2) illustrating the arrangements between these partners, sub-contractors and project stakeholders and also a list of the key personnel delivering the project.

SSEN-T is the GB network with the largest OWF pipeline and with the most constraints due to OWFs. SSEN-T will have the responsibility to deliver significant network upgrades as part of the HND upgrades. SSEN-T will lead this project to ensure the efficient delivery of their new network assets, through novel, collaborative processes.

Carbon Trust will be present in its role as coordinator of The Integrator Innovation Programme, thus bringing in the OWF developer partners EnBW, ScottishPower Renewables, Shell, SSE Renewables, Total Energies and Vattenfall. The Integrator programme is an OWF developer-funded programme addressing the problem of rapid, large-scale integration of OWF into the energy system. Carbon Trust will lead the delivery of the work packages, and the OWF developer partners will bring their technical and commercial development expertise and direct access to a large number of specific OWF development projects in SSEN-T's area, and
the wider GB network.

NGET also has a significant OWF pipeline, with several constrained areas. NGET will ensure that the solutions developed using the SSEN network will be transferrable to other locations on the GB network.

NGESO coordinated the HNDs and the connection queue in GB. NGESO will input into the developed solutions, to ensure that Blueprint complements NGESO's ongoing and previous work.

Sub-contractors

TNEI will assist the project team in the literature review, gap analysis and cost-benefit analysis (CBA). TNEI bring strong technical and commercial insights in innovative network design, planning and optimisation, as well as offshore wind development.

Only human resources will be used in Discovery, with no requirement for specialist facilities or equipment.

External stakeholders

In addition to OWF partners via Carbon Trust, external parties will include other network users in the SSEN-T area, particularly large demand and storage developers (including hydrogen) relevant to the solutions identified in Discovery for development in Alpha. Candidates have been identified and engaged.

Project Plans and Milestones

Project management and delivery

We have designed the project using an Agile work breakdown structure (see Project Management Template) and Appendix_Q3-Figure_3. The work packages are designed to explore the risks to the innovation challenge aim, accelerate connection times for renewables and/or demand sites to meet the 2030 target. Discovery will explore the central theme of the innovation challenge - *digital tools and novel commercial arrangements to maximise existing network capacity?* The Discovery phase will produce a ranked list of risks and opportunities to resolve these risks.

WP1: Collaborative gap analysis, and innovative solution development. £80,643

- WP1 will share knowledge on the underlying gaps and solutions for the HND to the speed of OWF development in constrained areas and identify collaborative, innovative solutions to address those gaps.
- The Milestone 1 deliverable will be a detailed risk analysis and a list of tangible innovative opportunities (7.05.2024)

WP2: Cost Benefit Analysis. £10,391

- WP2 will provide a high-level overview of the potential costs and benefits of the gaps and solutions identified in WP1, which inform the selection of solutions taken through to Alpha.
- The Milestone 2 deliverable will be a cost-benefit analysis for the potential solutions (21.05.2024)

WP3: Alpha and Beta scoping (one or more projects). £32,792

- WP3 will develop a scope of work for Alpha, which will involve taking the prioritised solutions from WP1 and WP2 to development, via a location-specific case study in the SSEN-T area.
- The Milestone 3 deliverable will be the creation of an Alpha phase plan (31.05.2024)

WP4: Project management. £23,264

- To deliver Milestone 4 (completion of Discovery), the project will use an Agile method of level 2 and 3 work packages defined to ensure the effective and efficient running of the project.
- The initial risk assessment is included in the PMT and will be updated regularly throughout the project to identify, assess, and mitigate risks.

The key project risks are identified in the Project Management Template. The top three risks are:
(1) Lack of information (from literature sources and stakeholders), Mitigated by engaging the key stakeholders involved in HND and consulting widely in the Discovery Phase.
(2) Risks and solutions not clearly identified. Mitigation: Blueprint will have direct access to the key experts of the various companies (TO, SO, OWF developer).
(3) Solutions developed in Blueprint do not make it to BAU implementation. Mitigation: Solutions will be developed with BAU implementation in mind.

Appendix Q7 - Blueprint.pdf (opens in a new window) (/application/10102926/form/question/36554/forminput/99639/file/630464/download).

Appendix_Q7_Blueprint_Project-Management-Template.xlsx (opens in a new window) (/application/10102926/form/question/36554/forminput/99639/file/630950/download).

Key outputs and dissemination

The discovery phase will identify innovative, collaborative methodologies that accelerate infrastructure development and maximise the use of existing infrastructure to enable OWFs to connect quickly. Solutions will be prioritised for development in the Alpha and Beta Phase. The idea is to develop one or more interrelated projects that can realise the opportunities presented by the HND.

The key output of Discovery will be a prioritisation of the opportunities, agreed on by the collaborating partners (ESO and TO's) to develop solutions to connect large numbers of OWFs into constrained networks. The benefits case for the prioritised solutions will also be developed.

WP1: with input from SSEN-T, NGET, NGESO, and the OWF developer partners, Carbon Trust and TNEI will produce the HND risk analysis report and risk register. SSEN-T, NGET, and ESO will produce independent reviews and prioritisation of the risks and solutions identified.

WP2: Carbon Trust and TNEI will deliver the CBA for the top-prioritised solutions from WP1.

WP3: based on the outputs of WP1 and WP2, SSEN and Carbon Trust will produce the Alpha Phase Project Plan.

Dissemination is at the heart of Blueprint, the title "Blueprint" has been chosen as the whole purpose of the project is to produce innovative methodologies using SSEN-T's network, which can be used as a "blueprint" for other constrained network areas. It is the intention for the outcomes of Blueprint (particularly Alpha and Beta) to develop solutions that can be delivered through projects that form part of HND and ASTI projects. This approach will require engagement with the ESO, TO's and collaboration with ongoing and planned projects.

In Discovery, there will be an online seminar to disseminate key findings conducted at the end of WP1 to which the wider teams of the project partners, other GB networks, and external stakeholders who provided input will be invited. Blueprint will also present the findings at SIF-organised events, such as the Show and Tell, and via the ENA's platform and Innovation Summit.

Further, the wide OWF developer consortium is already a natural vehicle for strong industry uptake of the results, and the presence of NGET in the consortium means the results will be relevant to the wider GB system and not just SSEN-T's area.

Blueprint will not undermine competitive markets. Indeed it will help to stimulate market competition: a fundamental aim is to maintain UK's position at the head of a competitive global offshore wind market.

Commercials

Intellectual Property Rights (IPR) (not scored)

In the Discovery Phase, we will use the default Intellectual Property (IP) arrangement. In Discovery only potential solutions will be identified, therefore IP is unlikely to be developed in the Discovery Phase. This may change in Alpha and Beta if detailed commercial information is shared for the location-specific case study.

A register of potential IP will be developed (I required) and the management of IP will be addressed in the Alpha and Beta applications for funding.

Value for money

Project costs

The total project cost for the Discovery phase is £167,891.

The project is requesting £147,090 of funding (88% of the total cost), with the remaining £20,801 (12% of the total cost) being provided by project partners.

SSEN-T's costs are £24,539, with a contribution of £2,500. NGET's costs are £13,009, with a contribution of £1,301. NGESO's costs are £14,029, with a contribution of £2,000. Carbon Trust's costs are £116,314, with a contribution of £15,000 (from The Integrator innovation programme, Carbon Trust's OWF developer-funded programme focussed on solving the problem of rapid, largescale integration of OWF into the energy system). In addition, Carbon Trust have secured an in-kind contribution of £10,000 (coming from the OWF developer
partners' technical and development experts' time to be spent supporting the project).

Carbon Trust's costs include £55,000 for a subcontract to TNEI. TNEI are critical to the project to provide additional commercial, regulatory, and technical support. Whilst each partner has expertise in its specific area (transmission, operation, offshore wind development respectively), TNEI is an independent party that can impartially aggregate the views and create a fair gap analysis.

Value for money

The SIF contribution requested will lead to outcomes that provide high value to the consumer. Discovery Phase will address one of the key issues in the industry: how to connect large numbers of OWFs to remote, constrained networks quickly and efficiently, whilst minimising curtailment.

Discovery has been designed such that the outputs of Discovery will be useful in and of themselves. It is at heart a focused, self-contained gap and solution analysis exercise. Getting the outputs of this exercise to BAU is of key importance to Blueprint. It may be that some solutions can go straight to BAU following the Discovery Phase. However, of course, where particularly innovative solutions are identified, it is the intention for the Discovery Phase also to act as a springboard for the Blueprint Alpha and Beta Phases, which will then be the stepping stones to BAU. The key is having a large consortium of TOs, ESO and OWF developers allows the key parties to adopt the outcomes of Blueprint, not only within the
SSEN network but also the wider GB system.

We, therefore, expect that the GB consumer will gain significantly more benefit from the Blueprint Discovery Phase than the SIF funding contribution.

The finances of all project partners are included in the milestones summary
(/application/10102926/milestones-summary).

Supporting documents

File Upload

Blueprint Show and Tell_FINAL.pdf - 842.3 KB
BluePrint Documents Available on Request.docx - 207.0 KB
BLUEPR~1.PDF - 221.0 KB
SIF Round 3 Project Registration 2024-03-08 2_59 - 71.4 KB
SIF Round 3 Project Registration 2024-02-28 4_33 - 71.3 KB

Documents uploaded where applicable?

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