SIF Discovery Round 2 Project Registration

Date of Submission

Apr 2023

Project Reference Number

UKRI10058535

Project Registration

Project Title

REACT

Project Reference Number

UKRI10058535

Project Licensee(s)

Scottish and Southern Electricity Networks Transmission

Project Start

Apr 2023

Project Duration

3 Months

Nominated Project Contact(s)

SIFprojects@sse.com

Project Budget

£169,409.00

Funding Mechanism

SIF Discovery - Round 2

SIF Funding

£149,320.00

Strategy Theme

Net zero and the energy system transition

Challenge Area

Data and digitisation

Lead Sector

Electricity Transmission

Other Related Sectors

Funding Licensees

Lead Funding Licensee

SSEN - Scottish Hydro Electric Transmission

Collaborating Networks

Scottish and Southern Electricity Networks Transmission

Technology Areas

Electricity Transmission Networks

Equality, Diversity And InclusionSurvey

Yes

Project Summary

REACT is fully aligned with SIF Challenge 3 Scope 2, which aims to strengthen the UK's energy system robustness to support efficient roll out of new infrastructure.

REACT is an innovative tool that will provide the ability to visualise connection requests in real-time, outline the impact they have on the grid and provide the optimal location to site connections on the network.

This will help manage the large increase in connection requests expected on the network by allowing developers to review the impact of their request and identify alternative solutions, saving time and resources. This will prevent the network from becoming overloaded, as each connection will be placed strategically, in turn helping improve the system's ability to withstand shocks.

Project Description

The UK currently has 294TWh of annual electricity demand, a figure set to more than double by 2050 if Net Zero is to be delivered.

Determining the best location to place new demand will become increasingly more important. For example, in the North of Scotland, the volume of electricity generated (18.1TWh) in 2020/21 was around three times the amount consumed (6.7TWh).

New demand could have a significant impact on how the network is configured and operates. Currently, the process for reviewing connection requests is done in isolation, with
little time to develop creative solutions on the best location to connect to the network.

The current system provides a static view of the potential network impact. However, this changes each time a project is contracted, making it difficult to assess the long-term, cumulative impact each request has on the grid.

Third Party Collaborators

Olsights

MapStand

Icebreaker One

Nominated Contact Email Address(es)

transmissioninnovation@sse.com

Project Description And Benefits

Applicants Location (not scored)

Inveralmond House, 200 Dunkeld Road, Perth, PH1 3AQ

Project Short Description (not scored)

Strategic geographic planning of all future demand and generation connection requests, using green hydrogen as a use case.

Video description

https://youtu.be/PeszAPDCs_Y (https://youtu.be/PeszAPDCs_Y)

Innovation justification

Connection requests are currently assessed individually over a 60-day-period.

Within this time, the connections team determine what work is required, what assets need built and the timescales and costs. The time pressure of this process limits the ability to be strategic with new connections.

REACT would address these issues by providing a dynamic view of all forecasted connection requests and accelerate the uptake of demand and generation technologies by highlighting the optimal locations to site projects (Appendix_Q4_Project Approach_REACT).

REACT is an interactive tool with two key components:
1. The spatial planning tool will incorporate the current and future power and gas infrastructure, allowing users to understand alternative grid connections and optimise the location of future developments. This requires the aggregation and integration of multiple spatial datasets, including new data for early-stage projects and online measuring tools to quickly screen cable routes and profiles.
2. The power flow modelling tool will approximate the impact and feasibility of connections prior to application. As connection requests to the network increase, the power flows on the system are continuously changing. Developing a tool that can interpret the power flow modelling data alongside the spatial planning data will provide an innovative way of assessing connection requests.

Benefits Part 1

Environmental - carbon reduction – direct CO2 savings per annum against a business-as-usual counterfactual
Environmental - carbon reduction – indirect CO2 savings per annum against a business-as-usual counterfactual
Financial - cost savings per annum for users of network services
New to market – products, processes, and services

Benefits Part 2

REACT will deliver the following net benefits to consumers:
Financial - Cost savings for users of network services
Significant interest to connect hydrogen electrolysis sites to the SSEN-T Network has resulted in multi-million-pound connection offers being made to developers due to the capacity requested and limited availability on the network. These requests would require costly reinforcement of the network, which would slow down the energy transition and increase consumers bills. Offering the tool to developers before they submit requests could deliver large savings by providing alternative locations to site their project on the existing network with more capacity. REACT will also save time and resource by eliminating the need for developer pre-application calls by providing them with all the information they need prior to the application. These calls cost approximately £6.3Kpa and will increase as connection requests rise. We'll review the savings on project development, pre-application costs and Transmission Network Use of System charges throughout the Project.

Environmental - Direct CO2 savings p.a against a business-as-usual counterfactual REACT will reduce the carbon emissions of building new infrastructure which would be required for the increase in connection requests. By utilising the existing network where possible, REACT will deliver direct environmental benefits. Environmental - Indirect CO2 savings p.a against a BaU counterfactual Carbon reductions will be investigated to identify the amount saved through reducing the delivery delays of hydrogen projects, while

taking into consideration the ESO's and SSEN-T's North of Scotland future energy scenarios.

New to market - products, processes, and services REACT is new to the market and will combine power flow modelling and spatial planning tool, making it a unique innovation. The license would be jointly owned by the developing parties (SSEN-T, Olsights, Mapstand) during the SIF staged process. As the tool developer, Olsights would administer license agreement on behalf of the joint owners. Licensees would enjoy commercial use of the tool, either as an adapted version for their own jurisdictions or as part of a broader
software package. The SME partners could see significant business-growth if this tool is rolled-out across the industry. Power Engineering International stated that 17,000 green jobs can be created in Britain if planned investments in hydrogen projects are implemented. By combining multiple processes into one, REACT will streamline the connections process and provide quicker results for developers, in
turn accelerating the uptake of renewable technologies and supporting the rise in green jobs across GB.

Project Plans And Milestones

Project Plan and Milestones

The Discovery Phase will be split into four work packages (WP) and 11 milestones, as detailed in the Project appendix.

WP0: Project Management (SSEN-T) (SIF funding request = £7,000)
WP0 will cover the Project Management from start to finish. The SSEN-T Project Manager (PM) will ensure the Project is on track to meet all deadlines and will meet with partners on a weekly-basis to update on progress, risks, and insights. As part of the Alpha preparation, we'll document the benefits of the Project throughout the Discovery Phase.
Deliverable: the successful completion of all work packages within Discovery
Phase.

WP1: Literature Review (MapStand) (SIF funding request = £24,064)
WP1 ensures REACT learns from best practices by producing a comprehensive literature review on hydrogen developments within GB and worldwide. This WP will map existing power transmission expansion scenarios and the impact on Net Zero goals.
Deliverable: assessment on the future impact of hydrogen on electricity networks.

WP2: User Needs and Data Availability (Icebreaker One) (SIF funding request = £54,703)
This WP engages with stakeholders to determine user needs and investigate data availability and data governance of identified key data sets for REACT. This WP builds towards the Alpha phase, as it determines what may be possible with today's data and makes recommendations for reducing friction to promote future innovation.
Deliverable: a recommendations report for detailing the main priorities and needs from a network perspective that will inform the development of WP3.

WP3: REACT Tool Planning (Olsights) (SIF funding request = £63,552)
WP3 will analyse what is technically required to create the tool, investigate if SSEN-T modelling tools can be incorporated, and when connection studies need to be carried out.
Deliverable: a summary showing proposed scope, resource, and cost plan for the Alpha build.

The key risks identified (as detailed in the risk register) include: Availability of stakeholders. Mitigation: Partners will identify crucial roles prior to start to ensure availability.

Tool does not address market needs. Mitigation: WP1 and regular stakeholder checkpoints will ensure WP3 will address market needs. Data security. Mitigation: Protect data in our systems with strong encryption, both when the data is at rest and when being transferred.

Project risks will be reviewed weekly and managed by the PM and raised with the monitoring officer as appropriate. Three potential regulatory barriers have been highlighted in Q8; however, we foresee no major commercial or technical constraints preventing this tool becoming BaU.

Regulatory Barriers (not scored)

There were three potential regulatory barriers identified that could impact the later stages of this project:
The immaturity of the hydrogen regulation space could mean that commercial models and the business case framework are still in the early stages of development and that many of the use-cases proposed for hydrogen are still uncertain and not supported by evidence. Gaining access to data from other networks could be difficult due to possible licensing constraints, however this is also a strength of this project as it would allow us to identify this gap early in the process and address these issues in advance.

The REACT Tool Planning Work Package (WP3) will help to investigate this by analysing the data and tools currently available. Customer data would need to be aggregated and desensitised if it was going to be used in the tool. The application information is not in the public domain until a connection agreement has been signed, so we need to be cognisant of that type of data. The User Needs and Data Availability Work Package (WP2) will ensure data is stored securely and all customer data is desensitised.

Commercials

Route To Market

To ensure use of the tool becomes BaU, SSEN-T would undertake a number of activities, including:
1. Host workshops to share learnings and best practice with the wider industry.
2. Launch the tool on the SSEN-T website, allowing developers access to it prior to submitting connection requests. This would allow for more informative discussions and enhance decision making.
3. Include a link to the REACT tool in the Customer Connections section of the website and the 'Transmission Connections Guide', making it easily accessible for developers.
4. Train the Connections Team on how to use the tool and update the 'Connection Application' work instructions to ensure the tool is used when assessing new connection requests.
REACT aims to provide developers with information on the best location to site their connection based on the current grid capacity. This should not impact the development of a competitive market as developers maintain the right on where they connect their project.

SSEN-T have Systems Planning and Investment Teams that assess, manage, and respond to all connection requests. They play a pivotal part in enabling renewable generation to connect to the network, therefore are best placed to make Project REACT a BaU activity.
Customers and value proposition
The primary customer segment of the tool will be developers who seek to connect to the electricity network and other electricity networks businesses. As the tool will be hosted on the SSEN-T website, it will be openly available to anyone. This tool has the potential to bring large business-growth opportunities for the SME partners involved, as the scale of this project could be rolled out across the entire industry.
The customer value proposition for REACT is it will reduce the cost of operating the network, as it allows developers to identify the optimal sites for locating future connections and utilise existing network capacity. This will reduce the need for costly reinforcement, consequently reducing the long-term impact on consumers bills.
Funding
As the tool leverages the capabilities of Olsights and MapStand, on-going costs for use of the tool would likely result in a licensing agreement between Olsights and MapStand for the ongoing infrastructure, data maintenance and further development of the tool. The long-term funding plan is for it to become part of the regular capital and operational expenditure of the business and be included in future price control budgets (RIIO-T3) following the Beta Phase.

Intellectual property rights (not scored)

To ensure clarity is provided to the Project Partners, UKRI and Ofgem regarding the IP landscape, 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.
For the Discovery Phase, all the IPR arrangements will follow the default recommendations of Chapter 9 SIF Governance Document.

Icebreaker One has an open by default policy and all relevant outputs will be openly licensed.

Costs and value for money

Partners

All partners carefully planned the work packages, using their expertise to define each deliverable and ensure Project REACT delivers quality output. There is an even spread of costs across the Project partners which have been appropriately calculated in line with the amount of work they are delivering. SSEN-T have competitive day rates, and the Project partners rates are consistent with previous innovation projects.

Economic

REACT will deliver economic benefits by allowing more efficient roll out of new infrastructure. The tool will streamline the connections processes and allow services to be coordinated, rather than treated separately. This will allow for a cost-effective approach to decarbonisation. Additionally, this project could bring significant business-growth for our SME partners through job creation, as it could open opportunities for them to work with the wider industry across the UK or internationally to customize and license tailored versions for other electricity or gas networks.

Environmental

The REACT tool will help accelerate the uptake of renewable technologies, as it allows future demand customers to easily identify areas to connect to the network, in turn helping speed up decarbonisation and reduce C02 emissions. The tool can also be used by other electricity networks and has the potential to incorporate the current and future power and gas infrastructure; therefore, the benefits of this can be rolled out across the industry.

Document Upload

Documents Uploaded Where Applicable

Yes

Documents:

SIF Discovery Round 2 Project Registration 2023-04-06 11_13

SIF Discovery Round 2 Project Registration 2023-04-17 11_21

REACT SIF Discovery End of Phase 2023-06-22.pdf

REACT SIF Discovery Show and Tell 2023-06-21.pdf

REACT Discovery - Risk Register.xlsx

This project has been approved by a senior member of staff

☑ Yes