Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Dec 2024

Project Reference Number

NIA_SHET_0052

Project Registration

Project Title

Rapid Evaluation Areal Connection Tool (REACT)

Project Reference Number

NIA_SHET_0052

Project Licensee(s)

Scottish and Southern Electricity Networks Transmission

Project Start

January 2025

Project Duration

1 year and 3 months

Nominated Project Contact(s)

Brant Wilson – Innovation Portfolio Manager

Project Budget

£1,080,000.00

Summary

REACT (Rapid Evaluation Areal Connection Tool) is a geographic visualisation planning tool designed to help stakeholders navigate the complexities of upgrading the power grid to achieve Net Zero. By visualising power flows and analysing planned generation, demand and storage, including contracted substation pipelines, alongside other decarbonisation pathways, REACT enables the Network Licensee to optimise network development. This NIA project aims to deliver a standalone tool covering the entire SSEN-T licence area based on the output of the REACT Alpha Phase and including the development of new scenarios to understand scheme status / likelihood of success plus other user-driven experimental features. Enabling users to optimise demand and generation placement with REACT maximises asset efficiency and supports effective deployment of new infrastructure.

Preceding Projects

UKRI10058535 - REACT

UKRI10079052 - REACT – Rapid Evaluation Areal Connection Tool

Third Party Collaborators

Olsights

MapStand

Nominated Contact Email Address(es)

transmissioninnovation@sse.com

Problem Being Solved

• The timely connection of renewable energy, new power demand and storage is crucial to realise the UK's net zero targets.

• Delays are threatening the decarbonisation of the energy network in the targeted timeframes.

• Lack of early engagement with planning, consenting and community stakeholders creates planning risk and delays.

• Currently the process for reviewing connection requests is carried out in isolation with little opportunity to explore more creative solutions that could be optimal for network, Developer and Consumers/ Community.

• The TO needs better visibility on the comprehensive status of projects and project timelines to enable optimisation of network development.

Method(s)

REACT began life as a SIF Round 2 project successfully completing the Discovery and Alpha Phase and involving two other networks:

National Grid Electricity Transmission (NGET) and SGN. During Alpha, an easy-to-use digital web-based transmission-level geographical planning tool was developed and demonstrated. Due to the limited project timeframes, the tool only covered a part of SSENTransmission's licence area.

The methodology is to build a stable and interoperable digital model by aggregating data from a broad range of sources including NESO, the Transmission Operators local councils, scheme developers and the Crown Estate. This data within this digital model will then be visualised by the development of an intuitive front-end application whose functionality and dashboard are driven by user needs. The project will significantly advance the REACT tool developed in the SIF Alpha Phase through the addition of new attributes and filtering options.

Data Quality Statement (DQS)

The project will be delivered under the NIA framework in line with Ofgem, ENA and SSEN Transmission internal policy. Data produced as part of this project will be subject to quality assurance to ensure that the information produced with each deliverable is accurate to the best of our knowledge and sources of information are appropriately documented. All deliverables and project outputs will be stored on our internal SharePoint platform ensuring access control, backup, and version management. Deliverables will be shared with other network licensees through the closedown reports on the Smarter Networks Portal.

Measurement Quality Statement (MQS)

The methodology used in this project will be subject to supplier's own quality assurance regime. Quality assurance processes and the source of data, measurement processes and equipment as well as data processing will be clearly documented and verifiable. The measurements, designs and economic assessments will also be clearly documented in the relevant deliverables and final project report and will be made available for review.

In line with ENA's ENIP (Energy Networks Innovation Process) document, the Assessed Risk Score is 6 = **LOW** which is the sum of the risk thresholds below:

• TRL Change: 1, Risk Threshold Low (Score 1)
• Cost: £500,000 - £1m, Risk Threshold Medium (Score 2)
• Number of suppliers: 2, Risk Threshold Low (Score 1)
• Data: Assumptions known but will be defined within project, Risk Threshold Medium (Score 2)

Scope

Scope

The NIA project plans to develop and expand the existing REACT visualisation tool to encompass the entire SSEN-Transmission licence area. The digital model that drives the visualisation will greatly be enhanced and with functionality that meets the needs of internal stakeholders. The longer-term plans (post-NIA project) are to apply for SIF Beta funding, which has already been discussed with UKRI and OFGEM, and build a GB-wide tool that will further expand the stakeholder group.

This project plans to add new attributes and filtering options to the tool that may be tested offline such that the project partners can rapidly and safely test and evaluate the deployment of commercially sensitive network features. This requires the development of new scenarios to understand project status/ likelihood cumulative context as well as other experimental features which are key to the future

development of the overall REACT project. The project is divided into four work packages as follows:

• WP1: Project Management (Lead: SSEN-T) including ensuring the project continues to meet the requirements of the NIA.

• WP2: Digital Model (Lead: MapStand) including building an Esri utility data model of the network and schemes to test interoperability with SSEN-T products:

o Definition of digital model requirements
o Expansion of digital model to include entire SSE-T licence area
o Statistical analysis of historical applications
o Develop methodology for assessing a schemes probability of success
o Develop processes to improve digital model.

• WP3: Front End Application (Lead: Olsights) including definition, agile iterative prioritisation and deployment and User testing of the front-end web application to address SSEN-T spatial planning challenges:

o Front-End Tool Requirements
o Initial SSEN-T Licence Area Standalone App
o First set of innovative features
o Second set of innovative features
o Third set of innovative features
o Beta Phase Statement of Requirements re-issued.

• WP4: Dissemination and Beta Scoping (Lead: SSEN-T) including preparing dissemination material for events such as the Energy Innovation Summit.

Benefits

The tool is an enabler for early discussions during the shaping of a project and does not favour a particular energy vector or technology.

A Cost Benefit Analysis has been developed to estimate the financial benefits which can be attributed to:

Cost Reduction for Network and Consumers

• Curtailment reduction by implementing a more holistic view of the network when considering connections

Reduced Environmental Impact

• Reduce the building of new infrastructure by utilising the existing network more optimally - consider the entire network at an early stage

Connection Application Improvements

• Facilitated through better informed pre-application discussion

Developers have a greater awareness of their opportunities which will help lead to more informed and creative investment decisions

Objective(s)

The main objective of this project is to develop an easy-to-use digital web-based geographical transmission system planning tool, covering SSEN Transmission geographical area, that provides a diverse group of stakeholders with a unique understanding of the complexities and opportunities of upgrading the power grid to deliver Net Zero.

Consumer Vulnerability Impact Assessment

An assessment of distributional impacts (technical, financial, and wellbeing related) for this project has been carried out using a bespoke assessment tool, which assesses the project as having a positive, negative, or neutral effect on consumers in vulnerable situations. To help inform the assessment, this tool considers the categories of consumers identified in the Priority Services Register. This project has been assessed as having a neutral impact, meaning that it does not have any effect on customers in vulnerable situations. This is because it is a Transmission project.

Success Criteria

The project has clear tangible deliverables (the key technical ones are shown below) whose completion will be a measure of success. Given the main deliverable is a digital visualisation tool based on a set of requirements agreed during the early stages of the project, its success can clearly be determined.

- Digital Model requirements (MapStand)
- Statistical analysis of historical applications (MapStand)
- Statistical predictive model to quantitively assess likelihood of project success (MapStand)
- Front-End Tool requirements (Olsights)
- Initial SSEN-T licence area standalone App (Olsights)
- Set of Innovative features (Olsights)

Project Partners and External Funding

There are two innovative Small Medium Sized Enterprises (SMEs) who are supporting the delivery of the REACT tool using NIA funding:

Olsights - a clean energy data visualisation and application developer creating tools to equip energy decision makers with insights to understand and assess the impact of decarbonisation projects.

MapStand who work closely with Olsights and manage and provide the geospatial datasets used for the visualisation of REACT.

No other funding is being sought to enable completion of this NIA project

Potential for New Learning

This project will focus on user experience of map-based visualisations to better understand how to communicate complex ideas around infrastructure planning. This is to enable REACT to move from providing data and information to being able to impart knowledge and develop wisdom (knowledge pyramid) which can facilitate the development of the infrastructure needed for net zero. The project will also conduct statistical analysis and develop machine learning methodologies enabling forecasting of risked cumulative impact and connection queue development considering connections reform. The outputs support multi-criteria decision analysis (MCDA) that can be disseminated through a future REACT beta application and expanding to include the whole network.

Learnings from the project will be disseminated via internal and external stakeholder events which will be conducted during the project. The learnings will also be shared within the annual project report and at relevant dissemination events such as the Energy Networks Innovation Summit.

Scale of Project

The project has been designed to provide the biggest impact at the lowest cost and takes advantage of the unique skillset of the two named innovative and agile SMEs. The investment of £1 million is far outweighed by the potential life-time cost saving which could reach £260 million. Given that REACT provides a more holistic view of the network, it is believed that this insight would help reduce wind curtailment through more informed decision-making.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL6 Large Scale

Geographical Area

The project will largely be executed in SSEN-T licence area as well as benefit from remote working given the project partners are situated in the South-East and North of England. The nature of the project is such that remote working does not represent a problem. The project has provisioned for face-to-face meetings as required although the majority will be via Teams which has proven to be effective previously.

Revenue Allowed for the RIIO Settlement

This type of development has no allowance associated with it within the RIIO-T2 settlement. There are no savings expected during project delivery and any future saving are dependent upon the outcomes of the project and future adoption of the learning.

Indicative Total NIA Project Expenditure

The project has been extended by four months to allow sufficient time to complete the remaining works. An additional £80,000 budget has also been approved to deliver enhanced user interface functionality and further refine the digital model underpinning the front end application. These changes materially increase the value of the software platform for its primary users, the Energy Insights team. The total NIA Expenditure for the project is £1,080,000 with £972,000 (90%) being allowable NIA expenditure.

Project Eligibility Assessment Part 1

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

The project aims to support efficient use of existing assets and the effective deployment of new infrastructure, by providing a visual toolbox with functionality to forecast and optimise the location of generation, demand and storage projects in the context of network development. Thus, it contributes to the energy system transition by driving more informed decisions that will help make the network more efficient.

How the Project has potential to benefit consumer in vulnerable situations:

Not applicable.

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved

Not applicable.

Please provide a calculation and/or description of the expected benefits of the solution

REACT's Unique Selling Point (USP) is that it is an intuitive aggregated spatial view of current and future planning status of energy and utility networks, energy developments and geography.

It satisfies a wide range of stakeholders with engaging, easy-to-use / understandable visuals in which the data model is live with automated updates. Moreover, the data model merges complex datasets that have never been previously combined.

The CBA model is based on the following assumptions:

A Cost Benefit Analysis (CBA) was developed for REACT in Q1 2024 as part of the SIF Beta Phase application and has recently been reviewed to ensure it remains relevant.

• It is assumed that the technology would be operational in **2031** following completion of this NIA project, a SIF Beta Phase and a period of further testing/refinement.
• Estimated total project cost (Discovery -> Deployment): **£7.7 million**

• The lifetime net financial benefit is estimated to be **£260 million** comprising savings to:
• Offshore wind curtailment reduction: 1% annual saving
• Onshore wind curtailment reduction: 1% annual saving
• Transmission Network Use of System (TNUoS) reduction: 1% annual saving
• Connection application cost reduction: 50% annual saving

Summary of Benefits:

Cost Reduction for Network and Consumers

• Curtailment reduction by implementing a more holistic view of the network when considering connections which allows Customers to connect quicker to the network.

Reduced Environmental Impact

• Build a more optimum network by considering the entire network at an early stage.
• Ability to visualise and understand the interactivity between different future network scenarios.

Connection Application Improvements

• Facilitated through a pre-application discussion.

Please provide an estimate of how replicable the Method is across GB

Whilst the NIA project focuses on the SSEN-T's licence area, the longer-term plan is to develop a GB-wide tool. The project has the support of other networks including NGET and SGN who were partners during the SIF Alpha Phase and will continue to be involved herein but not as a project partner. There has also been engagement with SPEN and NESO both of whom have shown an interest in participating.

Please provide an outline of the costs of rolling out the Method across GB.

The cost of expanding the REACT tool across the GB has previously beenestimated to be circa £5 million based on a figure generated as part of a SIF Round 2 Beta application. These costs are subject to change and would be further refined towards the end of the NIA project.

Requirement 3 / 1

Involve Research, Development or Demonstration

Projects must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

☐ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).

☐ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)

☐ A specific novel operational practice directly related to the operation of the Network Licensees system

☐ A specific novel commercial arrangement

Involve Research, Development or Demonstration - Please select all that apply

☐ A specific piece of new equipment (including monitoring, control and communications systems and software)

☐ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven

☑ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)

☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology

☐ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution

☐ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

This project will provide learnings on how the "knowledge pyramid" can inform new ways of visualising aggregated spatial data showing current and future planning of energy networks, energy development and geography. This represents new learning and aims to enhance understanding that can be shared. Ultimately the techniques can help a wide stakeholder group understand complex issues. The intention is for a variety of stakeholders including developers and network licence holders to be the beneficiaries of REACT.

Not applicable.

Is the default IPR position being applied?

☑ Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed. Networks must explicitly mention similar projects that they have considered and how these differ.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

The project partners carried out a review any digital tools deemed similar during the SIF Discovery Phase and revisited this list during the preparation of the SIF Beta Phase interview (July 2024). Whilst there are several digital tools in the space, none are directly comparable or as far reaching as REACT.

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

Not applicable.

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

There is currently no software solution that combines this broad range of geographical information system (GIS) data (e.g., power curtailment, energy demand, environmental resources) into a single digital tool that is beneficial to such a broad range of stakeholders.

The key innovations to be developed as part of this project are:

• The creation of a data-rich interoperable digital model combining the transmission network, connected/queued schemes and spatial planning risk/opportunity factors.
• The creation of an intuitive geographic front-end tool that uses the most advanced data visualisation and scenario analysis techniques.
• Development of statistical models including the use of machine learning techniques to better forecast the variables that impact project success relies on data and techniques that are cutting edge.
• Development of specific digital workflows to maintain a stable digital model shared between Open Data, GIS and Powerflow models to enable easy flow of data and interoperability. Thisis designed to integrate and support digital model and digital twin workflows aligning with other projects currently in development.

Relevant Foreground IPR

The REACT project has evolved during SIF Discovery and Alpha to a broader understanding of connection development success, and the currently identified Relevant Foreground IPR is expected to include:

• A toolkit for measuring and aggregating transmission network supply and demand data within an interactive map.

• A toolkit for automatically estimated planning capacity and other commercial implication for transmission supply and demand expansion scenarios.

All Relevant Foreground IPR will be made available to the other relevant networks licensees as per the NIA project requirements.

Background IPR will be captured before the project kick off and documented in an IP register. It will be readily available for the execution of this project.

Data Access Details

For information on how to request data gathered during this project, see Strategic Innovation Fund (SIF) and Network Innovation Allowance (NIA) Data Sharing Procedure at https://www.ssen-transmission.co.uk/about-us/innovation/.

Additionally, data from this project and all other projects funded under the Network Innovation Allowance (NIA), Network Innovation

Competition (NIC) or the Strategic Innovation Fund (SIF) can be found or requested in the ways listed below:

• Via the Smarter Networks Portal at: https://smarter.energynetworks.org. To contact select a project and click 'Contact Lead Network'. SSEN Transmission already publishes much of the data arising from our innovation projects here so you may wish to check this website before making an application.
• Via our Innovation website at: Innovation - SSEN Transmission (ssen-transmission.co.uk)
• Via our managed mailbox: transmissioninnovation@sse.com

Please identify why the Network Licensees will not fund the project as a part of it's business and usual activities

REACT aims to provide an aggregated spatial view of the current and future network which has multiple challenges e.g., data quality and openness. In addition, the project incorporates new analysis and techniques aimed at forecasting cumulative demand and infrastructure rollout that includes potentially sensitive information. The experimental techniques to understand knowledge dissemination though the agile development of visualisations is also not considered a business-as-usual methodology. Therefore, due to the innovative, unproven nature of REACT it is not considered a business-as-usual initiative.

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks (e.g. commercial, technical, operational or regulatory) associated with the project

As described in the NIA guidance, certain projects are speculative in nature and yield uncertain commercial returns. This is the case with this project. The interactivity of REACT with current network reforms make it suboptimal to move the project forward with SIF funding in the near term. NIA funding is sought to develop a clear set of use cases and techniques for the Network licensee which can be incorporated into future development of the REACT Project. The key risks that have been identified include:

• Some Data (especially externally provided) is not appropriately licensed which hinders future development.
• Techniques developed are costly or complex to run commercially.
• Key developments in the project have use cases with the network partner but do not deliver value to the wider stakeholder group.
• Not receiving high fidelity user feedback from users with the Network Licencee, which impacts the building of useful features and their incorporating in REACT SIF Beta re-application.

This project has been approved by a senior member of staff

☑ Yes