SIF Round 3 Project Registration

Date of Submission

May 2024

Project Reference Number

NPG_SIF_011

Initial Project Details

Project Title

SANND (Scenario Analysis for Non Domestic Network Decarbonisation)

Project Contact

Chris Goodhand

Challenge Area

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

Strategy Theme

Whole energy systems

Lead Sector

Electricity Distribution

Other Related Sectors

Electricity Distribution

Electricity Transmission

Gas Distribution

Gas Transmission

Project Start Date

01/03/2024

Project Duration (Months)

3

Lead Funding Licensee

NPg - Northern Powergrid (Northeast) Limited

Funding Licensee(s)

NPg - Northern Powergrid (Northeast) Limited

Funding Mechanism

SIF Discovery - Round 3

Collaborating Networks

Northern Powergrid

Technology Areas

Modelling

Project Summary

Scenario Analysis for Non-domestic Network Decarbonisation (SANND) will be a software tool to visually display forecast scenarios of additional demand on electricity distribution networks at different time points based on bottom-up modelling. It will model the propensity for individual large energy users to take different decarbonisation routes and build into a whole network model.

This tool would facilitate network planners understanding of probable future network needs (how much demand, where and when). Allowing network planners to pre-emptively plan network infrastructure upgrades/ flexibility to ensure the network is ready to cost effectively support each customers decarbonisation journey.

Add Third Party Collaborator(s)

EA Technology

Energy Systems Catapult

Project Budget

£167,602.00

SIF Funding

£144,831.00

Project Approaches and Desired Outcomes

Problem statement

Scenario Analysis for Non-domestic Network Decarbonisation (SANND) will be a software tool to visually display forecast scenarios of additional demand on electricity distribution networks at different time points based on bottom-up modelling. It will model the propensity for individual large energy users to take different decarbonisation routes and build into a whole network model.

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Video Description

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

Innovation justification

We are proposing to address DNO's long term strategic network planning challenges through modelling of HV connected site-based decarbonisation pathways. Using existing network data, novel planning methods and forecasting site-specific energy transition opportunities, the tool will allow better strategic planning and investment especially at HV, emphasising I&C customers and their impact.

Presently, network reinforcement planning is based on aggregated DFES scenario load forecasts. They are statistically robust due to the large number of customer, however it is unlikely loading changes can be uniformly applied to all networks and assets. Our proposal models loading variation within the distribution network, to determine where network capacity will be constrained, and importantly, when reinforcement will be required.

Building upon NPG's Inform Alpha project developed by EA Technology with work undertaken the Energy Systems Catapult in projects such as Modern Energy

Partners, Local Area Energy Planning and the modelling of decarbonisation of industry in ESME Industry, SANN□hypothesises that granular decarbonisation

pathways can be created for HV users, providing insight of the types of initiatives, timelines and changing in demand.

Combining national scenario with local pathway data sets described is innovative, with no guarantee what will be achievable.

Insight from these projects is that adoption of technologies vary depending on activity, can include electrification of heat, sometimes with onsite generation, or the adoption of other technologies with different energy sources. Understanding these better can additional granularity be added to future forecasting. DFES cannot offer that level of knowledge.

This Discovery phase will specify the proposed tool (TRL3) rather than develop it. It is envisaged to build upon existing tools and therefore development time accelerated during an Alpha phase.

This phase will scope stakeholders priority outputs. It is envisaged that the tool will topographically provide measure of network demand from 2030, 2035, 2050

according to specified decarbonisation scenario, outputting asset sizes needed and when. It will also explore data update processes.

Software development is complex and inherently expensive. The tool proposed, if proven successful, could be utilised by other network operators but carries development and data quality risks that need to be better understood. SIF funding is initially required to scope this project and understand available data sources, including best utilisation of existing data sources used by strategic planners and incorporate new data streams. This level of risk combined with potential for scalability to other DNOs makes it applicable for a multi-stage SIF funding approach.

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

Environmental - carbon reduction – indirect CO2 savings per annum

Revenues - improved access to revenues for users of network services

Impacts and benefits description

Decarbonising HV connected customers will provide significant carbon savings, but changing load will have the greatest impact and create most risk to ONOs. Anticipating load change among a changing technology landscape that influences load growth creates uncertainty, however doing nothing until a connection alteration proposal is received risks slowing realisation of national decarbonisation targets. SANNO aims to create more detailed future scenario analysis for ONOs reducing the risk of vital decarbonisation projects being impacted and ensuring the full value of those projects is realised.

Financial: Future Reductions in the Cost of Operating the Network
Enhanced understanding of probable demand growth, leads to more efficient and timely network investments, cutting long-term operational costs, allowing pre emptive network investment based on 'least-regrets' capacity assessments, mitigating the risk of over or under-investing in infrastructure.

Improved forecasting of network demand facilitates the identification of potential flexibility options, reducing the need for expensive network reinforcements and emergency responses to capacity issues. The proposed SANNO project seeks to refine the starting position of aggregated demand feeding into the OFES forecasts, improving network loading forecasts on a geographic and temporal basis.

Financial: Cost Savings Per Annum on Energy Bills for Consumers
Building operators and industries experience cost savings as projects are de risked and delivered faster due to networks being prepared for new demands. For consumers, this reduces energy bills, as efficient network upgrades create a

stable and cost-effective energy supply. Enabling network reinforcement works at the point of first requirement, designed to provide capacity for the longer term modelled requirements, will enable customers to implement cost-saving measures (e.g. generation) at the earliest opportunity.

Environmental: Carbon Reduction Indirect CO2 Savings Per Annum
Our tool supports carbon reduction by accelerating low carbon technology deployment, facilitating indirect CO2 savings. Mapping major energy users within DFES scenarios and aligning them with domestic energy use and other factors, enhances the effectiveness of the network to handle renewable generation and demand-side flexibility. Early identification of new barriers allows for quicker policy interventions, proactively steering the market towards low-carbon solutions, reducing reinforcement need, providing further indirect carbon savings.

Revenues: Improved access to revenues for users of network services
Timely increase in network capacity facilitates decarbonisation of HV sites and opens potential for further network services as low carbon technologies become more widespread. Early sign-posting of potential constraint issues enables sites to implement generation, electrified heat and transport opportunities for local balancing services through the tool.

Teams and resources

The proposed project team bring complimentary experience and knowledge of the electricity planning sector, energy industry, local area planning mechanisms, industrial and commercial building decarbonisation and software development. EA Technology and the Energy Systems Catapult have worked together on several projects and are currently collaborating on the Inform project with Northern Powergrid.

EA Technology have a long standing relationship with Northern Powergrid having partnered on a number of software and innovation projects including developing the AutoDesign connections tool. This insight into network connections procedure, and

existing access to network data, along with their knowledge of electricity and energy industry and the impacts of decarbonisation on the sector, will help inform and steer the direction of the proposed tool.

EA Technology also bring extensive project management expertise to this project encompassing the delivery of innovation and software projects for various DNOs, encompassing past and present Ofgem innovation funding streams, that through their nature carry delivery risk, mitigating issues encounter to deliver industry changing outcomes.

Energy Systems Catapult (ESC) will provide expertise and knowledge of complex sites and buildings, and support the Discovery project through engaging with key stakeholders and desktop research to understand the gaps in the current landscape of future energy demand modelling and what data and analysis will be required. ESC will draw knowledge from Local Area Energy Plan (LAEP) activity, industrial cluster decarbonisation modelling, Energy System Modelling Environment (ESME) and Modern Energy Partners (MEP).

Northern Powergrid will provide oversight to the project, access to network data, and fill the role of primary stakeholder. Their insight will ensure concept designs for the tool meet ONO requirements, aligning with existing forecasting processes, and consider likely data availability in the future. They will also provide contacts to other stakeholders for the planned workshops and advisory board.

The project team will include an advisory board comprising of DNOs, academics, and industrial representatives ensuring that the project output addresses stakeholder requirements. Initial mapping has taken place and further engagement will continue to ensure productive and efficient engagement during the stakeholder workshops. During the Alpha phase, this advisory board will form the basis of an engaged steering group combined with others identified during the Discovery phase stakeholder sessions. These committed stakeholders will have key knowledge and influence to ensure that the project output will be fit for purpose and have the necessary backing to ensure transition into a business as usual role.

Project Plans and Milestones

Project management and delivery

Work Package 1 -- Understand current context (ESC)

Review how future projections of electricity demand are being modelled and considered in network planning, to what extent bottom-up models are in place and how these could be improved. This will evidence the need for SANND via:

*Desktop research

*Engage stakeholders

*Establish an external advisory group to input through a stakeholder workshop. Milestone: Stakeholder engagement and write-up

Time: March 2024

Work Package 2 -- Map solution (EATL, and ESC)

Map a toolset that meets requirements of DNOs and consumers whilst accelerating decarbonisation of HV connected sites. Key outputs:

*Leveraging insights from WP1 to create a toolset visualization

*Develop an understanding of the requirements including mapping required datasets and flows.

*Identify existing data sources to be utilised during the Alpha phase, for combining to model strategic network growth.

*Select a target network area for more detailed analysis during Alpha phase Milestone: EATL to document research into data and modelling opportunities Time: April 2024

Work Package 3 -- Quantification of Benefits (EATL, ESC and NPg)

This work package will complete a cost benefit analysis of the proposed tool by:

*Reviewing available data

*Quantifying the potential savings and benefits, establishing -- low, central and high benefit estimates to various stakeholders.

*Qualitative analysis of benefit

*Time, cost, improving service, de-risking the projects, and net zero targets

*Recommend changes to regulatory models.

Milestones: High-level cost-benefit-analysis of SANND across the industry. Time: April 2024

Work Package 4 -- Project Management (EATL)
A dedicated work stream ensuring delivery as efficiently and effectively as possible. This ensures the Monitoring Officers and NPg Project Sponsor has a single dedicated point of contact with the project.

The team will hold regular on-line meetings to oversee project delivery and manage interdependencies working to a shared project plan outlining key dates and milestones. A RAID Log will track all identified risks and issues with active management to avoid or mitigate potential issues. The project will engage stakeholders to ensure effective communication is achieved in the final tool.

This project has sufficiently mitigated risk so that stage gates do not need to be included and does not foresee any policy or regulatory challenges that will impact Discovery phase, however the potential for future project phases will be evaluated.

The project will not require any supply interruptions or impact consumers' access to energy services.

We will ensure there is a plan developed for dissemination of findings.

Key outputs and dissemination

SANND's Discovery phase will confirm the concept and the feasibility of developing it further in an Alpha phase, based on engagement from key stakeholders internal and external to Northern Powergrid. It will capture:

*Qualitative use case scenario especially from internal to Northern Powergrid, but also external feedback

*What the tool/model will look like, and its functionality.

*Its user interface and what outputs will be provided to a user.

*How it will be built, with a timeline and programme of actions based on Alpha funding being the next stage, including MVP, and testing.

*The data sources that will be used and combined to build up a practical picture of tailored HV decarbonisation.

*How the tool/model will be able to predict and forecast scenarios, over set time periods, and how be updated over time with different inputs.

*How the tool can be scaled and deployed across DNOs through Alpha and Beta development

To provide those summaries a summary proposal and document will be developed. It will include sections on the above as well as:

*It'll explain the methodology adopted, and include a summary of the stakeholder engagement input received. It will demonstrate how that feedback has been

incorporated into the plans.

*The sources of information identified and explored, those not selected as well as others chosen to be part of the build with justifications/rationale for selection.

*Outputs of research into existing work in this space to ensure the project does not undermine development of competitive markets.

*The types of modelling techniques explored and the selection.

*An estimate of the benefits that the tool could offer both in financial and other terms.

*Cost Benefit Analysis to provide an understanding of the business case for the development of the outlined tool.

*An assessment of the development risks, plus operational risks associated with accurate outputs. This will capture a review of any regulatory barriers which may present themselves.

The project outputs will be disseminated via project partner digital media. ESC and EATL will create webpages containing project information hosted on their website. Information about the project will also be included in the ESC newsletter (circulation 13,500 subscribers).

All project partners will issue information about project outputs on LinkedIn. Stakeholder engagement will further disseminate outputs The partners will provide a thirty-minute presentation for the Show and Tell dissemination event, inviting all stakeholders who have supported the project and also making it open to others to attend.

Commercials

Intellectual Property Rights (IPR) (not scored)

All Project Partners are happy to comply with the default IPR requirements of the SIF Governance Document.

Should the Discovery phase identify value from the further development of a software tool it would be designed such that it could offer value to any ONO. As a result, the IP would be embedded within a Commercial Product and made available for sale. As such it will be Foreground IP and not Relevant Foreground IP as per the SIF governance with the specific commercial terms being agreed during the Alpha/ Beta submission process.

ESC would retain the rights to the background IP of any of its IP which would be used in the project, such as IP derived through the MEP programme.

Value for money

The majority of this funding is provided for the specialist activities of EA Technology and Energy Systems Catapult (ESC). They have an extensive background from working across the energy system, grid connection and building decarbonisation. To ensure Value for Money (VfM) the project partners have focussed on opportunities to reduce unnecessary costs wherever possible. This has been achieved through the collaboration of EA Technology and ESC to tackle a profound barrier to I&C building and site decarbonisation. This is a sector that can provide major cost and decarbonisation reductions. EA Technology, ESC and Northern Powergrid have extensive experience of delivering innovation projects together, ensuring effective and efficient collaboration and de-risking project delivery.

The total cost associated with the delivery of this project is: £167,602 of which £22,771 (13.6%) will come from Project Partner contributions will be funded through time in kind.

Additional funding is not proposed from another innovation funds, however outputs from other funded projects (IP permitting) will be used. This could include the use of pre-existing assets such as tools developed under Inform, LAEP, MEP, ESME. No subcontractor costs are planned.

Consumer VfM
VfM in the proposed programme is provided by maximising the impact of each pound spent to ensuring success versus agreed objectives. VfM will be added by the Project Partners bringing their knowledge and experience of previous project work that will be leveraged to support delivery of SANNDs at a lower cost, greater efficiency and to a successful outcome.

Normal Industry Rates
In the preparation of this proposal we have worked closely with our Project Partners to ensure their involvement is provided at a commercially competitive rate in line with those we've seen from project delivery elsewhere. This has been achieved through careful discussion and consideration of where the Project Partners are able to increase efficiency, reduce risk and maximise the value they deliver to the project.

Commercialisation of innovation

If at the end of the Discovery phase, the business case for the suggested tools or processes highlight their benefit, the tools could be developed further through proto-type and deployment phases. The exact process will depend on the findings from the Discovery phase but the challenges highlighted by this project are expected to be replicated across GB, therefore offering an approach or process to all DNOs and applicability in other countries.

Supporting documents

File Upload

SANND Discovery Show & Tell.pdf - 539.8 KB
SANND Discovery Report v2.0 FINAL.pdf - 2.4 MB
SANND Discovery CBA.xlsx - 1.4 MB
SANND Discovery MO mtg.pdf - 247.7 KB
SIF Round 3 Project Registration 2024-05-15 10_26 - 59.3 KB

Documents uploaded where applicable?

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