NIA Project Registration and PEA Document

Date of Submission

Dec 2022

Project Reference Number

NIA_SSEN_0065

Project Registration

Project Title

Storm AI

Project Reference Number

NIA_SSEN_0065

Project Licensee(s)

Scottish and Southern Electricity Networks Distribution

Project Start

December 2022

Project Duration

1 year and 4 months

Nominated Project Contact(s)

Tim Sammon

Project Budget

£137,500.00

Summary

The Storm AI project will seek to understand the potential role that Artificial Intelligence (AI) and Machine Learning (ML) could play in providing better information for customers who may have been impacted during a storm.

Third Party Collaborators

Open Grid Systems

Nominated Contact Email Address(es)

fnp.pmo@sse.com

Problem Being Solved

Whilst, traditional communication channels remain vitally important in allowing customers to engage with DNOs in storm situations, there has been an exponential growth in the use of digital channels (Twitter, Whatsapp and Facebook) as well as specific apps such as SSENs Power Track. In addition to reporting and tracking outages these give customers more options for consumers to report network damage and even upload photos of damaged sites.

In the "Final Report on the review into the networks' response to Storm Arwen"[1] Ofgem reported that one of the biggest issues customers faced related to communication around Estimated Time of Restoration (ETR). It was recommended that DNOs should improve their assumptions for estimating ETRs and increase the quality of their communication with customers. The Storm AI project will seek to understand the potential role that AI and ML could play in providing better information to customers during a storm by leveraging the additional information provided via these digital channels.

If successful, the Storm AI project will improve the quality of data provided to customers, especially around ETRs and will also ensure that the granular data provided by customers using these digital challenges is presented in a structured manner to operational staff

responsible for managing supply restoration and repairs. Storm AI will maximise the effectiveness of getting this information by digital means employing other data sets and AI and ML techniques.

Method(s)

Storm AI is a technical trial that will seek to understand how AI and ML can be employed to improve our performance during storms and provide customers with more accurate ETR.

SSEN implemented the use of the Power Track app following the successful NIA project Network Damage Reporter. The app enables users to report damage on our network and check the status of faults and outages. Damage is reported by users sending an image and form via the app with Geographical Position Service (GPS) data of the location. The Storm AI project is a demonstration project that will test if AI or ML can be employed to increase the amount of actionable data provided to SSEN via a customer report on Power Track. For example, type of fault, feeder voltage, number of customers affected, and potentially estimate resources required to resolve the fault. This will in turn enable SSEN to provide more detailed information to the customer regarding the ETR and help prioritise our restoration process.

Scope

The Storm AI project is a demonstration project that will test if Artificial Intelligence (AI) or Machine Learning (ML) can be employed to increase the amount of actionable data provided to SSEN via a customer report on Power Track. The main benefits to customers will be in relation to increase accuracy in the Estimated Time of Restoration (ETR). Benefits to Distribution Network Operators (DNO) will be due to greater efficiency during storms and weather events this is estimated at £2,061k for the next five years based on assumed similar weather patterns. The broadly proposed scope of works for the Storm AI project will cover.

• Research into the proposed use of AI and ML in Power Track and possible solutions

• An understanding of additional data sets available in SSEN that could provide useful contextual data for Power Track

• Subject Matter Experts from SSEN feeding the AI and ML algorithms

• Field trial of AI and ML solution

• Stakeholder engagement and feedback on the solution to ensure its appropriateness

Objective(s)

The objectives for the project are as follows;

• Understand how AI and ML can improve SSENs response in a storm

• Develop power track using AI and ML to leverage additional value from the data submitted to SSEN from customer reports in Power Track

• Understand how AI and ML can be utilised to improve the response to customers and the accuracy of ETRs provided

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

Not Applicable.

Success Criteria

The project will be deemed as successful if all items in the scope, objectives and learnings are achieved and this will contribute to advancing industry response to customer in storm conditions.

Project Partners and External Funding

The project will be undertaken using NIA funding by SSEN.

Potential for New Learning

The project will develop learning on the use case for AI and ML to improve our response to customers during storms. It will determine if AI and ML can reasonably be employed to identify further contextual and resourcing data from fault reports submitted by customers via digital channels. Learning will also be developed to assist the industry with identifying the required data sets to improve the accuracy of ETRs during a storm.

Scale of Project

The scale of the project is designed to develop enough learning to understand the specific issues associated with employing AI and ML to improve response to customers during storm conditions. The project will demonstrate the use cases for AI and ML in a real-world environment in enough detail to allow for an assessment of the success of using such technologies. Without a real-world demonstration of the technology the learning would not be sufficient enough inform a business as usual decision on the technology.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

The project will be undertaken within the SEPD and SHEPD licence areas.

Revenue Allowed for the RIIO Settlement

No revenue was allowed for this activity.

Indicative Total NIA Project Expenditure

The total expenditure expected from the project is £137,500 90% of which (£123,750) is allowable NIA expenditure.

Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

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

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

N/A

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

N/A

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 (RIIO-1 projects only)

It is very difficult to provide an estimate of the benefits if the problem is solved across GB, as weather events by their nature are not planned and different licence areas are affected differently. However Storm Arwen resulted in the DNOs impacted having to make £44,367k compensation and redress payments to customers. (https://www.ofgem.gov.uk/publications/ofgem-publishes-full-report-following-six-month-review-networks-response-storm-arwen) If successfully deployed, the project would see better information being provided to customers allowing them to make better informed decisions on how to manage during the outage, but will also help DNOs to better prioritise and help ensure appropriate resources (plant, materials and labour) are available to progress repairs. This should help reduce repair times and also improve customer service, both of which should help to reduce future compensation and redress payments. The project could potentially produce a saving of £887k across all DNOs from one weather event alone, calculated based on a 2% saving from a storm with the same impact as Storm Arwen.

Please provide a calculation of the expected benefits the Solution

Project Assumptions
The benefits are realised due to assumed reduction of 2% of Compensation and Guaranteed Standards payments during storms. This is because of the greater efficiency in resourcing faults during storms due to the employment of AI and ML.

SSEN Cost
Guaranteed Standards and Compensation Payments for 2021/2022 £20,615k (Assumed Similar Weather Patterns for the next 5 years)

Assumed AI/ML Saving = 2% based on more accurate resourcing and efficiency in responding to faults.
Benefits = 2% £20,615k = £412k
Benefits for 5 years = 5*£412k = £2,061k

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

As stated previously this will be directly related to the intensity and frequency of extreme weather events, however, it is anticipated that climate change will drive an increase in both leading to more regular storm events. The project will be applicable to all 14 DNO licence areas on a pro rata basis upon customer numbers. The benefits will be proportionate to the numbers impacted and the frequency of extreme weather events.

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

At this stage of the project a method cost has not been calculated for roll out across the UK.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project 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

RIIO-2 Projects

☐ 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

The project will develop learning on the use case for AI and ML to improve Network Licenses response to customers during storms. It will determine if AI and ML can reasonably be employed to identify further contextual and resourcing data from a fault report submitted by a customer.

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

N/A

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.

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

There is currently no other projects deploying AI and ML on the images gathered through fault reports in this way.

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

N/A

Additional Governance And Document Upload

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

This project is innovative as the use of AI and ML has never been tested on images received from customers reporting of faults.

Relevant Foreground IPR

N/A

Data Access Details

See Network Innovation Competition (NIC) and Network Innovation Allowance (NIA) Data Sharing Procedure at https://www.ssen.co.uk/InnovationLibrary/Distribution/

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

There are significant unknowns about how the AI and ML will behave in the operational environment the project will undertake research and real-world trials to de-risk a potential BaU deployment.

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

The current risks and unknows of this MI and AL would stop the project being undertaken without the support of NIA.

This project has been approved by a senior member of staff

☑ Yes