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

Oct 2018

Project Reference Number

ENWL020

Project Registration

Project Title

Artificial Intelligence and Machine Learning

Project Reference Number

ENWL020

Project Licensee(s)

Electricity North West

Project Start

October 2018

Project Duration

3 years and 1 month

Nominated Project Contact(s)

Geraldine Paterson

Project Budget

£825,000.00

Summary

This project will investigate the application of artificial intelligence and machine learning to datasets to provide additional insight into the network and its assets.

Preceding Projects

NIA_ENWL004 - Combined On-line Transformer Monitoring

NIA_ENWL009 - Cable Health Assessment - Low Voltage

NIA_ENWL015 - Tap Changer Monitoring

Third Party Collaborators

Kelvatek

Nominated Contact Email Address(es)

innovation@enwl.co.uk

Problem Being Solved

Large volumes of data have become available over the last few years due to the intelligent devices fitted to the network as BAU or innovation projects. This large dataset holds information regarding to network operation and performance, asset health, development of faults and abnormalities on the network. Analysis of this data is currently a time consuming manual process so only clearly defined small pieces of analysis takes place. The data may hold hidden trends which could not be manually investigated and may offer valuable insight into network operations which could influence investment decisions as well as response to events.
Finding an alternative way to interrogate this data could be crucial to the future management of DNO networks. This project proposes to investigate whether modern techniques such as machine learning and artificial intelligence could assist with this interrogation.

Method(s)

This project will investigate the application of artificial intelligence and machine learning to datasets already collected to provide additional insight into the network and its assets.

Scope

This project will be a research piece investigating the application of machine learning and artificial intelligence to data already being collected by low voltage monitoring equipment and transformer monitoring equipment already deployed on the network. The research will investigate whether machine learning can be used to identify hidden trends and make recommendations for network investment.

Objective(s)

1. Collate data from the various systems
2. Build, train and evaluate a model to classify and work with the data
3.Produce recommendations for network operation and investment.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

1. Report on the methodology for collating the data
2. Production of a model to interrogate the data sets
3. Report detailing outputs from the model and recommendations for network operation and investment.
4. Report detailing how the model can be transferred to business as usual.

Project Partners and External Funding

Kelvatek

Potential for New Learning

This project will produce a model which can interrogate large data sets to uncover hidden trends and make recommendations on appropriate actions to take.

Scale of Project

The project will look at a defined data set already collected by Electricity North West

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL6 Large Scale

Geographical Area

North West of England

Revenue Allowed for the RIIO Settlement

0

Indicative Total NIA Project Expenditure

£750000

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)

This project is a research and investigative piece and it is not possible to estimate savings at this point

Please provide a calculation of the expected benefits the Solution

Not required as this is a research project

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

If successful the model can be used by any network operator to interrogate their own data.

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

There is no rollout cost. The methodologies will be made available to all DNOs.

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 model will be available to other DNOs to allow them to apply it to their data.

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

This model will allow Electricity North West to target investment and event response more efficiently which helps us make the most of our existing assets and provide value for money for customers which are both a fundamental part of our innovation strategy.

☑ Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

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.

A review of the smarter networks portal has not revealed any projects in this area.

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

Machine learning and artificial intelligence techniques are still in their infancy and to date have only been used in the IT industry.

Relevant Foreground IPR

n/a

Data Access Details

n/a

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

The project is investigating a possible new solution which currently has a low TRL level which warrants research

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 project is investigating a possible new solution which currently has a low TRL level which warrants research

This project has been approved by a senior member of staff

☑ Yes