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

Sep 2024

Project Reference Number

NPG_NIA_50

Project Registration

Project Title

Application of LV Monitoring in Network Planning

Project Reference Number

NPG_NIA_50

Project Licensee(s)

Northern Powergrid

Project Start

September 2024

Project Duration

0 years and 4 months

Nominated Project Contact(s)

Laura Brown

Project Budget

£100,000.00

Summary

This project seeks to develop state of the art analytical techniques to address the big data aspects of LV network planning arising from the digitalisation programme.

Third Party Collaborators

EA Technology

Nominated Contact Email Address(es)

yourpowergrid@northernpowergrid.com

Problem Being Solved

Northern Powergrid is deploying thousands of low voltage (LV) monitoring systems to provide real-time data from distributed substations (DSSs) across our network. The LV network is where the vast majority of our four million customers connect to our system. Each DSS site may serve a wide, diverse community along many different feeder ways from the DSS.

Through ED2, Northern Powergrid are increasing the number of monitored DSS's by an additional 10,000 sites. This will result in a significant increase in network operational knowledge and increased efficiency in our network management if we can astutely and swiftly deal with and interpret the variety and volume of data provided from the monitors into accurate network intelligence. This project seeks to tackle that data analysis problem.

Method(s)

This exploratory innovation project investigates one area of the big-data problems emerging from the digitalisation programme – low voltage network planning. It seeks to develop novel, state-of-the-art data analytic techniques, methodologies and tools to

- Understand the nature of this emerging data source
- Establish which stochastic data analytics techniques will produce meaningful information for network planning
- Develop real time methods for DSS asset assessment
- Inform (via robust evidence) actions on network investment

Scope

The project will provide an analysis of LV monitoring data combined with other metrics to better understand how to process and utilise LV monitoring data in network planning.

Objective(s)

Develop understanding how to process and utilise LV monitoring data efficiently and systematically data to provide insight for network planning decision making on LV networks.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

This project has been assessed as having an overall positive impact on customers

Success Criteria

This project will demonstrate the value of advanced data analytical techniques of LV network data to inform investment decision making and network management in Northern Powergrid's network.

Outputs include:-

1. A state-of-the-art review of academic and industry techniques used in low voltage network data analysis and management

2. An analysis of a historic LV monitoring data combined with other metrics to provide a case study on how to process and utilise LV monitoring data in network planning

3. Provide a comprehensive recommendation to the industry of statistical analysis approaches to use for the monitoring data

4. Provide insight to the systematic uncertainty and variability in the measurements

5. Make a recommendation for how future yet-to-be-identified data sets might be integrated into the process

6. Provide dissemination across industry and with stakeholders

Project Partners and External Funding

No external funding

Potential for New Learning

This work will enable us to understand how to process and utilise LV monitoring data to make network investment decisions despite the variability remaining after causal relationships have been accounted for.

The investigations will consider the challenge from a number of lenses

1. data processing (inc cleansing),

2. long term data storage (what needs to be kept)

3. LV data analysis (main consideration)

4. LV data visualisation and reporting

5. LV network investment decision making (main driver for the research)

This enables us to answer pressing questions, like when network interventions are required, as well as the potential impact of LCT connections or extreme weather on those assumptions and opportunities for alternative solutions (e.g. flexibility service contracts) to mitigate risks.

Scale of Project

Scale of the project is designed to explore this emerging opportunity to improve the efficiency and accuracy of network planning decisions.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL6 Large Scale

Geographical Area

The communities served by ground-mount transformer distribution substation across both of Northern Powergrid licence areas.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£100,000

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:

increased understanding of the trends in demand at our LV substations will increase certainty in our decision making throughout the transition to net zero.

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

LV monitoring is deployed according to where we can gain most benefit from an increased understanding of the network. This granular understanding of our customers' demands underlies decisions on how to fairly provide for all our customers' needs.

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)

N/A

Please provide a calculation of the expected benefits the Solution

The project seeks to gain the best understanding of our data so that we are able to share the most useful insights, which is of greater value than simply the data itself.

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

The Method will be applicable where equivalent data sets are available

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

The method utilised in analysis of the LV will be shared with other DNOs, including production of standardised profiles. Costs of rolling out the solution would be minimal as this will be aknowledge exchange process.

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

- ☐ 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

Improved planning and operational forecasting in LV networks

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.

LV network monitoring is an emerging area of network operation. To the best of our knowledge there is no duplication of activity.

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

LV network monitoring is an emerging area of network operation

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 remains an emerging activity with an uncertain technical outcome.

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 remains an emerging activity with an uncertain technical outcome.

This project has been approved by a senior member of staff

☑ Yes