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

Nov 2023

Project Reference Number

NIA_SPEN_0093

Project Registration

Project Title

SMARTer selection of Automatic Sectionaliser links

Project Reference Number

NIA_SPEN_0093

Project Licensee(s)

SP Energy Networks Distribution

Project Start

December 2023

Project Duration

2 years and 4 months

Nominated Project Contact(s)

Ahmed Salama

Project Budget

£205,000.00

Summary

There is a growing reliance on reliable electricity supply on our path to achieving our Net Zero targets. An effective HV protection reducing the duration of HV main feeder outages due to faults at HV spurs can have direct positive impact on continuity of supply. However, there have been issues regarding the use of ASLs, such as not isolating the spur at its current threshold.

The aim of this project is to research the issues surrounding the use of ASLs and provide recommendations for improvements or alternatives to be included in the BaU integration. The work proposed in this project will play a crucial role in improving network's resilience to HV spurs faults and improve the CI/CML performance of the DNOs.

Nominated Contact Email Address(es)

innovate@spenergynetworks.co.uk

Problem Being Solved

There have been a number of reports on the issues with Automatic Sectionaliser Links (ASLs) operation. Single phase ASLs are usually used for isolation of HV spurs in conjunction with the auto-recloser located at the primary substations to ensure any fault in a spur can be isolated with no (or minimum) impact on outage of the main HV feeder. Two main operation issues raised:

- ASL does not isolate the spur at its current threshold
- ASL operates for one phase however ASLs on other phases may not drop isolating the spur

The two issues above may result in main HV feeder outage that consequently requires operation staff to inspect the OHL, find a faulty spur, isolate the spur and re-energised the main feeder. This process can be long/time-consuming contributing significantly to adverse CI/CML. In effect, a fault in a spur to a single house can lead to power loss to several villages or larger area of the network. It should be

noted that currently there can be up to 30000 ASLs installed across SPD and SPM.

An example of this recent issue is reported at the end of this document.

Single phase ASLs are a relatively low cost solution for isolation of faulty spurs, and they (perhaps) have served as expected to a large extent. However, considering there are growing reliance on electricity supply on our path to Net Zero, a fresh look to our approach for HV spur protection may be required to inform our protection policies and future protection equipment procurement. SPEN are now facing circumstances whereby one of the key suppliers is now due to imminently stop production and there are challenges in procuring appropriate quality and compatible replacements in the long term.

There are other technologies on the market which appear to provide better technical solutions, but these are firstly untested in our network and secondly it is understood to be considerably more expensive. We need to understand their performances first-hand under various fault scenarios and also develop criteria for their deployment. There can be also compatibility issues around the different sectionalisers offered by suppliers. In summary the background problems are threefold:

- Uncertainty around the reasoning for existing ASLs performance issues under certain fault conditions
- Uncertainty around the choice of new technology replacing single phase ASLs and technical specifications required
- Unclear business case and technical criteria that would support deployment of new technologies

Method(s)

The following activities will be carried out in the project:

1. Detailed system studies – studies of real-life events will be reviewed and collated to confirm the issues (“malfunctioning”) of ASL and provide the understanding of why spur is not isolated
2. Market research – existing solutions in the market will be researched and manufacturers will be engaged with to identify different protection technologies for spurs
3. Testing – the shortlisted equipment will be tested in a controlled environment under various fault conditions (informed by the detailed system studies)
4. BaU Integration – recommendations for products and specifications required will be provided, updating policy documents and CBA where required, and tools and procedures to use existing data analytic/system studies tool for selection of protection devices will be developed

Scope

Off-the-shelf equipment will be tested in a laboratory environment where control fault scenarios could be controlled. Then recommendations will be provided for specifications and best practices based on the assessments. The project will be delivered across 4 work packages:

- WP1 – Detailed system studies
- WP2 – Market research
- WP3 – Testing
- WP4 – BaU Integration

Objective(s)

The objectives of this project are as follows:

- Produce a report containing the most prevalent ASL issues and limitations using real-life examples, and an assessment of available spur protection solutions on the market
- Test the highest scoring spur protection equipment in a controlled environment and document findings
- Provide policy and product specification recommendation for HV spur protection

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

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 an overall positive impact on consumers in vulnerable situations. The assessment has identified that this project will look to reduce the amount of disruptions to customers in the home. Other considerations including the projects impact on supply, immediate health and safety in the home have been made in carrying out this assessment

Success Criteria

Delivering each milestone outlined in the above objectives on time and within budget.

Project Partners and External Funding

There is no external funding. Market engagement will be undertaken to identify the project partner(s)

Potential for New Learning

The knowledge gained from this project will be used to provide valuable guidance and policies for DNOs for selection of protection equipment and the relevant settings for main HV and spurs protections.

Scale of Project

This project will cover procuring and testing HV spur protection equipment in controlled laboratory environments to produce guidance and policy recommendations. The selected solution will be trialled and installed in a limited number of sites within SPD and SPM licence areas.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Solution will be tested in a controlled laboratory environment and installed within SPD and SPM licence areas.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

£205,000

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:

There is a growing reliance on reliable electricity supply on our path to achieving our Net Zero targets. An effective HV protection reducing the duration of HV main feeder outages due to faults at HV spurs can have direct positive impact on continuity of supply. The work proposed in this project will play a crucial role in improving network's resilience to HV spurs faults and improve the CI/CML performance of the DNOs, which is critical for electricity customers including vulnerable users.

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

The work proposed in this project will play a crucial role in improving network's resilience to HV spurs faults and improve the CI/CML performance of the DNOs, which is critical for electricity customers including vulnerable users.

Furthermore, WP4 will prioritise the needs of vulnerable customers when recommending policies for HV spur protection equipment. This project will look to limit the impact that HV spurs have on the energy consumers by producing technology and policy recommendations for reducing fault repair times and network outage durations, which would positively impact our energy customers, particularly those in vulnerable circumstances.

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

As this is a research project, the expected benefits are not yet quantifiable. However, in WP4 a CBA will be produced which will look into the cost of deploying the identified solution as part of BaU as well as its potential saving.

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

The guidance and policy recommendations will be applicable to all DNOs in the UK.

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

A recommendation for HV spur mitigation solution will be provided based on the project's research findings. The cost of rolling out the recommended solution will be produced as WP4 deliverable

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 knowledge gained from this project will be available to other Network Licensees and would provide them with valuable guidance and policies on optimal ways of dealing with HV spurs which will improve the resilience of their HV assets and improve their CI/CML performance.

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.

The projects registered on the ENA Smarter Networks Portal have been checked to ensure that project is not duplicating any previous work. We also hold an internal review process to avoid duplication of ideas.

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

The ultimate aim of this project is to develop best BaU practices to clearly advise which device would be most effective when considering the configuration of the HV network (number of spurs, number of customers, length of HV feeder etc). These devices will be tested in a laboratory environment mimicking our HV networks in various fault conditions to produce an applicable spur protection solution policy. There is no such approach or recommendation made by other projects across ENA members, therefore we consider

this an innovative project embracing uncertainty around the final approach and solution.

Relevant Foreground IPR

N/A

Data Access Details

The SP Energy Networks Data Sharing Policy can be found here.

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

There is no allowance within our RIIO-D2 settlement for carrying out this innovation project

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

There are commercial risks as the financial benefits cannot be determined without the research being completed. Therefore, it cannot become part of the BaU activities without the support of NIA.

This project has been approved by a senior member of staff

☑ Yes