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

Apr 2015

Project Reference Number

NIA_SSEPD_0002

Project Registration

Project Title

Locamation SASensor High-Medium Voltage (HMV) Primary Substation Protection

Project Reference Number

NIA_SSEPD_0002

Project Licensee(s)

Scottish and Southern Electricity Networks Distribution

Project Start

July 2012

Project Duration

3 years and 9 months

Nominated Project Contact(s)

SSEN Future Networks Team

Project Budget

£28,250.00

Summary

Assess one of the available solutions for alternative protection method at Primary substation level. Outline the required hardware and software required to install system at a local substation, with a high number of faults. Install and commission the equipment, then monitor for 12-18 months. Provide a report on the ability of the system, including a financial analysis of existing systems versus the new technology. The system is currently deployed at Caputh, has no control over the network, and is actively monitoring the network for fault analysis purposes.

This project will look at the ability of SASensor to protect a primary substation using a digital approach, and provide a financial comparison between this and carrying out a traditional approach. It will investigate the ability of the system to provide better asset management within a substation, and how operational expenditure costs differ in comparison with the traditional relay approach. This project is a continuation of an IFI project (2012_03), and is currently deployed at Caputh, awaiting real faults on the system for the purposes of fault analysis. It is anticipated that by Summer 2015 there shall be enough data collected for analysis.

Nominated Contact Email Address(es)

fnp.pmo@sse.com

Problem Being Solved

Current policy is to use individual relays to protect the power system from faults. This leads to vendor lock in as well as entrenching systems that are not flexible or interoperable. The proposed project uses a digitised approach where a single processing unit protects the entire substation. It also gives remote access to fault information, which may assist in a reduction of customer minutes lost during power cuts, and provides information which can be used to determine whether maintenance of plant and equipment is required.

Method(s)

The project involves a UK deployment of the Locamation HMV SASensor solution which has been successfully deployed in the Netherlands. This system uses a digital approach to protection and control of our substations, giving a central hardware processing

approach in contrast to the individual relaying approach we currently practise. This system will allow us to connect remotely to the system to retrieve fault and maintenance information, and allow for remote programming of settings, reducing the need to travel to site, and improving the overall network for our customers.

Scope

Assess one of the available solutions for alternative protection method at Primary substation level. Outline the required hardware and software required to install system at a local substation, with a high number of faults. Install and commission the equipment, then monitor for 12-18 months. Provide a report on the ability of the system, including a financial analysis of existing systems versus the new technology. The system is currently deployed at Caputh, has no control over the network, and is actively monitoring the network for fault analysis purposes.

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Objective(s)

1. Evaluate SASensor's ability to perform under a variety of fault conditions (10 system faults).
2. Proof of stability for faults beyond the first pole mounted recloser and proof of clearance for faults close into Primary substation (10 system faults).
3. Identification of fault current on individual feeders when faults occur.
4. SSE Power Distribution to improve understanding of commercial and technical aspects of system deployment (installation, design, commissioning and maintenance) with existing practices.
5. Evaluate the event recorder data to see if proactive maintenance of switchgear can be performed via condition based monitoring.
6. Evaluate system for business roll out.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

In response to each objective:

1. Perform post-fault analysis on waveforms captured by the SASensor system on site.
2. As number 1.
3. Post fault analysis on 10 system faults.
4. Note points during the development and installation where improvements could be made and discuss with Locamation. Determine full costs of both systems, and evaluate with pros and cons.
5. Desktop based report on the costs, time and training required.
6. Desktop based report on this new technology versus our existing range of protection systems.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project has been deployed at a single Primary, where there is a high likelihood of faults occurring on the system. This will allow the system to be proven in a live environment against the current generation of protection and control equipment at Primary substation level. Without an installation of this type, it would be more difficult to understand the real implications of installing, commissioning and monitoring the equipment.

Technology Readiness at Start

Technology Readiness at End

TRL7 Inactive Commissioning	TRL8 Active Commissioning

Geographical Area

Caputh Primary Substation, Old Military Road, Caputh, Perthshire, Scotland.

Revenue Allowed for the RIIO Settlement

At this stage no saving on expenditure during project implementation can be assumed.

Indicative Total NIA Project Expenditure

2015-16 - £28,250 forecast budget (90% allowable = £24,425)

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)

£10k per installation due to reduction in hardware costs. Potential cost savings during storms, if details can be extracted remotely concerning the type of faults that have occurred. The open platform should allow the system to integrate with other R&D providers to provide more cost savings.

Please provide a calculation of the expected benefits the Solution

£57k – £47k = £10k benefits

Base cost allows for a 12 relay 11kV board solution and all associated equipment including relays, and remote terminal unit (RTU) for communications.
Method cost assumes project based solution is applied (no relays or RTU), and a 25% reduction in hardware cost on the project budget due to economies of scale.

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

SSEPD total primary substations approximately 1000, applied to roughly 10% of these is 100. 10% is looking forward to how many substations may be installed with this equipment before a potential new solution comes along in a number of years time. It is suitable for retrofitting, which may provide a higher level of deployment, but it is more suited to new installations.

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

Total cost for 100 = £47k * 100 = £4.7M
Total savings = £10k * 100 = £1M (Applied to SSEPD)

Take SSEPD customers as percentage of UK wide customers and multiply up – how many UK customers are provided by DNOs? E.g if SSEPD provided 10, the rest of the UK provided 90, savings would be 9 (90/10) times £1M.

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

This modern approach to protection and control in substations will reduce installation time; provide remote access to fault information, and an open source platform for future Smart Grid technologies to utilize e.g. Active Network Management schemes.

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

Advanced distribution automation – network reconfiguration. The solution is a more advanced solution to distribution control and protection as it uses a digital, open sourced, platform which can be modified to tackle specific problem areas.

☑ 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.

n/a

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

n/a

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

n/a

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

n/a

This project has been approved by a senior member of staff

☑ Yes