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_SPEN0004

Project Registration

Project Title

Substation Earth Monitor

Project Reference Number

NIA_SPEN0004

Project Licensee(s)

SP Energy Networks Distribution

Project Start

April 2015

Project Duration

1 year and 1 month

Nominated Project Contact(s)

Nicol Gray

Project Budget

£350,000.00

Summary

This project aims to further develop and enhance the learning gained through past IFI projects by piloting a limited number of monitors at substation location. The scope of the pilot rollout will be structure as follows;

Stage 1

Limited rollout to unmanned substation locations

- Evaluate the effectiveness of the monitors at detecting copper theft and tampering of key infrastructure
- Develop installation program
- Understand how the monitors interact with substation environments
- Evaluate the performance of the monitors and how they could be developed further

Stage 2

Following successful completion of stage 1, a further limited rollout to allow for the monitors to be integrated into the corporate security system

- Integration into SCADA or internal security system
- Detailed understanding how the units could be integrated into BaU policy

Third Party Collaborators

Energy Innovation Centre

Assa Abloy

Nominated Contact Email Address(es)

innovate@spenergynetworks.co.uk

Problem Being Solved

Recent legislative changes to increase regulation of the scrap metal industry and eliminate cash payments have had some success in reducing the number of metal thefts. However, theft of copper earthing systems remains a serious safety risk for engineers, customers and metal thieves as well as an operational performance risk for electrical networks. While marking technologies help identify cable theft when the thieves or receivers are caught, preventing theft in the first place remains a desirable target.

On larger sites, security can be improved by technologies detecting trespass but there are many smaller sites where this approach is cost prohibitive. Such detection does not address the issue of what is happening on site upon such intrusion. The ideal solution is a low-cost method of detecting tampering with the earthing system itself.

Method(s)

SPEN has been working with our project partners to develop a novel method of reliably detecting the cutting and removal of sections of the key metallic infrastructure. Following the successful product development and subsequent field testing during IFI1209 Substation Earth Integrity Monitoring project, a large trial deployment is proposed to further develop the CuTS copper theft device into BaU. The scale of the project will have to be large enough to allow for further product and technology development at a range of secondary, primary and grid sites. The pilot rollout will evaluate and assess the functionality of the monitor in typical substation environments to reliably detect and report incidences of copper theft.

Scope

This project aims to further develop and enhance the learning gained through past IFI projects by piloting a limited number of monitors at substation location. The scope of the pilot rollout will be structure as follows;

Stage 1

Limited rollout to unmanned substation locations

- Evaluate the effectiveness of the monitors at detecting copper theft and tampering of key infrastructure
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Objective(s)

The objectives for the project include:

- The successful installation of a number of monitors to establish confidence that they can detect and report incidences of copper theft

and tampering, at a range of substation and environments

- Evaluate the effectiveness of the monitors at both detecting and preventing the incidences of copper theft at substation locations.
- Develop a understanding of the potential benefits that could be achieve via a wide scale roll out
- Ensuring the monitors are suitable in multiple locations/environments and can be installed with minimal impact on the distribution network
- Ensuring the monitors have the ability to be integrated into existing security systems or into SCADA
- Ability to immediately provide notification that infrastructure is being removed / tampered and accurately record times of such events

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The following success criteria has been established

- The successful and reliable detection of copper theft and tampering at key substation locations either through test simulations or actual events.
- Low incidences of mal-operation and spurious alarms
- Quantifying the benefits associated with detecting when key earth infrastructure is removed or tampered with
- Integrate the solution into BaU

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

This project has been designed to allow for the representative assessment of the monitors at a range of typical substations of differing sizes and environments

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Trial areas have been selected in locations in both SPD and SPM to reflect where there is currently high levels of theft occurring

Revenue Allowed for the RIIO Settlement

No allowances made for increase security of substation assets

Indicative Total NIA Project Expenditure

NIA £75k

IFI £275K

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)

The theft of copper at unmanned substation locations poses a serious safety risk for engineers, customers and metal thieves as well as an operational performance risk for electrical networks. Solving this problem will not eliminate the problem of metal theft however it is hoped it will lead to a reduction in incidences and increase prosecution.

SPEN have undertaken Cost Benefit Analysis (CBA) utilising the Ofgem ED1 CBA tool and has identified a number of feasible scenarios and benefits achieved from the use of the Cuts solution.

Please provide a calculation of the expected benefits the Solution

Based on historical evidence it is perdicted that replacement and maintenance costs associated with copper theft will be in the region of £4.5m during the ED1 period. The method, whilst unable to elimnate the root cause of metal theft, is expected to lead to a reduction in this figure and act as a deterient.

The following base cost vs method cost calculation has been generated for this period

£4.5m - £3.2M = £1.3M

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

This method would be replicable for all UK DNOs

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

Assuming average cost of installing monitor at a variety of secondary, primary and grid locations of £3k per site, with 100 locations per license area.

£3k x 100 x 14 = £4.2M

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 project is expected to provide all Network Licensees with an understanding whether this technology can successfully provide notification when key earth infrastructure is removed or tampered

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

☑ 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