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

Mar 2019

Project Reference Number

ENWL 023

Project Registration

Project Title

Intelligent Network meshing switch

Project Reference Number

ENWL 023

Project Licensee(s)

Electricity North West

Project Start

April 2019

Project Duration

1 year and 1 month

Nominated Project Contact(s)

Delroy Ainsworth

Project Budget

£1,870,000.00

Summary

Existing DNO networks are not designed to cope with the highly variable power flows that will be caused by the introduction of LCTs, such as vehicle charging and generation. Interconnection of LV networks is one of the means by which voltage, thermal and harmonic problems created by LCT loads and generation connected to LV networks can be significantly reduced. Retro-fit devices installed in link boxes can used to remotely mesh the network when required however a number of technical issues have been identified that require additional research to resolve. The following issues are currently restricting a BAU deployment in all areas of the network:-

· Condensation

· Communications in certain areas
Water ingress

Preceding Projects

ENWT205 - Smart Street (eta)

Third Party Collaborators

Kelvatek

Nominated Contact Email Address(es)

innovation@enwl.co.uk

Problem Being Solved

Existing DNO networks are not designed to cope with the highly variable power flows that will be caused by the introduction of LCTs, such as vehicle charging and generation. Interconnection of LV networks is one of the means by which voltage, thermal and harmonic problems created by LCT loads and generation connected to LV networks can be significantly reduced.

The Smart Street and FUN-LV projects proved that dynamic meshing offers considerable benefit in managing these power flows and successfully trialled retro-fit devices installed in link boxes to remotely mesh the network when required.

The projects trialled different devices which are proven technology and suitable to be deployed on 80% of the low voltage network. However, some technical issues have been identified that require additional research to resolve to ensure the solution can be applied to 100% of sites. The issues currently restricting a GB wide BAU deployment in all areas of the network are:

- Condensation
- Communications
- Water ingress
- Heat Dissipation

Method(s)

This project will be a research and development piece to overcome the final technical issues in retrofitting a simple link with a remote controlled link box switch for wide scale BAU purposes. These improvements will be tested via simulations, a test network and live system testing.

Scope

The project will further improve the link box meshing device to allow deployment in all locations and environments. The improved link box meshing device will be trialled at a number of link boxes on the LV network. These sites will be selected to cover the full range of location types covering all the environmental issues identified.

Objective(s)

A staged approach is proposed to produce a final device that is suitable for installation network wide. The three stages can be summarised as follows:

Stage 1

Improve the existing devices to make the device smaller with an improved water ingress IP rating. Investigate and select communication protocols that will provide maximum connection time to the installed device. Multiple protocols may be required to cover all location types.

Stage 2

Simulate heat and humidity in a link box with the device fitted. Investigate solutions and trial in a test environment. Develop a power supply and electronic design that will reduce overall heating and trial in a test environment.

Stage 3

Complete type testing and install a number of devices for live field testing. Evaluate live trial results.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The following criteria will be used to determine if the project has been successful

- Link box meshing devices show no signs of condensation during the trial period
- Link box meshing devices show no signs of water ingress during the trial period

Link box meshing devices show high level of communication availability during the trial period

Project Partners and External Funding

Kelvatek

Potential for New Learning

The project will look at fundamental design aspects of the link box meshing switch and help inform future developments of electronic devices that are required to operate in challenging environments.

Scale of Project

The project will be conducted by small scale trials which will initially be on a test system and will then result in field trials on selected areas with known environmental issues.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL9 Operations

Geographical Area

North West of England

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£1,7000,000.00

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)

Based on the outcomes of the Smart Street project deployment of these devices can save £20.76m across GB out to 2060

Please provide a calculation of the expected benefits the Solution

The total savings from the deployment of Smart Street were calculated as £519m across GB. The meshing accounts for 20% of these savings which is £103.8m assuming we could deploy to all GB sites. Therefore the savings associated with rectifying these issues accounts for £20.76m of the total savings.

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

The switch could be deployed in any GB link box

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

Cost of link box switch £3500 (expected to reduce)

Number of suitable link boxes in ENWL 1000

Total cost of full ENWL roll-out £3.5 million

If other DNO's have a similar amount of link boxes this figure could be increased to £49 million for a full GB roll-out

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 project will produce an improved design which can be deployed in all environments. The design and communications protocols investigated during the project will also provide insight on device requirements in challenging environments.

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 project addresses 3 challenges in our innovation strategy

· Capacity – Maximising the use of our existing assets

· Efficiency – keeping costs low by maximizing the use of our assets

Commercial evolution – increased network control to help progress move to system operator

☑ 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.

As stated before projects have deployed devices of this type is Smart Street and FUN-LV. These projects highlighted the issues that this work is looking to resolve.

We are also aware that SPEN are looking at temperature monitoring in link boxes. This project is not looking at temperature monitoring.

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

Historically there was no need to monitor or control the low voltage network but with the increase in low carbon technologies more control devices are required. Attempts to retrofit link box switches in link boxes have failed in certain areas due to environmental issues that this project aims to tackle.

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

This Project will provide valuable learning and inform the production of a device that will benefit all DNO's from a safety and operational point of view.

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 risk is that the device cannot be improved to enable a larger scale deployment in all areas which is why NIA funding is required.

This project has been approved by a senior member of staff

☑ Yes