

NIA Project Registration and PEA Document

Date of Submission

Aug 2015

Project Reference Number

NIA_SPEN0006

Project Registration

Project Title

Mini-Mole

Project Reference Number

NIA_SPEN0006

Project Licensee(s)

SP Energy Networks Distribution

Project Start

April 2015

Project Duration

3 years and 6 months

Nominated Project Contact(s)

Geoff Murphy, Nicol Gray, & Andy Wilcox

Project Budget

£544,555.00

Summary

This project aims to deliver a safer, less disruptive and more resource efficient way of repairing and replacing LV and Service cables, so as to provide an improved service to our customers. The following work packages are intended to develop, trial, evaluate and rollout the Mini-Mole into BaU for UK DNOs:

W.P 1 – Initial technology trials and development phase *(completed during IFI 1417 Keyhole Trenchless Technologies)*

- Review of existing miniature directional drilling excavation techniques and how applicable they are for LV application.
- Understanding the changes that's will have to be implemented to ensure that Mini-Mole can become a cost effective solution for these applications

W.P 2 – Onsite testing and review of existing methods and technology *(partially completed during IFI 1417 Keyhole Trenchless Technologies)*

- Onsite testing and reviewing of bespoke unit
- Establish baseline criteria where the Mini-Mole unit will offer increased savings against conventional open cut trenching techniques

W.P 3 – Development of prototype units

- Successful modification of existing technology to fit with use case and requirements
- Onsite trials in a variety of location to evaluate the effectiveness or otherwise of unit
- Develop robust use case and tracking methodology

W.P 4 – Integration into BaU

- If successful this WP will look identify all the requirements and recommendations for UK DNOs to adopt this technology as BaU
- Review of the potential benefits Mini-Mole could offer UK DNOs

Preceding Projects

NIA_ENWL004 - Combined On-line Transformer Monitoring

Nominated Contact Email Address(es)

innovate@spenergynetworks.co.uk

Problem Being Solved

Renewing and upgrading underground Low Voltage (LV) Cables and Service connections can be a costly and time consuming activity that is also disruptive to customers. The conventional DNO approach for this activity is to carry out open cut trenching to lay cables, whilst this is often the best solution in certain circumstances this approach can significantly increase costs and inconvenience to customers. For example, laying cables up driveways that consist of ornate or decorative paving leads to increased excavation and reinstatement costs, ties up resources from front line activities and causes a greater disruption to the customer. This civil challenge is likely to increase with smart meter enabling works and our social obligation to prioritise our vulnerable communities.

Whilst the merits and risks associated with conventional open cut trenching are understood, there still remains a risk to field operators, pedestrians and customers in their proximity. Any alternative approaches that minimise this risk would deliver societal benefits worth pursuing.

Method(s)

This project aims to develop a miniature / portable directional drill excavation unit which would allow it to be a less disruptive, cost effective safer solution to conventional open cut trenching for LV and Service cabling.

SPEN has worked closely with Tracto Technik (TT), and one of our services and internal mains contractors, IQA Group, to create a 'Mini-Mole' that can be applied in limited space without complication. The R&D phase completed during the IFI 1417 Keyhole Trenchless Technologies project, will be manufactured into a full scale working prototype and extensively trialed to establish the benefit of the technique over conventional excavation methods for a variety of typical jobs.

The project has been designed to create a safer, less disruptive and more resource efficient way for the business to carry out the repair and replacement of LV and Service cables.

Scope

This project aims to deliver a safer, less disruptive and more resource efficient way of repairing and replacing LV and Service cables, so as to provide an improved service to our customers. The following work packages are intended to develop, trial, evaluate and rollout the Mini-Mole into BaU for UK DNOs:

W.P 1 – Initial technology trials and development phase *(completed during IFI 1417 Keyhole Trenchless Technologies)*

- Review of existing miniature directional drilling excavation techniques and how applicable they are for LV application.
- Understanding the changes that's will have to be implemented to ensure that Mini-Mole can become a cost effective solution for these applications

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- Review of the potential benefits Mini-Mole could offer UK DNOs

Objective(s)

The objectives for the project for each WP include

W.P 1 –Initial technology trials and development phase

- To evaluate and review technology, highlighting potential changes that would have to be implemented to ensure Mini-Mole is a realistic solution for LV applications
- Evaluate the potential benefits this technology could have and its application for DNOs

W.P 2 – Onsite testing and review of existing methods and technology

- Successful product development and FAT / SAT testing
- To evaluate and quantify the volume of projects where this technology could be used.
- The development of a methodology for use, including evaluating and developing all safety and procedural requirements.

W.P 3– Development of prototype units

- Development of a fit for use 'Mini-Mole' prototype unit

W.P 4 – Integration into BaU

- To deliver the necessary business changes, documentation etc. required to facilitate 'Mini-Mole adoption prior to the end of this project.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Upon completion of the work packages the following success criteria has been highlighted.

- The delivery of a viable alternative to traditional open cut trenching for LV cable applications.
- Quantified comparisons of current methods compared to using Mini-Mole.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

To generate a representative understanding of potential benefits this technology may have, SPEN has highlighted one district area in each license area to conduct field trials. It is estimated that this will account for <1% of the total number of jobs in these areas however should provide a realistic volume and types of job to review the technology and process.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Glasgow (SPD) & Mid-Cheshire (SPM) Districts

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

£200k

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)

SPEN have undertaken a detailed cost benefit analysis (CBA) which has highlighted a positive case for using this technology. It is estimated that for typical jobs where this unit could be used, savings in the region of 30% would be achievable compared to conventional methods.

Please provide a calculation of the expected benefits the Solution

It is estimated that around 50 jobs will be trialled per year over the duration of this project, with an average cost in the region of £3250.

Base cost = $3250 \times 50 = £162,500$

Method cost = 30% reduction

$£162,500 - (£113,750) = £48,750$

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

This method would be replicable for all UK DNOs who have similar issues when carrying out LV service applications

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

Assuming average cost of the unit to deploy is £135k, with each DNO purchasing 2 of these units, same as this project, then base cost for UK DNO rollout would be:

$£135k \times 2 \times 6 = £1.62M$

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 will provide all Network Operators with an understand into where and when alternative excavation methods can generate savings for LV underground service connections

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