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

Jun 2024

Project Reference Number

NIA_SSEN_0075

Project Registration

Project Title

Alternative Jointing 2

Project Reference Number

NIA_SSEN_0075

Project Licensee(s)

Scottish and Southern Electricity Networks Distribution

Project Start

July 2024

Project Duration

4 years and 0 months

Nominated Project Contact(s)

Tim Sammon, Innovation Programme Delivery Manager at SSEN

Project Budget

£2,470,000.00

Summary

Alternative Jointing 2 will take the learnings from the Alternative Jointing project and further develop the foam alternative to the current resin and sand combination we use to fill joint shells. New shells will be developed to enable this. This project will also develop a shrink wrap solution for LV straight joints, and continue to investigate any other opportunities to improve jointing techniques.
Stage 1 will develop prototype foam and shrink wrap straight joints and test these to BS EN 50393:2015 and ENA C81, and identify any other techniques for trial.
Stage 2 will deploy field trials of successful straight joint designs and develop and test prototypes using their techniques for other joint types to include: - breach, single service and multiple service.

Preceding Projects

NIA_ENWL004 - Combined On-line Transformer Monitoring

NIA_ENWL004 - Combined On-line Transformer Monitoring

Third Party Collaborators

Energy Innovation Centre

TE Connectivity

Prysmian Group

SICAME

Hive

Nominated Contact Email Address(es)

fnp.pmo@sse.com

Problem Being Solved

SSEN delivers more than 35,000 LV cable joints per annum, and this is set to increase with the transition to Net Zero.
To complete a joint, operatives must adequately prepare the surfaces of the cables, and apply mixed resin and sand from several buckets on site, using a mould to form a secure seal around the joint. The excavation carried out to access the cables is only refilled once the resin has fully cured. The use of resin joints is hazardous, labour-intensive, and subject to human error and environmental variability. The transportation of the resin uses large amounts of fuel due to the weight and multiple trips due to volume, this being either delivery to the depots or in operational vehicles when using the product. The mixing equipment, resin and sand take up space and weight on delivery, operational vehicles and creates non-recyclable waste (the used buckets containing residue of mixed resin and sand).
This project seeks to improve the efficiency and ergonomics of LV jointing and reduce the associated carbon footprint and waste. The vehicles emissions will be reduced by carrying less weight making the vehicles perform more efficiently.

Method(s)

SSEN will work with partners to develop a foam compound to replace the current resin, once a foam has been developed the joint shell will be redesigned to suit the foam.
In parallel, SSEN will work with partners to develop a shrink joint to be used on LV cables.
The new joints will be tested, including to BS EN 50393:2015 and ENA C81. If successful, the joints will be used in field trials to ensure their suitability for use on the network.
SSEN will then work with partners to write a standard for the use of the new joints on the networks.

Data Quality Statement (DQS):
The project will be delivered under the NIA framework in line with Ofgem, ENA and SSEN internal policies. Data produced as part of this
project will be subject to quality assurance to ensure that the information produced with each deliverable is accurate to the best of our knowledge and sources of information are appropriately documented. All deliverables and project outputs will be stored in our internal systems with appropriate backup and version management. Relevant project documentation and reports will also be made available on
the ENA Smarter Networks Portal and dissemination material will be shared with the relevant stakeholders.

Measurement Quality Statement (MQS):
The methodology used in this project will be subject to supplier quality assurance regimes and the source of data, measurement process and equipment as well as data processing will be clearly documented and verifiable. The measurements, designs and assessments will also be clearly documented in the relevant deliverables and final project report made available for review.

Scope

Stage 1
Development of a foam compound and shell to pass testing to BS EN 50393:2015 and ENA C81 for LV straight joints.
Development of a shrink wrap either cold or heat activated to pass testing to BS EN 50393:2015 and ENA C81 for LV straight joints.
Identify any other techniques suitable for trial.

Stage 2
Field trial any successful designs from Stage 1, and develop application of successful designs to other joint types including breach, service and multiple service.

Benefits are estimated to include cost reduction which could amount to c£1.6m per annum, and reductions in carbon and waste footprints. The translation of project learning into a more detailed CBA will be reported as the project progresses and Embedded carbon and waste reductions will also be reported.

Objective(s)

Stage 1

Development of foam compounds, shell and a shrink wrap LV straight joint to pass BS EN 50393:2015 and ENA C81 tests and targeting the following benefits;

• Reduce overall joint costs for customers.
• Improve ergonomics and safety of job for jointers.
• Reduce jointing susceptibility to human error and environmental variability.
• Reduce waste and carbon footprint of joints.
• Reduce weight and volume of components.
Provide health and safety assessments on new materials/processes and report cost breakdowns of the final product based on testing the products in an operational environment.z

Stage 2
Deliver field trials of successful new LV straight joints, and develop and test prototypes of other joint types including breach, service and multiple service.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

Consumer Vulnerability Impact Assessment results below. This shows there is no negative impact on consumer vulnerability at this point it shows a positive impact with regards to disruption caused meaning vulnerable customers will be reconnected quicker in fault situations. From the project impact score below it can be seen that no negative impact will affect the customers.

Figure 1

Success Criteria

The project will succeed if it delivers new methods of LV jointing which deliver some or all of the benefits targeted, pass tests to the required standards and are deployed to field trials.
The following benefits are targeted:
• Reduce overall joint costs for customers.
• Improve ergonomics and safety of job for jointers.
• Reduce jointing susceptibility to human error and environmental variability.
• Reduce waste and carbon footprint of joints.
• Reduce weight and volume of components.

Project Partners and External Funding

Table 1

Organisation Name
Organisation Type
Project Role
External Funding
National Grid Electricity Distribution
DNO
Project partner
£0
Hive
Composite Engineering
Innovation Supplier
£0
Sicame
Electrical Distribution Equipment Manufacturer
Project partner and supplier
£0
Prysmian
Electrical Distribution Equipment Manufacturer
Project partner and supplier
£0
TE Connectivity
Electrical Distribution
Equipment Manufacturer
Project partner and supplier £0

Potential for New Learning

New learning potential includes:
•The introduction of new products to provide more effective alternatives to the current resin/sand joints
•Formulation of a new expanding foam that is hydrophobic

• Develop a shrink wrap solution from material in use on high voltage cables
Learning will be reported on the Smarter Networks Portal.

Scale of Project

The project is of an appropriate scale to demonstrate new jointing techniques, based on the learning of the preceding Alternative Jointing Techniques NIA project (NIA_SSEN_0054). A smaller scale project would be unable to conduct the supply chain engagement and testing necessary to inform a change in jointing policy.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

Trial joints will be made up within SSEN's SEPD licence area and tested in the UK. Field trial deployments may include SSEN's SHEPD and NGED's licence areas.
Supply chain engagement extends to the EU.

Revenue Allowed for the RIIO Settlement

No revenue was allowed for this activity in RIIO-ED2.

Indicative Total NIA Project Expenditure

£2,470,000

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:

The energy system transition requires the large-scale deployment of LCTs within SSEN's licence areas, resulting in increased load and a consequential increase in LV jointing activity. Improving the efficiency and reducing the waste and carbon footprint of LV jointing would therefore provide benefits to customers and enable a faster and more effective energy system transition. The proposed role out of EV vehicles/vans means it will be possible to carry the foam instead of the current resin and sand combo used at present due to weight capacity carrying of EV vehicles.

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

This project seeks to improve the efficiency and ergonomics of LV jointing and reduce the associated waste and carbon footprints. If successful it will deliver more efficient new connections with lower waste and carbon footprints just as the volume of new connections increases to enable the energy system transition to Net Zero. This will deliver benefits to all customers including those in vulnerable situations.

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)

Not required this is a RIIO-2 project

Please provide a calculation of the expected benefits the Solution

In 2022 – 2023 SSEN used around 81,000 buckets of resin/sand, at an approximate cost of £700,000.

The foam trialed in the preceding NIA project would reduce the cost significantly against the price per bucket of resin.

Assuming this could be applied to 50% of joints, and that any cost increases in the foam material are offset by reductions in logistic and waste costs, savings could be c£280,000 per annum in SSEN network areas. If similarly applied throughout GB, this translates to potential savings of c£1.6m per annum.

Further benefits in jointing efficiency are potentially available.

The translation of project learning into a more detailed CBA will be reported as the project progresses. Embedded carbon and waste reductions will also be reported.

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

If validated by type approval testing and field trials, the Method could be used on every GB site where a joint type included in this project is to be used, subject to approvals by other DNO policy and operational teams.

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

Subject to other DNOs approval of testing to BS EN and ENA standards and acceptance of SSEN and/or NGED field trial data, the

project outputs should be able to be rolled out across GB without substantial further cost.

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 new jointing techniques developed in this project will be subjected to industry standard type approval testing, and to field trials, which would enable other DNOs to evaluate the techniques and their suitability for use in their network areas. Details of this work will be provided to other DNOs as the Project progresses.

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.

Nothing of this nature on the ENA database and trials of this nature have not been completed with current manufacturers.

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

This type of product has not yet been trialled and is not available for purchase within the UK.

Relevant Foreground IPR

Findings from the Alternative Jointing Techniques NIA project (NIA_SSEN_0054) will inform the development of IPR within this project. Resulting IPR will be shared with all project partners to enable supply chain readiness to supply for any successful new joint products, and will be freely available to other DNOs. Background IPR for any techniques not resulting from the preceding Alternative Jointing Techniques project may be subject to separate arrangements.

Data Access Details

For information how to request data gathered in the course of this project, see Network Innovation Competition (NIC) and Network Innovation Allowance (NIA) Data Sharing Procedure at https://ssen-innovation.co.uk/innovation-strategy/.

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

No BAU funding available for this type of R&D. The technology within this project has yet to be fully proven and fully demonstrated.

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

This project requires collaboration between DNO and external companies to be successful as well as live trials on a DNO network to enable BaU approval of its outputs. NIA funding is suited for this type of project which may provide benefits if successful but involves risks which cannot be funded by BaU.

This project has been approved by a senior member of staff

☑ Yes