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

Jul 2026

Project Reference Number

NIA3_NGET0015

Project Registration

Project Title

Twin Spacer-Damper Removal Robots for carbon core conductor (SpacerClear-CC)

Project Reference Number

NIA3_NGET0015

Project Licensee(s)

National Grid Electricity Transmission

Project Start

August 2026

Project Duration

0 years and 4 months

Nominated Project Contact(s)

Prem Ranjan, Box.NG.ETInnovation@nationalgrid.com

Project Budget

£85,000.00

Summary

Twin SpaceIDamper Removal Robots for Carbon Core Conductors (Spacer ClearICC) is a development and demonstration project to create a droneIdeployed robotic system to remove and replace defective spacers on carbonIcore overhead conductors. It addresses maintenance scenarios where conductor trolleys cannot be used because conductor condition is unknown. The robotic method aims to improve safety, reduce temporary works and outage requirements, and increase efficiency. TechAir AS will develop and demonstrate a robot for the YYM spacer configuration and a drone deployment method. The trial will verify installation and replacement procedures and safe operation under representative network conditions. If successful, the project will provide a practical maintenance method for similar carbonIcore routes and support wider deployment across suitable overhead line assets.

Third Party Collaborators

TechAir AS

Nominated Contact Email Address(es)

box.NG.ETInnovation@nationalgrid.com

Problem Being Solved

A large number of defective twin spacers on the YYM OHL route require replacement. Conventional access using conductor trolleys is not possible because the condition of the carbon core conductors is unknown, and no suitable robotic method is currently available for spacer removal and replacement.

The current maintenance method is slow and costly, requiring extensive temporary works and exposing personnel to working at height, manual handling and conductor integrity risks. Spacer replacement can only be carried out on out-of-service circuits.

A safer, more efficient and lower-impact method is therefore required to remove and replace defective twin spacers while reducing

operational constraints and improving maintenance efficiency.

Method(s)

TechAir AS has been developing a drone-deployed robotic solution for spacer replacement on overhead lines. The project will develop a robot specifically designed for the YYM spacer configuration, which will be installed onto the conductors using a drone.

The robot will remove defective twin spacers and install replacements while reducing land access, tower visits and the number of personnel required. The solution also has the potential to be extended to live conductor work, subject to further technical and safety assessment.

Scope

The project covers the development of a robotic system for the YYM spacer configuration, designed for deployment by drone to remove and replace defective twin spacers on carbon core conductors. The project includes demonstration of the method to confirm that the solution can be applied under representative network conditions.

Objective(s)

Develop a robotic system for the YYM spacer configuration.

Demonstrate deployment of the robot by drone on the conductors.

Remove and replace defective twin spacers on the YYM OHL route.

Confirm that the method can be safely applied on carbon core conductors.

Establish the basis for wider application of the technology on similar assets.

Consumer Vulnerability Impact Assessment

An assessment of distributional impacts (technical, financial and wellbeing related) for this project has been carried out using a bespoke assessment tool, which assesses the project as having a positive, negative or neutral effect on consumers in vulnerable situations. To help inform the assessment, this tool considers the categories of consumers identified in the Priority Services Registration

This project has been assessed as having a neutral impact on customers in vulnerable situations.

Success Criteria

Robotic system completed for the YYM spacer configuration.

Successful deployment and recovery of the robot using a drone.

Defective twin spacers successfully removed and replaced on the YYM OHL route.

Inspection confirms no damage to the carbon core conductors following the replacement.

The method is demonstrated under operational conditions and considered suitable for wider application.

Project Partners and External Funding

TechAir AS – technology developer, responsible for the design and development of the robotic system, drone deployment solution and project delivery. National Grid Electricity Transmission (NGET) is the network owner, providing the trial route, operational input and safety oversight for trials. The project is funded through NIA and does not rely on any external funding sources or third-party financial contributions.

Potential for New Learning

The project will demonstrate whether a drone-deployed robotic system can successfully carry out twin spacer replacement on carbon core conductors under operational conditions.

The learning from the project, including the deployment method, replacement process and interaction with carbon core conductors, may support future application on similar routes.

Scale of Project

The project will be demonstrated on a selected section of the YYM OHL route, providing sufficient scale to demonstrate the drone-deployed robotic system and the spacer replacement process on carbon core conductors while limiting operational impact. This technology reduces working at height for line workers, particularly where the condition of the conductors is unknown. Following successful demonstration, the technology and process could support wider deployment across suitable overhead line assets and may be further developed for operation on the live network, reducing costs associated with outages.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Laboratory based studies and manufacturing will be carried out at the innovation provider's facilities at TachAir AS in Norway. The trial and design approval will be carried out at YYM transmission OHL route of NGET in UK.

Revenue Allowed for the RIIO Settlement

Not Applicable

Indicative Total NIA Project Expenditure

£77,000

Project Eligibility Assessment Part 1

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

The project specifically helps NGET to remove the defective spacers on YYM OHL route which is with carbon core conductors of unknown conditions restricting the use of conventional method for maintenance (including the removal of spacers) - using the conductor trolley.

A drone-deployed, conductor-mounted robot designed to remove and install twin spacers on the YYM OHL route can accelerate the energy system transition by reducing land access and mobilisation costs, lowering personnel exposure to working at height and on conductors of unknown mechanical integrity, cutting the number of tower visits and freeing specialist crews for higher‑value work, and by shortening the time defective spacers remain in service which improves network resilience.

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

The SapcerClear-CC project represents an important technical foundation that enables broader system changes on spacering on carbon core conductors with cascading benefits for all electricity consumers, 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

n/a

Please provide a calculation and/or description of the expected benefits of the solution

Comparison is based on an example to remove one spacer using a 50m MEWP requiring temporary works to access the site vs the drone/robotic method.

1. Baseline (Existing MEWP method) – Average costs associated with hiring the MEWP, temporary works to access site and a team of 6 line workers ~£15k to remove one spacer removing 2 spacers a day.

2. Innovation (Drone/Robot method) – estimated cost per day using the drone/robot method ~£8k removing ~6 spacers a day.

Savings – 6.2k per spacer for ~90 spacers for now on YYM OHL route - £560k

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

Implementation of the technology can be rolled out and benefitted by all the UK utility industry (electricity transmission and distribution) and EPC partners.

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

Deployment strategy - primarily the robot technology will be used on the YYM OHL scheme but can be scaled up to remove multiple spacers and used on other schemes

Deployment budget requirements – costs of deployment will be covered by the YYM OHL scheme. For other networks and EPC partners in GB, the results will be shared through the steering committee to enable the roll-out.

Requirement 3 / 1

Involve Research, Development or Demonstration

Projects 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

Involve Research, Development or Demonstration - Please select all that apply

☑ 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

We expect this to be both a technology and process rollout for the YYM refurbishment project. Safety of personnel, speed of removal and reduced temporary works and associated environmental impact were all considered and factored into CBA. Reducing the risk to ALARP is a mandatory requirement under the Working at Height regs, and this technology negates the need for line workers to work at height in spacer trolleys on twin conductor bundles. Other network licensees can adopt the robot for the spacering activities.

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. Networks must explicitly mention similar projects that they have considered and how these differ.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

There are no other projects in development looking at spacering that can help with removal of spacers on arbon-core conductors. The TWIN-SPIDER (NIA3_NGET0002) project isn't going to be ready until Q3 2027 and is a solution to remove/install spacers in bulk, it is installed manually using personnel, starting at one end of the span and traverse through the span on the conductors to the other end of the span. The SpacerClear-CC (this project - NIA3_NGET0015) is a solution initially for the carbon core conductor, because of the issues NGET are currently having on carbon core conductor of unknown conditions. The SpacerClear-CC is installed on the conductors using a drone and can remove one spacer at a time, after being placed on the conductors near the defective spacer.

The risk of duplication will be addressed through dissemination of progress with other licensees and being open to co-operate with licensees working in this space.

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

Not applicable.

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

The project is innovative because it combines drone deployment and specialised tooling to remove twin spacers—addressing precision work on a conductor with unknown conditions while minimising land access, tower visits and personnel exposure—and because it targets a specific spacer geometry and operational profile (YYM OHL) rather than using generic inspection drones or ground‑based crews.

Relevant Foreground IPR

Relevant foreground IPR expected from the project may include documented methodology, solution design outputs, pilot learning, user guidance, implementation lessons and final project reports.

The main foreground learning to be shared through NIA dissemination will focus on the method, findings, governance considerations, value evidence and lessons learned, rather than security-sensitive implementation detail or restricted internal information.

Any foreground IPR and related learning will be managed in line with the applicable NIA framework and project contractual arrangements, with appropriate protection for personal, commercial, security-related and operationally sensitive information.

Data Access Details

Data for this project and all other projects funded under the Network Innovation Allowance (NIA), Network Innovation Competition (NIC) or the new Strategic Innovation Fund (SIF) can be found or requested in a number of ways:

· A request for information via the Smarter Networks Portal at: https://smarter.energynetworks.org , to contact select a project and click ‘Contact Lead Network’. National Grid already publishes much of the data arising from our innovation projects here so you may wish to check this website before making an application.

· Via our Innovation website at: https://www.nationalgrid.com/uk/electricity-transmission/innovation.

· Via our managed mailbox: box.NG.ETInnovation@nationalgrid.com

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

Network Licensees are unlikely to fund this as business‑as‑usual because the robot solution is an innovation and requires non‑routine R&D, testing and specification changes before it can be adopted across the network. Key reasons are:

· It is a development/demonstration activity rather than routine maintenance: BAU budgets typically cover established, repeatable workstreams; this project needs trials and proof of performance.

· Implementation and safety risk: introducing robotic removal/installation requires additional safety case development and approvals that sit outside routine activity.

· Unquantified commercial and performance risk: without trial data the return on investment, reliability and whole‑life benefits remain unproven, so BAU funds (which are prioritised for established deliverables) are not the right source.

· Potential operational impacts: trials may require different working arrangements and therefore need dedicated project funding and oversight rather than being absorbed into normal maintenance schedules.

Because of these factors, the appropriate route is targeted innovation funding to deliver the testing, validation and specification updates needed before the solution can be funded and deployed as BAU.

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 requires NIA support because it is a non-routine innovation with material technical, operational, commercial and regulatory risks that cannot be absorbed within business-as-usual budgets or delivery processes. NIA funding enables the controlled testing, de-risking and specification work needed before the solution can be approved, procured and rolled out at scale. Therefore, considering the risks associated with the success of the project, NGET believes NIA funding is the best route for the project.

This project has been approved by a senior member of staff

- [x] Yes