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

Oct 2026

Project Reference Number

NIA3_NGET0030

Project Registration

Project Title

HAPS Discovery

Project Reference Number

NIA3_NGET0030

Project Licensee(s)

National Grid Electricity Transmission

Project Start

November 2026

Project Duration

0 years and 5 months

Nominated Project Contact(s)

Yageen Khames box.ng.etinnovation@nationalgrid.com

Project Budget

£381,500.00

Summary

This project will investigate the potential value of High-Altitude Platform Systems (HAPS) for National Grid Electricity Transmission (NGET). It will explore how HAPS capabilities could address future operational challenges, including communications resilience, asset visibility, emergency response and network monitoring. The project will identify and assess potential use cases, define relevant requirements and benefits, and develop a techno-commercial roadmap outlining potential next steps for NGET. The project will generate new learning on the application of HAPS within the electricity transmission sector and provide recommendations for future development.

Nominated Contact Email Address(es)

box.NG.ETInnovation@nationalgrid.com

Problem Being Solved

NGET faces increasing challenges in maintaining the resilience, visibility and operational performance of the GB electricity transmission network as it becomes more geographically dispersed, digitally dependent and exposed to changing environmental conditions.

Key challenges include:
Maintaining resilient communications during normal operations and major incidents.
Maintaining visibility and monitoring of geographically dispersed assets and transmission routes, particularly in remote locations.
Obtaining timely information during incidents, emergencies and severe weather events.
Supporting effective emergency response and operational decision making when access or existing infrastructure is disrupted.
Improving network resilience to climate related and other disruptive events.

Existing approaches have different technical, operational and commercial limitations, and there is insufficient evidence on whether they can meet all future requirements for resilience, coverage, responsiveness, persistence and cost effectiveness.

The project will therefore address the lack of evidence and understanding of how NGET can maintain and improve communications resilience, asset visibility, monitoring and emergency response capability across an increasingly dispersed transmission network.

Method(s)

The project will assess the potential application of HAPS to electricity transmission by:

Assessing HAPS technology maturity and capabilities towards 2030.
Identifying NGET operational challenges and requirements.
Identifying and prioritising potential HAPS use cases.
Assessing potential technical, operational, commercial and consumer benefits.
Developing a techno-commercial roadmap for potential future development.
Producing a final report with findings and recommendations.

The project will reduce technical and commercial uncertainty and provide evidence to support any future demonstration or deployment decision.

Data will be obtained from NGET stakeholders, Cambridge Consultants, existing research and relevant public technical and industry sources. Sources, assumptions and limitations will be documented and reviewed, with project outputs stored in approved NGET systems.

Cambridge Consultants' quality assurance processes and NGET governance will be applied. Sources, assumptions and analysis will be documented and reviewed for accuracy and traceability. As this is a discovery project, the focus will be on the quality of technical, operational and economic evidence rather than physical measurements.

Risk Assessment
TRL Steps: TRL 4 → 6
Cost: £346.5k direct cost
Suppliers: Cambridge Consultants
Data Assumption: NGET, supplier and external sources
Overall Risk: Medium

Rationale: A contained 12-week discovery project with one specialist supplier and no physical deployment, but with uncertainty due to the emerging technology and reliance on stakeholder and external evidence.

The project will assess potential benefits including improved resilience, asset visibility, emergency response, reduced outage impact and potential operational cost savings.

As the final use cases and deployment costs are not yet established, a detailed CBA or payback period will be developed at a later stage. This project will establish the evidence and assumptions required for that assessment.

Scope

The project will investigate the potential application of HAPS to the GB electricity transmission network, with a focus on the 2030 timeframe.

The scope will include:
Assessment of the current and expected future capabilities and maturity of HAPS technology.
Identification of NGET operational challenges that may be relevant to HAPS capabilities.
Assessment of potential applications across the transmission network, including communications resilience, asset and route monitoring, remote-site connectivity, emergency communications, incident response and Earth Observation.
Identification and assessment of potential use cases.
Prioritisation of use cases according to their potential technical, operational, commercial and consumer value.
Definition of technical and operational requirements for prioritised use cases.
Assessment of potential benefits, costs and value.
Consideration of the scalability and potential replication of use cases across the GB transmission network.
Development of a techno-commercial roadmap identifying potential future activities.
Production of a final report documenting the findings, evidence, assumptions, conclusions and recommendations.

The project is a discovery and assessment activity and does not include full scale deployment of HAPS across the transmission network. The proposal describes a 12 week programme covering technology exploration, use case development, prioritisation, roadmap development and final reporting.

Objective(s)

Assess the maturity and capabilities of High Altitude Platform Systems (HAPS) and understand their potential applicability to the electricity transmission sector, considering the expected development of the technology towards 2030.

Identify and assess NGET operational challenges where emerging technologies could provide additional capability, particularly in relation to communications resilience, asset visibility, network monitoring, emergency response and resilience during major incidents or disruptive environmental conditions.

Identify and prioritise potential HAPS use cases for NGET, assessing how HAPS capabilities could address identified operational requirements and where they could provide additional value compared with existing approaches.

Define the technical, operational and commercial requirements associated with the prioritised use cases, including consideration of network coverage, communications, data requirements, integration, operational processes, regulatory considerations and potential implementation constraints.

Assess the potential benefits and value to NGET and electricity transmission customers, including potential improvements in network resilience, asset visibility, emergency response, outage impact and operational efficiency.

Establish the potential financial value of the prioritised use cases, identifying relevant cost drivers and potential financial benefits that could accrue to electricity transmission through areas such as reduced operational costs, reduced inspection or monitoring requirements, reduced outage impacts and improved incident response.

Develop a techno commercial roadmap identifying the technical, operational and commercial steps required for NGET to further investigate, demonstrate or potentially deploy the most promising use cases.

Generate new knowledge and evidence on the application of HAPS within the electricity transmission sector, reducing technical, operational and commercial uncertainty and providing an evidence base for future innovation, investment and deployment decisions.

The project will therefore provide NGET with a structured assessment of where HAPS could provide value, what would be required to realise that value, what uncertainties remain and what potential next steps should be considered. The proposal identifies technology exploration, use case assessment, prioritisation and development of a techno commercial roadmap as the core activities.

Consumer Vulnerability Impact Assessment

The HAPS discovery project is expected to have a neutral impact on consumer vulnerability during the discovery phase, as it focuses on researching High-Altitude Platform Systems, identifying potential use cases and assessing technical feasibility rather than implementing a live solution.

In the longer term, HAPS technology could have a positive impact on vulnerable consumers by potentially improving communications resilience, supporting network reliability and helping maintain electricity supply during emergencies or disruptions. However, these benefits have not yet been demonstrated and will depend on the outcomes of the study and any further implementation.

Success Criteria

The project will be considered successful if it identifies and assesses the potential impact of HAPS technology on consumers, including vulnerable consumers and demonstrates how the technology could contribute to more resilient and reliable electricity transmission network. Success will also include identifying potential consumer benefits, such as reduced outage durations and improved resilience, while ensuring any potential risks or negative impacts are identified resilience, while ensuring any potential risks or negative impacts are identified and considered. The assessment should provide clear findings and recommendations that can inform future decisions regarding the development and application of HAPS technology.

Project Partners and External Funding

Cambridge Consultants is the only formal partner on this project. There is no further funding beyond the allocated Network Innovation Allowance.

Potential for New Learning

The project has the potential to generate new learning on the ecological and environmental considerations associated with the development and future application of HAPS technology. It will improve understanding of any potential impacts on habitats, protected species and biodiversity, while identifying appropriate assessment requirements and potential mitigation measures. The findings could provide useful learning for future HAPS projects and help inform how environmental and ecological considerations are incorporated into the development of similar technologies.

Scale of Project

WP0 – Project management and meetings: Project management and coordination across both phases, including project meetings and stakeholder engagement.
WP1 – HAPS technology exploration: Desk based research and Cambridge Consultants subject matter expert interviews to assess the development of HAPS technology over the next five years, supported by futurecasting and consideration of how HAPS could operate alongside terrestrial telecommunications.
WP2 – NGET needs and priority use cases: Identification and definition of potential HAPS use cases and requirements through NGET and Cambridge Consultants knowledge sharing activities, including assessment of NGET's anticipated operational challenges over a five year horizon.
WP3 – Roadmap and Phase 1 report: Prioritisation and refinement of HAPS use cases against NGET requirements, supported by workshops, capability mapping and persona-based storyboarding to establish potential value to NGET. This work also includes development of a techno commercial roadmap and the Phase 1 report.
WP4 – Prototype service architecture and concept development: Development of a prototype HAPS enabled service architecture and operating concept for the selected priority use case, including communications, monitoring, data, ground segment and interfaces with existing NGET systems.
WP5 – Technical feasibility and integration assessment: Engineering assessment of the proposed service concept, including coverage, capacity, resilience, operational workflows and integration with existing NGET systems, to assess whether the solution could meet the priority use-case requirements.
WP6 – Demonstration concept and deployment assessment: Definition of a potential future demonstration or pilot, including objectives, candidate partners, procurement considerations, deployment approaches and identification of remaining uncertainties requiring validation.
WP7 – Final report and project close-out: Consolidation of the project findings, including use case prioritisation, the prototype architecture, technical feasibility assessment and recommendations for future demonstration or implementation.

The proposal itself defines five corresponding areas of work: technology exploration, review of use cases/requirements, key use case exploration and refinement, techno commercial roadmap development and report development.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL6 Large Scale

Geographical Area

The project will primarily be desk-based, involving research, analysis, internal discussions and workshops. No physical deployment or field-based testing of HAPS technology is planned as part of this project.

Revenue Allowed for the RIIO Settlement

Not Applicable

Indicative Total NIA Project Expenditure

£343,350
The total indicative project expenditure is £343,350, comprising £300,000 for external supplier costs, £26,850 of internal and indirect costs, and £16,500 contingency funding. The breakdown of external supplier costs is as follows:
WP0 – Project management and meetings: £42,942
WP1 – HAPS technology exploration: £17,912
WP2 – NGET needs and priority use cases: £64,081
WP3 – Roadmap and Phase 1 report: £48,481
WP4 – Prototype service architecture and concept development: £36,647
WP5 – Technical feasibility and integration assessment: £30,988
WP6 – Demonstration concept and deployment assessment: £30,988

WP7 – Final report and project close-out: £27,961

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 has the potential to support the energy system transition by exploring how HAPS technology could improve the resilience, communications and monitoring capabilities of the electricity transmission network. As the energy system becomes more complex and increasingly reliant on digital technologies, HAPS could provide additional capabilities for monitoring assets, maintaining communications during major incidents and supporting emerging response. This could help NGET maintain a reliable and resilient network while supporting the transition towards a more flexible, digitalised and Net Zero energy system.

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

The project has the potential to benefit consumers in vulnerable situations by exploring how HAPS technology could improve the resilience and reliability of the electricity transmission network. By supporting communications, network monitoring and emergency response during major incidents or disruptions, HAPS could help reduce outage durations and improve the speed of network restoration. This could help minimise the impact of power interruptions on consumers who may be particularly vulnerable to disruptions in electricity supply.

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

Not applicable as a Development or Demonstration project.
This is a research/discovery project and does not involve deployment of a solution. The project will instead establish the evidence required to assess potential future benefits, including improved network resilience, asset visibility, emergency response and potential operational efficiencies.

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

The project will assess the potential applicability of HAPS across the GB electricity transmission network.
Potential applications may include communications resilience, remote asset monitoring, emergency response and connectivity for geographically dispersed transmission infrastructure. The level of replication will depend on the specific use case, technical requirements, coverage, regulatory requirements and commercial viability identified during the project.

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

A reliable GB-wide rollout cost cannot be established at the discovery stage because the specific use cases, deployment model and required infrastructure have not yet been determined.
Future costs could include HAPS services, ground infrastructure, system integration, data and analytics, deployment, operation and maintenance, and regulatory requirements. The project will identify these key cost drivers to support a future assessment.

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

The learning generated will help relevant Network Licensees understand how HAPS technology could address future operational challenges within electricity transmission. The identified use cases, requirements, benefits and techno-commercial roadmap could be used to inform future innovation projects, investment decisions and potential deployment of HAPS technology across the network. The findings could also support Network Licensees in assessing the feasibility, value and potential risks of HAPS and identifying areas for further research, development or trials.

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.

No other identified project explores the potential application of HAPS technology specifically within the electricity transmission network to address NGET's future operational challenges, identify potential use cases and develop a techno-commercial roadmap.

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 will investigate the potential application of High-Altitude Platform Systems (HAPS) to the electricity transmission network, an area where there is currently limited evidence and learning within the energy sector. The project will explore how HAPS could provide capabilities such as improved communications resilience, asset visibility and emergency response, and assess these against NGET's future operational needs. The work will generate new learning by identifying and prioritising potential use cases and developing a techno-commercial roadmap for their future application.

Relevant Foreground IPR

No significant Foreground IPR is currently expected to be generated.

The project is focused on **research, technology assessment, use-case identification, benefits assessment and development of a techno-commercial roadmap**, rather than development of a new physical product or software solution.

Existing/background IPR belonging to Cambridge Consultants or third parties may be referenced where required to undertake the assessment, but the project is not expected to require the transfer or creation of new NGET-owned technology at this stage.

Data Access Details

A description of how any data (de-sensitised where necessary) that are expected to be gathered in the course of the project can be requested by interested parties, and, if applicable, reasons why such data cannot be released to interested parties. This requirement may be met by including a link to the publicly available data sharing policy, which is required by virtue of paragraphs 2.13-2.16 of the RIIO-2 NIA Governance Document.

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 would not typically fund this work through business-as-usual activities because HAPS is an emerging technology with significant technical, commercial and operational uncertainties, and its potential application to the electricity transmission network has not yet been established. The project is exploratory and focused on generating new learning, identifying potential use cases and assessing future opportunities rather than delivering an established operational requirement. Innovation funding is therefore appropriate to investigate the technology and its potential value before any future business-as-usual investment or deployment decisions are made.

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 due to the technical, operational, commercial and regulatory uncertainties associated with applying HAPS technology to the electricity transmission network. NGET's specialist knowledge of its network, operational requirements and future challenges is required to identify relevant use cases and assess their potential value and feasibility. The project also involves emerging technology where the suitability, performance, costs and practical implementation of HAPS for transmission network applications are not yet fully established. NIA support will enable these uncertainties and associated risks to be assessed through technical research, stakeholder engagement and use-case analysis, while ensuring that potential operational, commercial and regulatory considerations are appropriately considered.

This project has been approved by a senior member of staff

☑ Yes