

NIA Project Registration and PEA Document

Date of Submission

Jan 2018

Project Reference

NIA_NPG_022

Project Registration

Project Title

Drones Within Visual Line Of Sight (Drone WVLOS)

Project Reference

NIA_NPG_022

Project Licensee(s)

Northern Powergrid

Project Start

January 2018

Project Duration

2 years and 10 months

Nominated Project Contact(s)

Michael Rice

Project Budget

£245,000.00

Summary

The project is an assessment exercise. Completion of the assessment, whether the outcome is positive or negative would comprise a successful outcome.

Nominated Contact Email Address(es)

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Problem Being Solved

The use of drones to inspect critical network infrastructure is now becoming recognised as a viable alternative to traditional inspection methods – either ground or helicopter based. Utilising drones can potentially provide a number of benefits ranging from reduction in cost, increased speed of delivery and improved safety. Some of these benefits are currently being investigated by UK energy networks that are already successfully using drones for some inspection tasks. However Civil Aviation Authority rules require that drone inspections are conducted within visual line of sight (WVLOS), defined as within 400 feet vertically and 500 metres horizontally whilst maintaining a safe distance from people, buildings and vehicles.

WVLOS restrictions potentially impact the usefulness and potential improvement that can be achieved through the adoption of drone inspection techniques. We aim to test the limitations of these flight regulations to determine whether or not the use of drones is an efficient and economically effective alternative to traditional inspection methods and to establish a baseline of performance that can be compared with the current approaches.

The challenge remaining is to develop acceptable means of demonstrating safe WVLOS operations that can be approved by the civil aviation authority and accepted

into business as usual practice.

Method(s)

Northern Powergrid intends to purchase up to four drones, of differing types, by April 1, 2018 and conduct a nine month trial program. Trials will be undertaken primarily in rural operating zones and will look to assess the applicability of drone based methods to the range of current operational and asset management and maintenance activities.

As part of the assessment Northern Powergrid will engage with an established inspection survey and asset management company to assist in the purchase vs contract decision. Following the completion of trials we will look to tender for the services needed for the desired solution. Vendors may be utilized on an as-needed basis for one-off specialized applications.

Scope

This project is concerned with undertaking further exploratory work to assess the technical and commercial viability of using UAS WVLOS within NPg through a series of carefully designed trials. The trials will look to assess the following:

Flying capability: The ability to fly consistently in a range of "real life" scenarios:

Weather: Visibility (clear skies, cloudy, night), Wind (None to high), Rain (Rain, snow)

Route type: Urban, rural, no fly zone

Line type: Route length (<5km, >15km) and Line design (pole, tower)

Data capture: The ability to provide a consistent and quality set of information including photographs, videos, infrared and LiDAR to a pre-determined specification.

Integration into business processes: The ability to integrate into (and/or enhance and/or replace) existing business processes:

Routine inspections: generate a bespoke report along a route using a generic condition pro forma

Ad-hoc inspections: to undertake a specific assessment, e.g. inspect a cable bridge structure.

Fault management: to help identify the location of a specific fault. This project would explore the ability to have condition data live streamed back to an NPg subject matter expert (SME).

Make versus buy analysis: Assess each potential business process to decide the best deployment solution

Objective(s)

The utility of a drone based approach for each of the activities identified above in "scope" and an assessment of the economics of that utilisation would be the minimum successful output. Identification of new tasks suitable for this technology as well as an identification of associated operational issues are also likely additional outcomes but would be seen as additional to the base success criteria.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The project is an assessment exercise. Completion of the assessment, whether the outcome is positive or negative would comprise a successful outcome.

The utility of a drone based approach for each of the activities identified above in "scope" and an assessment of the economics of that utilisation would be the minimum successful output. Identification of new tasks suitable for this technology as well as an identification of associated operational issues are also likely additional outcomes but would be seen as additional to the base success criteria.

Project Partners and External Funding

None

Potential for New Learning

The main learning expected to be developed during this project is as follows:

- The rules and regulations of the Civil Aviation authority

- A better understanding of all the benefits of using WVLOS drones for network inspection tasks, financial, data, environmental, safety.
- A full understanding of network tasks undertaken by drones WVLOS, such that they are satisfactory to the requirements of the relevant stakeholders. For example, drones WVLOS inspecting for encroachment being acceptable to the HSE.

Scale of Project

The project is a small scale trial assessment of drone technology.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Specific ad-hoc locations across NPg license areas

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£245,000

Project Eligibility Assessment Part 1

There are slightly differing requirements for RII0-1 and RII0-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RII0-2 / RII0-1).

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 RII0-2 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 (RII0-1 projects only)

The NPV of savings is estimated at £1.65m per annum at Northern powergrid and around £10m ppa across the electricity distribution industry.

Please provide a calculation of the expected benefits the Solution

Assuming that the method replaced the base method the saving would be around £110k over a single annual inspection cycle.

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

The method is replicable across all of the other DNO's license areas.

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

Cost of roll-out depends on both the volume and nature of take-up but significant implementation could probably be undertaken for a sum between £500k and £5m.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RII0-1 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

RII0-2 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

n/a

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

The need to reduce operational costs of the network is a specific requirement of the Northern Powergrid innovation strategy. This project contributes to potentially bringing down overall operational cost primarily in the area of overhead line management but also other areas. Additionally we anticipate that the application of the trial technology will also support the specific innovation strategy of improved network reliability and availability.

- 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.

No other similar project has been identified. The CAA has been a party to the development of the project plan for this project and they indicated that this work has not already been undertaken by other DNOs. This work will also support (but differs from) the beyond visual line of site (BVLOS) activities being undertaken with other licencees through the Energy Innovation Centre.

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

Availability of cheap technology and motivation to pursue.

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

Uncertain business case

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

Uncertain business case and lack of understanding of technical capability.

This project has been approved by a senior member of staff

Yes