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

Jan 2014

Project Reference Number

NIA_NGET0141

Project Registration

Project Title

T-pylon Structure and Composite Insulator Testing

Project Reference Number

NIA_NGET0141

Project Licensee(s)

National Grid Electricity Transmission

Project Start

February 2014

Project Duration

2 years and 11 months

Nominated Project Contact(s)

David Clutterbuck

Project Budget

£2,470,000.00

Summary

This project addresses two aspects of the continued effort to develop the T-pylon to a deployable asset:

1. To certify that the physical T-pylon structures can meet the maximum mechanical loads that they have been designed to withstand and validate all the design methodology for the whole family of T-pylons developed.

2. To verify that 3 suppliers are able to develop 400kV solutions that meet future type registration requirements for the first of its kind composite insulator solution.

Nominated Contact Email Address(es)

box.NG.ETInnovation@nationalgrid.com

Problem Being Solved

Visual amenity of new Electricity Transmission assets, particularly overhead line routes, is becoming increasingly important to stakeholders.

National Grid began developing the T-pylon as a more visually amenable alternative to traditional 400kV electricity transmission towers to aid the mitigation of visual impact of any new route.

There are further aspects of demonstration required to ensure that the T-pylon structure and insulator solution meet all 400kV safety, environmental and operational performance requirements before they can be deployed.

Method(s)

Demonstration

1. Two T-pylon structures (one suspension and one tension, from 1 supplier) and a flying angle T-pylon insulator assembly will be

procured (from a different supplier) and subsequently tested to maximum design loads to validate the design solutions simulated behaviour.
2. Electrical and mechanical verification testing and wind testing of the novel composite insulator solutions of three suppliers (therefore 3 insulator solutions) to prove the design solutions meet National Grid requirements in support of type registration.

Scope

This project addresses two aspects of the continued effort to develop the T-pylon to a deployable asset:

1. To certify that the physical T-pylon structures can meet the maximum mechanical loads that they have been designed to withstand and validate all the design methodology for the whole family of T-pylons developed.
2. To verify that 3 suppliers are able to develop 400kV solutions that meet future type registration requirements for the first of its kind composite insulator solution.

Objective(s)

1. To demonstrate that the physical T-pylon structures are suitable for utilising on the GB transmission system. The output will be a certified test report, which will feed in to the specification being developed outside of this R&D scheme.
2. To find a composite insulator solution that meets National Grid requirements based on the geometry required by the t-pylon, and can be offered by suppliers for use on the 400kV Transmission system. Secondly, to ensure that there are multiple suppliers that are able to offer this solution for implementation on the National Grid 400kV Transmission system.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

1. Validation of the design loads on two T-pylon structures (one suspension and one tension) and a flying angle T-pylon insulator assembly which will validate all the structural design methodology for the whole family of 6 T-pylon designs. This will be in the form of an independant report, by a certified body.
2. Minimum of one supplier proven to be able to deliver type registered composite insulator solutions for the T-pylon. This will also be in the form of a report.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

This project is being delivered on an appropriate scale to create market competition for tender submissions on future National Grid capital projects for new infrastructure.

The scope of the project covers three suppliers. This is to drive competition in tender submissions for future deployment on the National Grid 400kV system. Therefore, while the scope of the project can be reduced, this will not drive the best value for the consumer.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

The project will predominantly be undertaken in Europe for the majority of the work, however, National Grid are limited by the

availability of the suitable test facilities and will consider options when they arise.

Revenue Allowed for the RIIO Settlement

Zero

Indicative Total NIA Project Expenditure

NGET NIA project expenditure is £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:

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)

Being able to deploy the T-pylon as an option other than a lattice solution for a new transmission line has the potential to reduce visual impact and provide community benefits.

Please provide a calculation of the expected benefits the Solution

Base cost – The current latice unit cost allowance using 400kV double curcuit overhead line route is £2.2m/km. This is subject to site/route specific requirements.

Method cost – The T-Pylon is a new innovative concept driven by visual amenity for the benefit of the community. For new transmission infrastructure, being able to offer an alternative solution to 400Kv lattice technology and provide community benefit via visual amenity is likely to cost more. As this is a new technology it is anticipated this cost could be in the range of £2.5 - £3.5m / km.

B-M= + £0.3-1.2m/km

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

This solution can be offered as part of all new infrastructure schemes.

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

There would be no cost of rolling this method out across GB, in it is an enabler to offering the T-pylon as a solution in the future.

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

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)

Connections – Smarter Transmission Philosophy

Connections – Facilitating Connections

Strategic – New Materials and technologies

This project is also specifically named in the Innovation Strategy and identified as helping National Grid reduce the visual impact of our transmission assets.

☑ 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