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

Dec 2013

Project Reference Number

NIA_NGET0067

Project Registration

Project Title

Trial & Performance Assessment of ACCR Conductor (3M)

Project Reference Number

NIA_NGET0067

Project Licensee(s)

National Grid Electricity Transmission

Project Start

September 2011

Project Duration

2 years and 7 months

Nominated Project Contact(s)

Mike Fairhurst

Project Budget

£600,000.00

Summary

In order to increase a line's thermal rating without rebuilding or replacing its structures and foundations, the original conductor can be replaced with a special high-temperature, low-sag (HTLS) conductor having the a similar dimensions and properties as the original, but which can be operated safely and reliably at much higher temperatures with far greater ampacity.

This project will assess the suitability of the new generation of high temperature low sag OHL conductors currently available on the market, for deployment on the UK transmission network, in terms of mechanical capability & performance, erection methods, maintenance & repair.

At present National grid have installed both GAP and ACCC (CTC) conductors on the bottom & middle phase on the de-commissioned YYO line near Sheffield in order to evaluate the mechanical performance.

Nominated Contact Email Address(es)

box.NG.ETInnovation@nationalgrid.com

Problem Being Solved

There are many sorts of power flow limitation in modern power systems. If the problem can be solved by a relatively large increase in the thermal rating of an overhead line, re-conductoring the line with High Temperature Low Sag (HTLS) conductor is a possible solution. These conductors are capable of high temperature operation with minimal change in electrical and mechanical properties and have low sag at high temperature when compared to conventional conductors.

In order to increase a line's thermal rating without rebuilding or replacing its structures and foundations, the original conductor can be replaced with a special high-temperature, low-sag (HTLS) conductor having the a similar dimensions and properties as the original, but which can be operated safely and reliably at much higher temperatures with far greater ampacity.

Method(s)

The method proposed for this project includes:

1) Review previous test data and installations
2) Procure conductor fittings
3) Carry out site assessment and risk mitigation measures
4) Determine test requirements
5) Erect conductors on YYO route
6) Carry out mechanical and ice loading tests on all 3 conductor types
7) Report with recommendations

Scope

In order to increase a line's thermal rating without rebuilding or replacing its structures and foundations, the original conductor can be replaced with a special high-temperature, low-sag (HTLS) conductor having the a similar dimensions and properties as the original, but which can be operated safely and reliably at much higher temperatures with far greater ampacity.

This project will assess the suitability of the new generation of high temperature low sag OHL conductors currently available on the market, for deployment on the UK transmission network, in terms of mechanical capability & performance, erection methods, maintenance & repair.

At present National grid have installed both GAP and ACCC (CTC) conductors on the bottom & middle phase on the de-commissioned YYO line near Sheffield in order to evaluate the mechanical performance.

Objective(s)

The goal of this project is to string ACCR (3M) on the remaining Top phase in order to evaluate and compare the stringing, sagging and termination of these three HTLS conductor types, to monitor their mechanical behaviour during simulated ice loading conditions and to evaluate the practical application of the three.

HTLS conductors and their component materials have been extensively tested both during and after their development by the manufacturers and various research organizations, but to date National Grid have yet to carry out such works.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

This project is successful if we improve the knowledge of alternative conductors.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

This project is stringing the conductor on one route.

Technology Readiness at Start

TRL7 Inactive Commissioning

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

This project will deliver tools and techniques for use on the whole of the UK Transmission Network (national).

Revenue Allowed for the RIIO Settlement

Zero

Indicative Total NIA Project Expenditure

IFI - £200,000

NIA - £400,000

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)

The advantage of the high temperature low sag conductors is their ability to operate continuously at temperatures of 150oC or above with less increase in sag and little or no loss of strength, the net result being increased line rating from existing assets.

Manufacturer tests of ACCR(3M) indicate that it can be operated at 210oC continuously without changing its mechanical or electrical properties, with a post fault temperature of 240 oC.

Providing increased capacity on existing overhead line routes and increased operational flexibility of the network under post fault conditions.

The initial cost is considerably more than conventional conductor systems (5 times), however a proportion of this cost will be off set by the eliminating the requirement to strengthen existing towers and foundations as is currently the position when existing lines are up-rated, with larger heavier conductors (nominally £30 - £40k per tower) which could generate a potential £10m benefit on a new OHL.

Please provide a calculation of the expected benefits the Solution

Base Cost - £1m (based on a loss of capacity due to sag incurred from high load flows)

Method Cost - £400k

B-M = £600,000

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

This could be applied to all OHL routes.

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

This could be applied to all OHL routes.

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)

This project addresses the reliability and connections themes with focus on optimizing asset management and facilitating new connections

☑ 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