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

Nov 2019

Project Reference Number

NIA_SSEN_0042

Project Registration

Project Title

Feasibility of Compressed Dry Air 33kV Insulated Switchgear

Project Reference Number

NIA_SSEN_0042

Project Licensee(s)

Scottish and Southern Electricity Networks Distribution

Project Start

December 2019

Project Duration

0 years and 7 months

Nominated Project Contact(s)

SSEN NIA Programme Delivery Manager – Joe McNeil

Project Budget

£66,700.00

Summary

The environmental impact of Sulphur Hexafluoride (SF6) means that its use in the electricity distribution industry is becoming increasingly regulated and restricted. Given that one tonne of SF6 is the equivalent of 23,500 tonnes of carbon, it is important that alternatives are investigated.

Third Party Collaborators

Energy Innovation Centre

Threepwood Consulting Ltd

Nominated Contact Email Address(es)

fnp.pmo@sse.com

Problem Being Solved

The environmental impact of Sulphur Hexafluoride (SF6) means that its use in the electricity distribution industry is becoming increasingly regulated and restricted. Given that one tonne of SF6 is the equivalent of 23,500 tonnes of carbon, it is important that alternatives are investigated.

The ENA have formed the SF6 Fluorogas Working Group to estimate the impact in the event of an introduction of legislation concerning the use of SF6 as insulating medium.

Switchgear manufacturers are continually researching alternatives to SF6 which match the same dimensional footprint and operational reliability, whilst also delivering a more sustainable, environmentally friendly product. Considering this challenge, a potential solution has been identified specifically for the 33kV network, which is to utilise compressed dry air as an insulation medium.

This project will determine the viability of utilising compressed dry air as a SF6 alternative across the 33kV switchgear.

Some Manufacturers have identified that the compressed dry air technology may be available in the future – currently this technology is unproven in GB.

Method(s)

Desktop study to undertake background research to establish if dry compressed air is a suitable alternative to SF6.

Scope

The scope of this project is to undertake a desktop study which will include as a minimum;

· Literature review on compressed dry air as an alternative to SF6, identifying any associated risks and unforeseen challenges;

· Contact with supply chain to ascertain their progress in developing compressed dry air as an insulation medium;

· Identification of the likely parameters of the compressed dry air switchgear, associated operating functionality/performance, operational and maintenance requirement and risk assessments;
Cost Benefit Analysis for potential field trials;
Understand the parameters where compressed dry air can be utilised;
· Produce an implementation plan detailing the requirements if we were to transition compressed dry air 33kV switchgear into business as usual;
Recommend potential for further work if initial timings are positive.

Objective(s)

The projects objectives are as follows;

Production of a desktop study which details switchgear manufacturers progress into investigating compressed dry air as an alternative to SF6 for 33kV products.
Detail an implementation plan required to transition compressed dry air 33kV switchgear into business as usual.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

A report with a clear recommendation on the potential benefits and likely time frames, on the use of compressed dry air as an alternative to SF6, incorporating previously stated project scope and objectives.

Project Partners and External Funding

N/A

Potential for New Learning

Through compiling the report there will be a better understanding of the progress being made by switchgear manufacturers into using compressed dry air technology as an alternative to SF6.

Scale of Project

As this is relatively new technology, this project is a small-scale desktop study to determine the feasibility, and viability, of utilising compressed dry air as an SF6 alternative.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

The Project will be run in Southern Electric Power Distribution area, but the findings will be applicable to all Licence areas.

Revenue Allowed for the RIIO Settlement

No allowance has been made in the RIIO settlement for exploring compressed dry air as an alternative to SF6.

Indicative Total NIA Project Expenditure

The total expenditure expected from the project is £66,700.
90% (£60,030) is allowable NIA expenditure.

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)

This is a research project in its early stages. It has the potential to deliver net financial benefits to customers, however, the scale of those benefits can only be assessed on completion of the project, if the compressed dry air is deemed a suitable alternative to SF6 and becomes a commercialised concept.

Please provide a calculation of the expected benefits the Solution

Not required for this research project

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

The findings from this project will be replicable across all DNOs.

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

The cost of rolling out the Method across GB will be determined by the success of the Project returning data to build a Cost Benefit Analysis.

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

The learning from the project will be directly relevant and transferable to other licence areas, which are under the same legislative constraints as SSEN when managing SF6 Gas Insulated Switchgear (GIS).
This will inform about the potential suitability of utilising compressed dry air technology.

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 desktop research into an alternative for SF6 is focused primarily on innovating on an environmental front via investigating an insulation medium that is as reliable and as compact as SF6.
☑ 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.

There are no known projects by other DNOs which research this problem.

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

To date there has been no GB projects which have looked to determine the feasibility and viability of utilising compressed dry air as a SF6 alternative in 33kV Gas Insulated Switchgear This project will be the first to capture and develop, at business level, an understanding to further integrate SF6 alternatives on a 33kV network.

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

Compressed dry air as an insulation medium is an emerging technology, little is known about it and therefore this information must be collected first before SSEN decides on further activities.

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

There is no allowable spend in RIIO-ED1 in this area

This project has been approved by a senior member of staff

☑ Yes