

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

Apr 2020

### Project Reference Number

NIA\_SPEN\_0052

## Project Registration

### Project Title

A Substation of the Future

### Project Reference Number

NIA\_SPEN\_0052

### Project Licensee(s)

SP Energy Networks Distribution

### Project Start

May 2020

### Project Duration

1 year and 11 months

### Nominated Project Contact(s)

Michael Eves

### Project Budget

£70,000.00

## Summary

Current expectations are for SF6 to be banned for new installations come 2025. A review of current legislation is due to take place prior to June 2020. As this EU review incorporates up to 52kV it will have a large impact on DNOs as this is where SF6 alternatives are scarce and they will need to act fast to propose new solutions to the alternative installation of gas insulated equipment. From the RIIO-T2 submissions there has been an incentive to UK TNOs from the regulator, OfGEM, to install alternative gas insulated technologies. It is expected that the same will happen when RIIO-ED2 takes effect and the same principles in consideration of CO2 emissions will be applied.

Non-SF6 alternatives exist but their integration into BaU has not yet been seen. Doing nothing now means potentially having to rapidly roll-out an unfamiliar solution when the issue becomes imminent.

### Nominated Contact Email Address(es)

innovate@spenergynetworks.co.uk

## Problem Being Solved

Current expectations are for SF6 to be banned for new installations come 2025. A review of current legislation is due to take place prior to June 2020. As this EU review incorporates up to 52kV it will have a large impact on DNOs as this is where SF6 alternatives are scarce and they will need to act fast to propose new solutions to the alternative installation of gas insulated equipment. From the RIIO-T2 submissions there has been an incentive to UK TNOs from the regulator, OfGEM, to install alternative gas insulated technologies. It is expected that the same will happen when RIIO-ED2 takes effect and the same principles in consideration of CO2 emissions will be applied.

Non-SF6 alternatives exist but their integration into BaU has not yet been seen. Doing nothing now means potentially having to rapidly roll-out an unfamiliar solution when the issue becomes imminent.

## Method(s)

To purchase and install non-SF6 Stand Alone Panels, as part of the re-design of a secondary substation to account for the non-SF6 Panel & low carbon TX and other standard components. We may perform system studies where required to confirm no impact on the network operation. The project will investigate the LCA of the non-SF6 unit and novel substation arrangement and develop learning of commercially available options to enable solution to be optimised for rollout.

## Scope

**Procurement** – To obtain the novel equipment required for the S/S

**Identification** – To identify and specify the optimal demonstration site for trial

**Design** – To design and approve the novel arrangement for the S/S; this will also include analysis of the offset carbon from the approach

**Deploy** – To deliver all works required on site

**Review** - To review on the project learning to inform future rollout

## Objective(s)

To purchase and install non-SF6 Stand Alone Panels, as part of the re-design of a secondary substation to account for the non-SF6 Panel & low carbon TX and other standard components. We may perform system studies where required to confirm no impact on the network operation. The project will investigate the LCA of the non-SF6 unit and novel substation arrangement and develop learning of commercially available options to enable solution to be optimised for rollout.

## Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

## Success Criteria

The design and piloting of a low carbon S/S which includes a non-SF6 RMU, environmentally transformer and a standard LV board, with clear understanding of the carbon impact and the other benefits from the design.

## Project Partners and External Funding

N/A

## Potential for New Learning

An approved design and a pathway to rollout - A substation where low carbon technologies (meaning non-SF6 Panels and low carbon TX) are interfaced and a new S/S design which enables them to be compliant to enable rollout.

## Scale of Project

A single S/S in an urban substation environment

## Technology Readiness at Start

TRL5 Pilot Scale

## Technology Readiness at End

TRL7 Inactive Commissioning

## Geographical Area

SPEN License Area

## Revenue Allowed for the RIIO Settlement

£0,000

## Indicative Total NIA Project Expenditure

£70,000

## 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)

Assuming UK rollout, the reduction in penalties from SF6 leakages and the carbon saving of 2.66ktCO<sub>2</sub>e (applying the BEIS's central appraisal carbon price) could see a cumulative saving of £2.54m by 2030.

The savings can only be identified once we determine and establish possible additional costs of deploying and maintaining a Low Carbon S/S, these will be identified as part of the project as well as carbon benefits.

#### Please provide a calculation of the expected benefits the Solution

Method costs will be confirmed and benefits clarified as part of the project scope.

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

Design aimed to enable wide, replicable rollout with urban setting being chosen where site footprint is limited.

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

To be identified further during the design of the scheme. Expected reduction of unit costs due to economies of scale.

### 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

User experience in non-SF6 RMUs and new arrangements will be valuable to the wider industry as we look to reduce reliance on SF6 technologies and integrate new switchgear with our existing designs and policies.

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

Sustainable Networks

- 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 similar work known to both deploy a non-SF6 RMU, environmentally friendly TX and integrate it into an existing substation

### 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

The technology and its arrangement requires to an extent a re-design of S/S and the enclosure and requires investigation and trial to be realised.

### Relevant Foreground IPR

n/a

### Data Access Details

n/a

### Please identify why the Network Licensees will not fund the project as part of its business and usual activities

The proposal is a new arrangement outwith the allowance for standard S/S and has several technical challenges before it can become

a part of the BaU activities, the NIA will fund the incremental costs only to support this.

**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**

We see risks in the technical design and arrangement which must be addressed (to prevent mal-operation or unwanted conditions).  
NIA enables us to investigate this further.

**This project has been approved by a senior member of staff**

Yes