

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

SPTEN01

## Project Registration

### Project Title

Visualisation of Real Time System Dynamics using Enhanced Monitoring (VISOR)

### Project Reference Number

SPTEN01

### Project Licensee(s)

SP Energy Networks Transmission

### Project Start

December 2013

### Project Duration

3 years and 4 months

### Nominated Project Contact(s)

James Yu (Future Networks Manager)

### Project Budget

£7,370,000.00

## Summary

The three GB transmission owners are tasked under their licence and the System Operator Transmission Owner Code (STC) to develop an efficient, coordinated and economic transmission system. This obligation sits in a background of challenging renewable generation targets that have triggered significant transmission infrastructure reinforcements. The drive on sustainable development has led to the application of new technologies such as HVDC links and Series Compensation to avoid where possible the construction of new circuits.

The safe and secure integration of these technologies requires exhaustive system design studies. However experience tells us that it is not possible, let alone economic to design a power system that is guaranteed free from unforeseen and potentially damaging events.

In network planning time-scales the determination of network capability and hence the need for generation constraints, is based on the application of Security Standards to network models with prudent assumptions regarding generation and network backgrounds. The Wide Area Monitoring (WAM) system proposed for development and trial in VISOR will provide a new insight to the capability and dynamic performance of the transmission system in both planning and operational time-scales.

The VISOR project is proposing new Phasor Measurement Units (PMU) deployment and innovative applications for using phasor data to understand and analyse real-time dynamics of the transmission network. The VISOR trial will demonstrate a potentially avoided investment benefit of £45m for every 100MW capacity realised. It will provide the system operator with the ability and confidence to utilise the full capacity of the network where increasing volumes of wind generation lead to more volatile system flows, resulting in greater operating margins to maintain and manage network security. A conservative estimate of operational savings is £4m per annum. The WAM system will also provide transmission network owners with a risk-mitigating measure in a period of uncertainty to help safeguard the network against low probability high-impact events that may result in partial or widespread system failure. An estimate of the financial impact of a GB wide black-out is in the order of £30bn.

The project duration is 40 months and will commence as soon as funding is provided with the issue of an Invitation to Tender.

### Nominated Contact Email Address(es)

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## Problem Being Solved

## Method(s)

## Scope

## Objective(s)

The project objectives are detailed in the following five Work Packages.

The key issues addressed in Work Package 1 include:

- Sub-Synchronous Oscillation
- Oscillation Analysis & Source Location

The applications to be trialled in Work Package 2 relate to modelling that influences the B6 boundary, but can also be applied more generally to the quality of static and dynamic models and other boundaries. The components of model validation to be addressed include:

- Line parameter estimation
- Oscillation analysis validation
- Transient stability simulations
- Generator model validation

Work Package 3 aims to improve the understanding and visualisation (Figure 2 - 4) of the network stability limits for the system planners and operators by:

- Understanding of uncertainty
- Improvement of model initial conditions
- Improved visualisation of stability limits for operators
- Trial the reliability of area angle

The project will also look at the performance of the power system in terms of baselining the performance over a long period of time so that known and unforeseen abnormalities can be more easily detected. This performance assessment in Work Package 4 includes:

- Continuous analysis of oscillations
- Impact assessment of
- Data-Storage

The key objectives of Work Package 5 are to successfully achieve the following:

- Internal Knowledge dissemination
- External Knowledge dissemination
- Influencing and updating policies and standards
- Public Engagement

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

n/a

## Success Criteria

n/a

**Project Partners and External Funding**

n/a

**Potential for New Learning**

n/a

**Scale of Project**

n/a

**Geographical Area**

**Revenue Allowed for the RIIO Settlement**

**Indicative Total NIA Project 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)

n/a

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

n/a

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

n/a

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

n/a

### 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)**

n/a

- Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

**Is the default IPR position being applied?**

- Yes

**Please demonstrate how the learning from the project can be successfully disseminated to Network Licensees and other interested parties.**

**Please describe how many potential constraints or costs caused, or resulting from the imposed IPR arrangements.<**

**Please justify why the proposed IPR arrangements provide value for money for customers.**

## 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