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_NGET0085

Project Registration

Project Title

UK Regional Wind: Extreme behaviour and predictability

Project Reference Number

NIA_NGET0085

Project Licensee(s)

National Energy System Operator

Project Start

August 2013

Project Duration

2 years and 1 month

Nominated Project Contact(s)

David Lenaghan

Project Budget

£253,300.00

Summary

The scope of the project is to examine the wind's properties over spatial scales between the two existing projects (i.e., bigger than a single wind-farm but smaller than a 250x250km area) and, secondly, to understand how well operational weather forecast models are able to predict these events.

Third Party Collaborators

University of Reading

Nominated Contact Email Address(es)

box.so.innovation@nationalgrid.com

Problem Being Solved

Wind generation plays an increasing role in the energy-mix of Great Britain. Wind is, however, intermittent and, in many cases, difficult to predict. This create significant costs for National Grid in terms of system management and reserve setting. With the increasing levels of renewable wind generation (22 GW expected by 2020) the cost of these errors could be expected to increase substantially. The ability to improve the accuracy of wind-power forecasts and also have confidence in the forecast error will lead to significant reductions in the number of forecasting errors and the associated costs.

Method(s)

Research

Three classes of wind events have been identified as crucial for reducing the cost (and increasing the security) of power-system management and operation, this includes

1. Rapid changes in wind-speed affecting power output (ramping)
2. Persistent low wind producing low power output (low wind conditions)
3. Very-high wind events (exceeding wind-turbine safety cut-out)

This project proposes to investigate the wind's properties over spatial scales between

Scope

The scope of the project is to examine the wind's properties over spatial scales between the two existing projects (i.e., bigger than a single wind-farm but smaller than a 250x250km area) and, secondly, to understand how well operational weather forecast models are able to predict these events.

Objective(s)

The objectives of the project are based on five work packages; this includes

- WP 1 – Obtaining observational data and robustness testing of "UK wide wind" results
- WP 2 – Predictability: statistical
- WP 3 – Predictability: case studies
- WP 4 – "Worst case" scenarios at sub-regional level
- WP 5 – Dissemination and identification of further research needs

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The success criteria of this project will be the submission of an academic report providing recommendations to National Grid of improving the process of predicting extreme weather events and understanding the trend once the start of an event is detected.

Project Partners and External Funding

University of Reading

No external funding

Potential for New Learning

New learning will be generated from an improved understanding of extreme wind events and the response to these events that occur during the project's duration.

Scale of Project

The project will be limited in scale to lab-based studies and desktop investigation.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

The project can be applied globally.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

The total NIA project expenditure will be £253,300

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)

Approximately 1 GW of wind-power forecast error (approximately 15-20% of current installed wind capacity) that persists for around 12 hours can lead to additional costs to NG of between £100k and £400k. This project will manage this financial impact.

Please provide a calculation of the expected benefits the Solution

Not required for research projects.

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

The method is relevant and replicable to all Network Licensees to manage and respond to extreme weather events.

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

The cost of rolling out the method will be dependant on the findings of the research and could involve further demonstration and development.

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

All outcomes and lessons following the implementation of the project will be disseminated through the National Grid Innovation Strategy website, the ENA website, at the annual NIA conference and in the final year report.

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

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.

Given a review of all companies' IFI reports, the project engineer and academics confirm to the best of their knowledge that this does not produce any duplication of innovation work.

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