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

Feb 2014

Project Reference Number

NIA_NGET0058

Project Registration

Project Title

Scalable Computational Tools and Infrastrucutre for Interoperable and Secure Control of Power System

Project Reference Number

NIA_NGET0058

Project Licensee(s)

National Energy System Operator

Project Start

October 2012

Project Duration

3 years and 7 months

Nominated Project Contact(s)

David Lenaghan

Project Budget

£143,000.00

Summary

The scope of the project will involve Investigating techniques to improve the computational speed, operation and modelling of stability control methods such as Real-time Digital Simulation (RTDS) and other applications using novel scalable ICT tools and infrastructure such as trusted cloud computing platforms in the network. Objective(s)

Third Party Collaborators

Brunel University of London

Royal Academy of Engineering

Nominated Contact Email Address(es)

box.so.innovation@nationalgrid.com

Problem Being Solved

It is widely accepted that as new electricity operational strategy develops pointing the way forward to 2020 and beyond, the importance of information management and in particular, the linking of business processes to information use cases, will be more critical to maintaining control of the electricity grid.

Changes to current system architectures will also be necessary to cope with the level of data exchanges and computational

demands. Significant changes will be required with regard to interoperable and scalable operational modelling and analysis procedures in order to secure such future transmission networks.

Currently, researchers wishing for high performance Information Communicaton Technology infrastructure often have their choice of platform constrained beyond the optimal balance among different types of requirements: factors such as scalability, availability to collaborators, usability or policy and legal requirements around their data security are often inadequately addressed.

Method(s)

Research

This project will compare commercially available cloud infrastructures with emerging Trusted Cloud Computing technologies and review data security and provenance requirements of these multi-user inter-institutional standards and platforms.

Develop and deploy emerging industry standards such as Common Information Model (CIM) on high performance computational platforms to fully enable interoperable power system data exchange both internally and externally to electrical power network operators. This processing capability could help to deliver

- Interfacing between operational applications at the transmission and distribution network level between Energy Management System (EMS) and Data Historian and between EMS (including future Wide Area Monitoring Systems (WAMS) and Energy Balancing Systems
- Assess a novel industry scale trusted cloud computing platform for secure and scalable data processing and information exchange
- Secure and scalable data exchange between European Transmission System Operators;
- Secure and scalable data exchange between Distribution Network Operators and Transmission Network Operators to extend real-time large-scale power system model depth.

Scope

The scope of the project will involved Investigating techniques to improve the computational speed, operation and modelling of stability control methods such as Real-time Digital Simulation (RTDS) and other applications using novel scalable ICT tools and infrastructure such as trusted cloud computing platforms in the network.

Objective(s)

The objectives of this project include the following research deliverables

- Investigation, development and deployment of emerging industry standards such as Common Information Model (CIM) on high performance computational platforms to fully enable interoperable power system data exchange both internally and externally to electrical power network operators, such as National Grid.
- Investigation and recommendation for optimal representation of distribution networks in GBSO operational planning and control processes.
- Secure and scalable sharing of model structures and data exchange between Distribution Network Operators and the GBSO to extend real-time large-scale power system model depth to the level recommended above.
- Interfacing between operational applications at the transmission or distribution network level, for example between GBSO and DNO operational planning systems.
- Remote NG access to assess a novel industry scale trusted cloud computing platform for secure and scalable data processing and information exchange

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The success of the project will be based on the following criteria

The publication of the findings from the project with feasible business recommendations and improvements from the research components being identified.

Project Partners and External Funding

Brunel University

Brunel University will support co-funding of this project from internal resources and will also seek further support from the Royal

Academy of Engineering.

Potential for New Learning

There is opportunity for key learning as the project will develop a clearer understanding of emerging computational tools and infrastructure technologies which can help develop measures for securing the network.

Scale of Project

The project will be a desktop study..

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

The research will be compiled at Brunel University

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

The NIA project expenditure is £143,000

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 project will address the challenge of secure and standardised power system information exchange both internally and externally to National Grid. Wide Area Monitoring Systems are in the early stages of development and as such any tool which facilitates improved visualisation and observability could potentially reduce system constraint margins or a stability event occurring. Typical constraint costs associated with these events will be in excess of £100k per event rising to £1m for a wider scale effect.

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

As all Network Licensees could benefit from understanding emerging computational tools and infrastructure, the method is replicable, and can be applied, to all.

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

An implementation plan and costs will evolve through the finding and recommendations identified throughout the time of this project.

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 expected learning from this project, developing key knowledge and learning from emerging computational tools and infrastructure technologies, can help develop measures of securing the network and can be applied to all relevant Network Licensees.

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.

Following a review of all companies IFI reports and registered NIA projects this project does not duplicate other innovation work funded through these routes.

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