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## NIA Project Registration and PEA Document

### Date of Submission

Jan 2014

### Project Reference Number

NIA\_NGET0127

## Project Registration

### Project Title

EPRI Research Collaboration on Information and Communication Technology.

### Project Reference Number

NIA\_NGET0127

### Project Licensee(s)

National Grid Electricity System Operator

### Project Start

April 2013

### Project Duration

1 year and 10 months

### Nominated Project Contact(s)

Glyn Kirkland

### Project Budget

£2,364,209.00

## Summary

IntelliGrid Coordination, Analysis and Technology Transfer EPRI Project PS161A: The following sub tasks are being conducted under this project:

- Smart Grid Standards and Communication Technology Tracking and Analysis
- Realized Impact and Benefits from Smart Deployments
- Utility Enterprise Architecture.

Information and Communication Technology for Smart Transmission Systems EPRI Project PS161B: The following sub tasks are being conducted under this project:

- Common Information Model (CIM) for Transmission - Development and Implementation
- Synchrophasor Communication Infrastructure and Data Management
- Integration of Internal and External Data Sources to Support Transmission Operations, Planning and Maintenance.

### Nominated Contact Email Address(es)

box.so.innovation@nationalgrid.com

## Problem Being Solved

The Worldwide electricity industry recognises that there are parallel challenges within the field of electricity transmission which are more economically investigated and addressed through collaborative learning and knowledge generation among key industry stakeholders. The Electric Power Research Institution (EPRI), with its wide international membership, takes a key role in determining and delivering the most impactful R&D projects. This portfolio of work is focused on Information and Communication Technology (ICT)

which address key aspects of National Grid's Innovation Strategy.

Utilities are increasingly deploying monitoring, communications, computing, and information technologies to enable grid modernization applications such as wide area monitoring and control, integration of bulk or distributed renewable generation, distribution automation, and demand response. Companies face significant challenges when deploying these technologies, including

- selecting the technologies that best meet current and future business needs and regulatory requirements, while minimizing the risk of early obsolescence and vendor lock-in;
- creating an overall architecture that integrates the many intelligent devices, communications networks, and enterprise systems to leverage resources and provide information to all users;
- mining and managing the tremendous amount of data that is generated, converting the data into actionable information, and effectively presenting the information to the people who need to take action;
- managing a growing network of intelligent devices that have different capabilities and use different protocols and data formats in a way that optimizes performance; and
- ensuring that the workforce has the skills necessary to design, operate, and maintain equipment and systems that use new technologies

## Method(s)

### Research

EPRI is a non-profit organization which facilitates a variety of research projects relating to ICT within the electricity industry. These collaborative projects bring together scientists, engineers and academic experts in the industry to help assess recognised challenges within the field. EPRI's approach in managing collaborative projects is beneficial to provide National Grid with valuable information, learning and knowledge which would be more expensive to formulate on an individual basis.

On an annual basis we work with EPRI to select a portfolio of projects which is made available to all collaborators; this annual portfolio review includes an overview of the project's research value, the approach and alignment of objectives with the needs of and priorities for the GB Electricity Transmission Network. Each project that is chosen for National Grid to join is reviewed and agreed through our governance processes with authority for sanctioning innovation projects within the Company.

Of the 4 Information and Communication Technology projects put forward by EPRI members for the 2013/14 programme, National Grid has identified 2 of particular value to the GB Transmission system.

EPRI Project PS161A: Intelligrid Coordination, Analysis and Technology Transfer, and

EPRI Project PS161B: Information and Communications Technology for Smart Transmission Systems

The approach for providing value in the ICT program involves multiple strategies:

- Tracking and Analysis—Build on IntelliGrid staff involvement in industry-related activities to provide insight and analysis.
- Industry Best Practices and Lessons Learned—Document utility experiences as they implement early-generation technologies and applications and core grid-modernisation technologies. Experiences are captured through utility immersions, interviews and case studies.
- Industry Leadership—Help advance the industry toward open and interoperable devices and systems.
- Laboratory Testing—Conduct work in EPRI laboratories that enables detailed assessment of emerging standards, equipment and software performance and communications architectures.
- Field Demonstrations—Perform full-scale deployments of emerging standards and communications technologies.
- Technology Transfer—Utilise a variety of approaches to share research results, including technical reports, white papers, newsletters, webcasts, and workshops.

## Scope

IntelliGrid Coordination, Analysis and Technology Transfer EPRI Project PS161A: The following sub tasks are being conducted under this project:

- Smart Grid Standards and Communication Technology Tracking and Analysis
- Realized Impact and Benefits from Smart Deployments
- Utility Enterprise Architecture.

Information and Communication Technology for Smart Transmission Systems EPRI Project PS161B: The following sub tasks are being conducted under this project:

- Common Information Model (CIM) for Transmission - Development and Implementation
- Synchrophasor Communication Infrastructure and Data Management
- Integration of Internal and External Data Sources to Support Transmission Operations, Planning and Maintenance.

For more information relating to these projects please use the following link: <http://portfolio.epri.com/ProgramTab.aspx?sld=PDU&rlid=277&pld=7537>

## Objective(s)

The overarching objective of this programme of research is to facilitate the integration of smarter network management and monitoring devices in a way that doesn't compromise security at best value.

### **IntelliGrid Coordination, Analysis and Technology Transfer EPRI Project PS161A:**

#### Smart Grid Standards and Communication Technology Tracking and Analysis:

Track industry and government activities relating to smart grid interoperability and communications standards, and provide an analysis of how these activities could impact utilities and how they can best prepare;

Track communications technology advances and their impact on utility applications; and

Contribute EPRI R&D results to relevant industry and government efforts, such as the NIST Smart Grid Interoperability Panel (SGIP), Open SG, and standards development activities.

#### Realized Impact and Benefits from Smart Deployments

To work closely with utilities that have deployed smart grid technologies or applications and capture the actual costs and realized impacts and benefits of the deployment.

#### Utility Enterprise Architecture

To capture best practices from utilities that have been successful with EA (Enterprise Architecture) and apply that learning to utilities that are just getting started to accelerate the adoption and benefits of EA.

### **Information and Communication Technology for Smart Transmission Systems EPRI Project PS161B:**

#### Common Information Model (CIM) for Transmission - Development and Implementation

Develop requirements and explore solutions for integrating data and applications that are key to effective operation of future transmission systems

#### Synchrophasor Communication Infrastructure and Data Management

Monitor and assess the adequacy of current communications infrastructure

To investigate data management issues that may arise

#### Integration of Internal and External Data Sources to Support Transmission Operations, Planning and Maintenance

Identify benefits and costs of implementing each use case investigated, including any effort to restructure the data to accommodate the geospatial information linkages

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

n/a

## Success Criteria

Specific deliverables for the whole ICT programme include

- newsletters that track and provide analysis on the most significant developments in interoperability and communications standards;
- information on the actual costs and realized impacts of advanced metering deployments;
- industry best practices in Enterprise Architecture;

- development and harmonization of the Common Information Model as well as educational material and implementation strategies of the key smart grid standards;
- applications based on the CIM such as the Network Model Manager, Field Force Data Visualization, and Standards-Based Data Integration;
- development of an overall plan to create an open and interoperable AMI system; and
- development of tools to help members improve the quality of Geospatial Information System (GIS) data.

The outcomes from both projects are shared during the annual EPRI Dissemination Event and by National Grid through the ENA website.

## Project Partners and External Funding

Each project facilitated by EPRI is funded through collaborators, including National Grid, that contribute to the development of the project portfolio and then express specific interest in being involved in a project once the portfolio is decided. Total external funding to the value of £2.2 million has been provided by other collaborators involved in the IntelliGrid Coordination, Analysis and Technology Transfer and Information and Communication Technology for Smart Transmission Systems projects.

## Potential for New Learning

EPRI's varied portfolio enables National Grid to select appropriate R & D projects that align to delivering benefits to consumers covering therefore objectives relating to ICT. Each project provides opportunities for extensive learning and knowledge generation through collaboration which would not be economically feasible if carried out independently.

The IntelliGrid Coordination, Analysis and Technology Transfer Project PS161A will create new learning opportunities relating to the operability and reliability of the current and future smart grid infrastructure and applications

The Information and Communication Technology for Smart Transmission Systems EPRI Project PS161B will develop understanding of communication required for real-time applications and improvements required to the existing communication systems and development of universal, advanced transmission applications.

## Scale of Project

Both PS161A and PS161B are predominantly laboratory or desk based projects and as such there is no scope to reduce the scale of the projects any further.

## Technology Readiness at Start

TRL2 Invention and Research

## Technology Readiness at End

TRL4 Bench Scale Research

## Geographical Area

The research undertaken in the EPRI ICT programme is predominantly carried out in the UK and the US, although the programme also reviews the latest research from across the world.

## Revenue Allowed for the RIIO Settlement

None

## Indicative Total NIA Project Expenditure

The total NIA expenditure is £171,217

## 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)

Each project will have different financial savings based on the outcomes and potential benefits gained. Each EPRI programme that National Grid joins has been through two stages of review that consider the potential to deliver financial benefits. In the first instance, within EPRI's governance, the Research Advisory Committee provides guidance on policies and issues that impact the power industry to inform the content of the research programmes. Within National Grid, the Technical Leader for each aspect of the GB Transmission Network undertakes a review of the proposed EPRI programme relevant to their technical expertise and responsibilities and evaluates which provide potential value from a GB perspective as part of an annual review of which programmes to participate in.

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

This is not required for a research project.

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

The scope and methods being addressed by IntelliGrid Coordination, Analysis and Technology Transfer project and Information and Communication Technology for Smart Transmission Systems project are applicable to the information and communication infrastructure of the whole of the Transmission System.

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

The direct cost of making a policy or procedure change could range from as little as ten thousand to hundreds of thousands of pounds depending on the complexity of the change implications. The wider cost implications arising from such changes will be dependent on the specific outcomes generated from the project and typically will be subject to further stages of demonstration prior to roll out. Further information regarding roll out costs can be provided prior to demonstration stage.

### 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 of the GB Electricity Networks are increasingly deploying monitoring, communications, computing, and information technologies to enable grid modernization applications such as wide area monitoring and control, integration of bulk or distributed renewable generation, distribution automation, and demand response. The learning from the EPRI ICT Project 161A will be relevant to all network Licensees. Project 161B specifically addresses ICT developments for Transmission Systems. EPRI run a separate project under the same programme for Smart Distribution Systems.

#### 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.

By participating in collaborative projects through EPRI National Grid can ensure that unnecessary duplication with other projects under NIA is avoided.

#### 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