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

Nov 2013

Project Reference Number

NIA_NGET0110

Project Registration

Project Title

Electricity Demand Archetype Model 2

Project Reference Number

NIA_NGET0110

Project Licensee(s)

National Energy System Operator

Project Start

November 2013

Project Duration

1 year and 1 month

Nominated Project Contact(s)

Bernie Dolan

Project Budget

£299,000.00

Summary

The EDAM2 project will build on the algorithms already developed for EDAM1 (Residential demand only) and the EST (Energy Saving Trust)/UCL (University College London) FALCON energy demand model (Residential, non-domestic and generation embedded at lower than NG voltage).

It will include:

- A review of potential changes to non-domestic demand due to technology adoption (to complement the existing view of Residential demand)
- An investigation into the impacts of weather changes on demand across both residential and non-domestic sectors
- A forecast of embedded generation supply and demand

Note: Falcon is a LCNF project being conducted by EST/UCL in collaboration with WPD (Western Power Distribution).

Third Party Collaborators

University College London

Energy Saving Trust

Nominated Contact Email Address(es)

box.so.innovation@nationalgrid.com

Problem Being Solved

The GB Electricity System Operator must continually match generation to demand. To do this, National Grid needs accurate forecasts of both electricity demand, and the rate of change of that demand, during the course of a day.

Current processes make use of historic records. To predict the demand for the following day the System Operator will refer to records for a similar day from the past held in a database containing several years of data. This will then be used as a starting point for the forecast but will have added to it special events (such as TV pick-ups etc.).

It is widely expected that that the behavior of electricity demand in 2020 will be very different from the past. The adoption of electric vehicles, solar panels, heat pumps etc will change the shape of the demand profile.

The Energy Savings Trust (EST) has developed a model of domestic demand (EDAM1) which allows users to apply different levels of technology adoption and to generate a new demand profile.

EDAM2 will extend this model to include industrial and commercial demand to obtain a total daily profile.

Method(s)

Modelling and research to mirror the EDAM1 project within an industrial and commercial context.

Scope

The EDAM2 project will build on the algorithms already developed for EDAM1 (Residential demand only) and the EST (Energy Saving Trust)/UCL (University College London) Falcon* energy demand model (Residential, non-domestic and generation embedded at lower than NG voltage).

It will include:

A review of potential changes to non-domestic demand due to technology adoption (to complement the existing view of Residential demand)

An investigation into the impacts of weather changes on demand across both residential and non-domestic sectors

A forecast of embedded generation supply and demand

* Falcon is a LCNF project being conducted by EST/UCL in collaboration with WPD (Western Power Distribution).

Objective(s)

The key objective is to develop a model that will enable the GB System Operator to produce more realistic demand forecasts in the future (up to 2020).

In addition to use this information to stress test our business processes and to assess their viability for future operation by having a better understanding of the rate of change of demand during the day at key moments

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

A model which can be shown to replicate current demand profiles (i.e. with zero new technology uptake) at National level.

Future demand profiles with fully understood assumptions that can be traced to the final results generated.

A tool that allows data to be easily extracted and used in other areas.

Project Partners and External Funding

Energy Saving Trust (EST) external funding £nil, and

University College London (UCL) external funding £nil

Potential for New Learning

The EDAM2 project will provide 2 specific areas of new learning :

The potential impact that changes in energy technology in the non residential sector will have on daily electricity demand, and

How demand will vary during the day.

Scale of Project

The project comprises desktop study and modelling.

The project will take a two phase approach. A prototype model will be developed, looking at just national demand, and evaluated. If successful the work will continue to a second stage where demand is broken down into geographic areas.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

The project comprises desktop study and modelling. The demand forecast model will cover the whole of GB demand but will also look at individual geographical areas

Revenue Allowed for the RIIO Settlement

Zero

Indicative Total NIA Project Expenditure

299,000

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)

If we continue to assume that daily non residential demand profiles will be unchanged by technology and we either over estimate or underestimate demand in 2020 our balancing costs will be affected.

As already published, National Grid are predicting that the cost of Operating Margin will grow from £102M (2010/11) to £565M (2020/21) assuming hourly variation in interconnectors or even as high as £945M (2020/21) if interconnector variation is at the demand peaks.

Even a small insight from this work could help to mitigate these costs.

Please provide a calculation of the expected benefits the Solution

Not required. EDAM2 is a research project.

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

The output from the project will be a model at national level. In the second phase (developing the model at a DNO level) it will be applicable to all 14 DNOs.

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

The output from this project will be a model that applies to whole system demand.

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)

The EDAM2 project will meet the reliability, system operability and environmental outputs from National Grid's Innovation Strategy. The reliability and system operability of the network will improve due to a greater understanding of commercial demand and a study of the potential impacts on demand in the future.

☑ 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.

This project will concentrate on how daily demand variation will affect the system operator business processes Other work that we are aware of looks at demand from the point of view of network reinforcement.

EDAM2 will complement these other projects but has a different use

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