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 2016

Project Reference Number

NIA_WWU_041

Project Registration

Project Title

Flexible Energy Model

Project Reference Number

NIA_WWU_041

Project Licensee(s)

Wales & West Utilities

Project Start

November 2016

Project Duration

0 years and 4 months

Nominated Project Contact(s)

Chris Clarke – Director of Asset Management, Safety & Environment

Project Budget

£26,667.00

Summary

The revised model will be constructed in Microsoft Excel to allow for future flexibility and modifications. Specific tasks include:

- Re-structure the model to make it simpler and more flexible. The core calculation components where suitable will be taken from the existing model and incorporated into a new more streamlined and robust version. All areas of manual intervention in the running of the model (for example copying data from one place to another) will be removed with automated actions wherever possible. Errors identified in the review will be corrected or overwritten in new code.
- Interface. A simple interface will be created which collate all the inputs and operations required by a user, so that the operation is much simpler and reliable. This will all be Excel based and make use of standard Excel functionality (colours, drop down boxes, etc). The principle throughput will be that any user input will only be required once, and fed throughout the model.
- Outputs. An outputs section will be created which collates and presents all the key outputs clearly for the scenario set up and run in the model. We propose that the model will run two scenarios at once – the baseline, and one other user-defined.
- Documentation. Where necessary, simple user instructions will be included to guide the user through the model, and understand the range of inputs and outputs.
- Scenarios. The model will be set-up so that a number of scenarios can be defined, and simply selected using a single scenario drop down list. This allows for quick comparison of different scenarios (for example, different energy supply mixes)
- Functionality. Some basic functionality will be added:
  - Efficiency improvements on the baseline profile. This will allow the baseline profile to be adjusted to allow simulation of efficiency improvements. We propose this uses monthly adjustment factors to allow for the difference between heat and hot water improvements.
  - Baseline efficiency inclusion. This will include the impact of baseline heating efficiency in the demand calculations.
  - Alternative technology assumptions. This will include the ability to allow a proportion of the load to be met by alternative technologies (such as heat pumps) to provide demand side efficiency savings.
  - Testing. A series of tests will be run (including comparison of different scenarios with the existing model and results) to ensure that errors are minimised.
  - Training. An afternoon training session with representatives of WWU.

Nominated Contact Email Address(es)

innovation@wwutilities.co.uk

Problem Being Solved

We have conducted extensive analysis of energy balances in our work using the Cornwall energy model. This allows examination of hourly heat, lighting and power loads, and how they are met using baseline energy supplies of gas and electricity from a range of sources. The model then allows assessment of a range of alternative supply scenarios to calculate the costs and benefits of alternative supply scenarios and understand the value of the gas network as an energy storage mechanism.

The existing model has been constructed for the purpose of bespoke analysis and reporting. The model has not been developed to allow wider scenario analysis and is not suited for use by our employees for further work. A review of the model by Delta Energy and Environment demonstrated that the model is fit for purpose for the current reporting, but requires improvement for us to be able to simulate a wider range of scenarios, and update the model in the future as specific requirements are made. This future analysis is central to us providing leading industry insight into future energy scenarios.

Method(s)

It is proposed that the existing model is improved to allow more flexible use by the energy sector. These improvements include:
- Some re-structuring to allow greater flexibility in future analysis with modifications as and when required.
- Inclusion of simple interfaces to allow use of the model by ourselves and others, providing greater in-house analysis capability and reducing future analysis costs.
- Inclusion of some simple functionality to allow a greater range of scenarios to be modelled.

Scope

The revised model will be constructed in Microsoft Excel to allow for future flexibility and modifications. Specific tasks include:

- Re-structure the model to make it simpler and more flexible. The core calculation components where suitable will be taken from the existing model and incorporated into a new more streamlined and robust version. All areas of manual intervention in the running of the model (for example copying data from one place to another) will be removed with automated actions wherever possible. Errors identified in the review will be corrected or overwritten in new code.
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- Testing. A series of tests will be run (including comparison of different scenarios with the existing model and results) to ensure that errors are minimised.
- Training. An afternoon training session with representatives of WWU.

Objective(s)

The objective will be to provide a simple, user-friendly, and flexible energy model which can be used by our employees and other bodies to allow assessment of energy demands across a specific area on an hourly basis. This should be capable of modelling a set of realistic energy load and energy supply profiles to examine the coincidence between these, to estimate energy storage requirements. Key outputs will be in the form of customer energy costs to understand the impact that different energy supply scenarios

will have on customer energy bills.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The following success criteria are proposed:

- The model should replicate the outputs of the existing (when final corrections are made) modelling and reporting.
- The model should be easily understood and capable of use by our employees following guidance and training by Delta Energy & Environment.
- The model should provide sufficiency functionality to allow a range of energy load and supply profiles to be met.
- The model should be simply structured to allow future upgrades to be made by WWU and others.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project will aim to allow the UK Gas Networks to be in a position to plan and deliver any future strategic opportunities to help the UK meet the challenges of the energy trilemma and bring benefits to a range of stakeholders.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

The information used for the development of the model will be from Wales & West geographical operating area but will be adaptable for other geographies.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

External cost - £20,000

Maximum internal cost – £6,667

Total NIA project expenditure - £26,667

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)

This research project will provide long term savings to GB customers by providing better information on which to base long term planning decision.

This work will support the UK's strategic aim to decarbonise energy over the next 40 years.

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

This is not required for a research project

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

The project outcomes could illustrate or demonstrate the need for further research and could influence future energy policy.

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

This project will allow appropriate whole life cost decisions in connection with gas asset investment in UK; the operating period of that asset is a key factor within the appraisal. For example, if an asset is to be operated for a longer period of time, then replacing aging iron mains to reduce annual operating costs, may be the best whole life cost solution for the Network.

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.

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