NIA Project Registration and PEA Document

Date of Submission

Oct 2017

Project Reference Number

NIA_WWU_044

Project Registration

Project Title

Gas Demand Forecasting

Project Reference Number

NIA_WWU_044

Project Licensee(s)

Wales & West Utilities

Project Start

October 2017

Project Duration

0 years and 3 months

Nominated Project Contact(s)

Bethan Winter - Bethan.Winter@wwutilities.co.uk

Project Budget

£36,667.00

Summary

- Location: All of WWU can be considered, one of the review areas is to consider whether sub-LDZ forecasting would provide additional value vs the additional effort / cost

- A range of new customer types / behaviours to be considered including, power generation, CHP, industrial Review of existing UK future of gas scenarios and storage solutions

- Assessment of existing as well as new/alternative WWU forecasting models

- Report on implications of findings, presentation and recommendation for future developments

Nominated Contact Email Address(es)

innovation@wwutilities.co.uk

Problem Being Solved

Scenarios being developed across the GB Energy Industry highlight significant uncertainty in the quantity and types of energy likely to be used in the future.

A consistent message is that future gas customer usage patterns will be increasingly difficult to predict and will require the gas networks to provide more flexibility in response to more variable customer demands.

Examples include:

- Increase use of Gas Power Stations responding to the intermittency of renewable generation such as solar and wind and / or sudden increased generation requirements to support the charging of electric vehicles

- New gas usage patterns in homes with hybrid heating systems which may be optimised to use air source heat pumps where renewable electricity is available, but which would revert to gas heating when green power is unavailable or cooler temperatures mean

that air source heat pumps are less efficient

- Use of gas for vehicles, where there is currently very little good data on usage patterns and arrangements are under development.

- Increased connections of combined heat and power units where customers are able to support the power networks through engaging with electricity balancing products which incentivise customers to limit their use of power at peak times. We anticipate increased use of the gas network to power on-site generation in response

- Forecasting at a more local level as different areas / cities develop independent approaches to delivering lower carbon solutions

Legacy gas industry long term forecasting does not consider the variety of customer types we are now connecting to our networks. Demand variability was generally attributed to domestic loads with peaks at breakfast and tea-time. Industrial and power generation loads were assumed to have a more consistent profile, with less variability.

WWU has recently developed an in-house investment decision support tool that allows us to assess the impact of changing customer requirements on our network, when considering maximum load, minimum load and likely hourly profiles. Minimum load is more important than it has been historically in order to help us understand how to manage green gas entry onto our network. There will be a direct impact on the network, by allowing WWU to assess how these changes are able to react in a flexible way thus minimising future investment.

The model has been externally validated and is providing useful information. However, good input data on the long term volume and characteristics of different load types, which are required for the model have been difficult to obtain, especially at a local level.

Our proposal is to undertake a 3 stage project to review and improve our long term forecasting processes in a way that will support existing needs and provide data to support the use of our new investment model.

This PEA document is in relation to stage 1, however detail on the 3 stages are provided below.

Stage 1: Gap analysis. Understanding the prioritisation of gaps (i.e. scale of impact on gas demand forecasts) and the effort required to address gaps (i.e. which gaps are short term vs long term priorities.)

Stage 2: Scoping study. After the gap analysis, a scoping study would be carried out, which will be used to research and identify suitable data sets, methodologies and processes for addressing gaps. This will include reviewing of existing in-house data sets and models. The conclusion of this study will be a list of recommended actions, mapped onto a timeline with an indication of the effort required per action. We will focus this time line on two key periods: leading up to March 2018; 1 – 2 years after this.

Stage 3: Addressing the actions prioritised. A detailed scope of work / proposal will likely be needed for each identified action from stage 2. Scopes of work would then be proposed following the conclusion of stage 2, but if critical actions are identified early in stage 2, these could be done earlier for these.

Method(s)

The first stage will consist of a gap analysis, focusing on a number of 'gaps' including those given as examples above. This gap analysis will address the following points for each of the gaps:

1. **Quantifying the impact of the 'gap' on future gas demand** – a high level sensitivity analysis will be carried out to understand if addressing a gap (i.e. adding new functionality to models, adding new technologies to models, refining the data inputs, etc.) significantly increases or decreases gas demand (annual and peak) in the future. This will be conducted through a number of simple quantitative calculation assessments, or where preferable, qualitative assessments for more process related issues.

2. **Identifying the likelihood of a gap actually occurring** – some gaps are more likely to occur than others (e.g. hybrid heat pumps are likely to come to market in the next 5 years; but will we see significant uptake of CNG transport by 2050?)Key timeframes will be identified which need to be considered, then assess how the gaps are likely to link with these periods, and therefore which gaps are more likely than others to be realised. In the scoping study, those gaps that are more likely to occur, and that have a significant impact on future gas demand, should be prioritised.

3. **Effort required to plug gaps** – for each of the gaps above, a **very high level** scope will be developed to provide the estimated effort required to address each gap in terms of developing new models or tools. Some gaps may be addressable in a few months, while others could take 1+ years to address. Understanding the effort required for each task will enable us to map out the gaps that should be prioritised in the shorter term versus longer term.

4. **Prioritisation of gaps / recommendations** the outputs from tasks 1 – 3 of stage 1 will be mapped out to produce a prioritisation matrix. This will allow all the gaps to be compared using a number of simple metrics and prioritised.

Scope

- Location: All of WWU can be considered, one of the review areas is to consider whether sub-LDZ forecasting would provide additional value vs the additional effort / cost

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Objective(s)

This project proposes to:

1. Produce recommendations of loads by type, which have been deemed as having a material impact on future network design and operation
2. Provide recommendations and a prioritisation matrix to inform the next stages of work in order that gaps for the highest impact site types are considered first
3. Consider whether the existing forecasting models at WWU should be combined and / or developed further or whether it is appropriate that they should be kept separate

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Produce an evidence based assessment of WWU forecasting capability and recommendations for any material improvements that are required to feed stages 2 and 3.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

This project is done at the relevant scale which is a desk top study to affect follow on stages.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

Stage 1 will focus on the WWU geography

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

WWU External Costs: £27,500

WWU Internal Costs: £9,167

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 savings to GB customers by providing better long term planning decisions. Optimising capacity management and network design through use of improved forecasts has the potential to reduce the risk of unnecessary investment.

Please provide a calculation of the expected benefits the Solution

Research Project

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

Research Project

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

Research 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

This modelling together with other gas futures research and the WWU investment model will provide the networks with a holistic view and impact assessment allowing them to better predict future requirements for their Gas Networks allowing networks to plan future investment wisely. This work will support the UK's strategic aim to allow use of smart technologies to help decarbonise energy over the next 40 years.

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