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

May 2015

Project Reference Number

NIA_WWU_022

Project Registration

Project Title

Gas CHP Impact Study

Project Reference Number

NIA_WWU_022

Project Licensee(s)

Wales & West Utilities

Project Start

May 2015

Project Duration

1 year and 10 months

Nominated Project Contact(s)

NGN- Peter Thomson (Project Manager) WWU- Ian Marshall (Project Manager) – (lead GDN) Element Energy (EE) – Ian Walker

Project Budget

£116,084.00

Summary

This study will be run across two stages;

Stage 1 – With regard to gas-CHP technologies the study will consider the business models available to GDNs only at a high-level, in order to identify the value streams that GDNs could access to varying extents through different forms of engagement.

Stage 2 - With regard to gas-CHP technologies the study will consider the potential levels of engagement for GDNs and appropriate commercial arrangements in greater detail, including consultation with the GDN partners (as well as technology providers) in order to understand the feasibility of different models and how they would impact on GDN businesses.

Nominated Contact Email Address(es)

innovation@wwutilities.co.uk

Problem Being Solved

The potential market for gas Combined Heat & Power (CHP) is growing, particularly as new technologies such as fuel cell CHP become closer to commercialization. Currently there are a number of gas CHP technology types, across a wide range of scales, each with differing characteristics and relevance to different applications & markets. Depending on the application and system scale, they will connect to different parts of the gas network and so create different issues for network operators such as pressure drops, increased energy losses and the need to supply increased ramp rates.

To date there has been little research on the technical and commercial implications of more widespread deployment of these technologies on the gas distribution networks. GDNs need to understand these potential impacts on network operation in order to devise appropriate strategies for engaging with the technology. Equally the GDNs need to appreciate the potential benefits that can be achieved with greater deployment of these devices on their networks.

Method(s)

The project will be split into two stages –

Stage 1 will provide a high level assessment of the scale of impacts of deployment of gas CHP, across a range of sizes, markets and different technology types, the potential benefits to GDNs and barriers to accessing the benefits. The potential models for GDN engagement will be considered at high-level, in order to identify and quantify the value streams arising. Stage 1 will produce a set of outline recommendations for GDN engagement with the most relevant technologies and also identify areas of focus for Stage 2.

S**tage 2** will involve significantly more in-depth analysis of the technologies highlighted as being the most relevant to GDNs in Phase 1 and their interaction with distribution networks (including some network modelling where appropriate). It will provide an understanding of the system benefits of mCHP deployment and the financial value that could be derived and provide a limited view of the impact of this deployment on networks. Also included is a consultation exercise with stakeholders (to include at least the Gas distribution Network (GDN's), mCHP manufacturers and electricity network operators) that will identify system benefits and innovative business models to overcome societal, technological and regulatory barriers to the deployment of mCHP.

Scope

This study will be run across two stages :

Stage 1 – With regard to gas-CHP technologies the study will consider the business models available to GDNs only at a high-level, in order to identify the value streams that GDNs could access to varying extents through different forms of engagement.

Stage 2 - With regard to gas-CHP technologies the study will consider the potential levels of engagement for GDNs and appropriate commercial arrangements in greater detail, including consultation with the GDN partners (as well as technology providers) in order to understand the feasibility of different models and how they would impact on GDN businesses.

Objective(s)

The objective of this Project is to undertake the following tasks :–

Stage 1

- Characterisation of different gas-CHP technologies by size, type, heat: power ratio, gas pressure/ramp rate/volume requirements, and by their typical applications / markets (domestic and non-domestic), including consideration of diurnal operating profiles, seasonality, etc.
- Identification of commercial, technical and regulatory barriers to the widespread deployment of each technology, or potential negative impacts on GDNs – identified based on known technology characteristics and gas network operating parameters
- High-level assessment of the relevant business models for GDN engagement with gas CHP and the potential benefits available to GDNs from the widespread deployment of the technology in each of these potential markets – evaluated and quantified at a network-wide level
- Outline strategic recommendations for GDN companies to engage with different gas CHP technologies, in order to maximise the benefits available to them, or avoid major issues identified with the widespread deployment of each technology – as well as recommendations for particular focus areas for further investigation in stage 2

Stage 2

- Based on the stage 1 analysis, a more in-depth analysis of the benefits and challenges to GDNs of the widespread deployment of the most relevant gas CHP technologies will be undertaken. Gas flow modelling will be undertaken, in order to quantify the magnitude of the impact of gas CHP technologies in high potential applications and on each relevant section (IP, MP, LP, etc.) of the distribution network
- A more in-depth analysis of the commercial models for GDNs to engage with the most relevant gas CHP technologies will also be undertaken, including additional data collected through consultation with GDN companies and gas-CHP technology providers
- A detailed strategy for GDN companies to engage with selected gas CHP technologies, including specific, timed and detailed actions for individual teams within the gas network partners, to ensure GDNs are able to access the benefits identified, or avoid the barriers identified for the widespread deployment of gas CHP on their networks – including quantified trigger points for actions where necessary

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The success criteria for the Project are:

- A clear understanding & definition of widespread uptake
- A clear identification of the benefits that could be available from engaging with the widespread deployment of selected gas CHP technologies and evaluation of the business models that could be employed by GDNs to access these benefits
- Clear identification and quantification of technical/commercial/regulatory challenges to GDNs from the widespread deployment of gas CHP technologies
- Clear recommendations for next steps for GDNs to engage with the most relevant gas CHP technologies, to mitigate any negative effects and maximise benefits from their deployments

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

This project is limited to a study looking into current gas-CHP technologies and the impacts on the UK gas distribution networks.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

This is a study being conducted by Element Energy. This project is being conducted at a high level study, it may inform a future project that investigates a further level of detail to specific areas.

Revenue Allowed for the RIIO Settlement

Not applicable

Indicative Total NIA Project Expenditure

NGN £58,042 total Project expenditure, 90% of which is Allowable NIA Expenditure

WWU £58,042 total Project expenditure, 90% of which is Allowable NIA Expenditure

Total project expenditure - **£116,084**

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)

Potential savings may be identified from this research project, this will be a consideration in the production of the closure report.

Please provide a calculation of the expected benefits the Solution

This is a research project

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

All GB networks are aware of this project and will be able to use the data to inform their future investment decisions

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

This project will produce a final report which will be made available to all via the smarter networks portal as a minimum. It is likely that additional methods of information dissemination will be undertaken with the gas networks.

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 Licensees are likely to have the potential deployment of gas-CHPs within their networks thus the learning from this project will be applicable to the UK energy sector.

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

All GB gas networks recognize the role gas plays within the UK's energy requirements and its impact on the environment. Gas Networks are collaborating collectively on research projects that meet the future requirements of customers, UK economy, reduction in emissions and future investment decisions. We believe that this type of research will provide valuable insights that will result in more efficient operations across all networks.

☑ 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