

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

Mar 2015

### Project Reference Number

NIA\_WWU\_024

## Project Registration

### Project Title

Bridgend Future Modelling

### Project Reference Number

NIA\_WWU\_024

### Project Licensee(s)

Wales & West Utilities

### Project Start

April 2015

### Project Duration

0 years and 3 months

### Nominated Project Contact(s)

Chris Clarke - Email : [chris.clarke@wwutilities.co.uk](mailto:chris.clarke@wwutilities.co.uk)

### Project Budget

£24,000.00

## Summary

The scope of this work would be in the following stages:

1. Initial Research into work already completed and available and model build
2. NPV calculations for ASHP; GSHP and Heat Network
3. Evaluate the impact on Bridgend Network based on cost of carbon abated – DECC non-traded rate (£76/tonne) and at upper limit (based on NPV calculations above)
4. Document findings in a report and recommend the scope of future research

### Nominated Contact Email Address(es)

[innovation@wwutilities.co.uk](mailto:innovation@wwutilities.co.uk)

## Problem Being Solved

The future of gas debate has become critical in deciding future investment policy and asset lifespans and as such is impacting investment decisions and in future, will impact negotiations for funding allowances within the regulated timelines (Mid-point being 2017 and GD2 being post 2021).

More recently, the Department of Energy & Climate Change (DECC) have launched a study into the viability of investing in iron mains and the Gas Distribution Network Operators Gas Futures group has evaluated top down "WHAT WILL THE GAS DISTRIBUTION NETWORK LOOK LIKE IN 2050?", but this doesn't give insight into how gas will be used at a dwelling level and hence which iron mains will be needed in future.

## Method(s)

To determine the certainty of gas use, the certainty of alternative heat sources will be evaluated -regarding cost (including cost per tonne of carbon saved); reliability (intermittency) and availability. The networks area of Bridgend has been selected to evaluate this in light of proposals to install heat networks in the area.

Initially, this research project will review the key findings from the Carbon Connect report (Dec 14) and the DECC pathways to heat report (2013) and will identify the suggested alternatives to heat provision. Using a literature search, a partner will scope and construct a range of “bottom up” specific hypotheses and models which will take some of the current “top down” assumptions (primarily heat pumps and heat networks) and test them against such criteria as:

- Is the alternative low carbon technology available? Can it reasonably be expected to be developed to deliver alternatives to gas in the timescales? What are the consequences of switching? (Eg major reinforcement of the local electricity network)
- What are the costs? To individual consumers and the UK economy (i.e. what subsidy is required and what carbon saving can be achieved and hence cost per tonne of carbon abated) This will be determined using a cost benefit analysis estimating the cost of the investment to a consumer, a calculation of the savings made and qualifying subsidy under the RHI.
- Understand the customer likely reaction to the costs and benefits.
- How does this affect Security of Supply? If the Gas Network was not the primary source of heat then what back-up energy sources and options are available and at what cost?

The results will be applied to a geospatial model of Bridgend and exploring the scenarios around “what could a low carbon Bridgend look like in 2050 and what would it take to deliver a low carbon Bridgend?” This could then be used by WWU to determine the investment period that gas assets should be assessed within and stimulate debate leading into Mid-Point and GD2.

## Scope

The scope of this work would be in the following stages:

1. Initial Research into work already completed and available and model build
2. NPV calculations for ASHP; GSHP and Heat Network
3. Evaluate the impact on Bridgend Network based on cost of carbon abated – DECC non-traded rate (£76/tonne) and at upper limit (based on NPV calculations above)
4. Document findings in a report and recommend the scope of future research

## Objective(s)

To produce a report that evidences how gas will be used in the future, at a dwelling level by evaluating alternative heat sources in terms of cost (including cost per tonne of carbon saved), reliability (intermittency & availability).

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

n/a

## Success Criteria

A report that provides a view of how gas will be used in the future, at dwelling level & recommends any future research areas.

## Project Partners and External Funding

n/a

## Potential for New Learning

n/a

## Scale of Project

This short research project will support DECC’s study into the viability of investing in iron mains. The Bridgend Network has been

chosen to compliment the decision to install heat networks in this area.

### **Technology Readiness at Start**

TRL2 Invention and Research

### **Technology Readiness at End**

TRL2 Invention and Research

### **Geographical Area**

The bottom up analysis will be based on the Bridgend Network area, South Wales.

The top down assumptions will be taken from the published reports Carbon Connect report (Dec 14) and DECC Pathways to Heat report (2013)

### **Revenue Allowed for the RIIO Settlement**

None

### **Indicative Total NIA Project Expenditure**

External Costs - £18,000

Internal costs - £6,000

Total cost - £24,000

Project Value claimable under NIA (90% of total cost) - £21,600

## 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 decisions.

The assumptions to be used within the project for an air source heat pump for an average household are:

#### Assumptions

Gas price: 4.36p/kwh

Electricity price: 13.46p/kwh

Gas usage for space and water heating using condensing boiler: 16,000 kwh

Seasonal Performance Factor = 4.0 – 2.5

Gas carbon footprint: 0.185kg/kwh (carbonindependent.org)

Electricity carbon footprint: (0.527kg/kwh (2015); 0.250kg/kwh (2030); 0.00kg/kwh (2050))

#### Example CBA inputs

Investment to install ASHP - £10,000

KWH used by heat pump =  $16,000/4.0 = 4,000\text{kwh}$  (SPF 4.0)

Electricity cost for heat pump =  $4,000 \times 0.1346 = £538$

Gas cost for condensing boiler =  $16,000 \times 0.0436 = £697$

Saving to consumer = 697-538 = £159

RHI PA (for 7 years) = (16000 – 4000) x 7.3p/kwh = £876

Carbon saved per annum (2015) = (16,000 x 0.185) – (4,000 x 0.527) = 0.852 tonne

Carbon saved per annum (2050) = 16,000 x 0.185 = 2.96 tonnes

### Sensitivities

Future gas and electricity costs

SPF (Range 2.5 – 4.0)

Carbon footprint of electricity over time

### 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.

The results from this project and any subsequent further research pieces can be considered by UK GDNs and will be presented to DECC.

### 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 research will provide the networks with a typical view of what it would take to deliver a low carbon town to determine the

investment period that gas assets should be assessed to stimulate debate. This work will support the UK's strategic aim to 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)**

All GB Gas Networks recognise the role gas plays within UK's energy requirements and its impact on the environment. We are undertaking this research projects to ensure we can plan to meet the future requirements of customers, UK economy, reduction in emissions and future investment decisions.

We believe this type of research will provide valuable insights that will result in more efficient long term planning decisions 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