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NIA Project Registration and PEA Document

Date of Submission

Sep 2015

Project Reference Number

NIA_WWU_028

Project Registration

Project Title

Bridgend Future Modelling – Phase 3 – Required Policy Changes

Project Reference Number

NIA_WWU_028

Project Licensee(s)

Wales & West Utilities

Project Start

September 2015

Project Duration

0 years and 4 months

Nominated Project Contact(s)

Chris Clarke, Director of Asset Management and HS&E - WWU

Project Budget

£42,240.00

Summary

The project will utilise the three policy options above, but as the variations of up front contribution, RHI and carbon tax would be infinite, some of the variables will be fixed to aid the analysis:

Carbon tax – three variables will be analysed on a cost per tonne basis. • Zero – as is • £12 per tonne – the approximate market rate of carbon and that which consumers can 'offset' their emission now. • £70 per tonne – the approximate DECC non traded rate representing the societal damage caused by carbon.

Upfront government contribution • Zero – as is • £5k – the current rate applied to electric vehicles (this represents between 25%-10% of the cost of a typical electric car, and between 25% - 50% of a low carbon heating system). • Other variable payment e.g. to be assessed during the research

This will leave the unit subsidy variable and would represent the level of RHI needed to satisfy the consumer willingness to pay for air source heat pump and heat network. Heat network is split between those with a carbon source and those without as the carbon reduction is significantly different. In addition, illustrations with zero RHI will also be modelled to understand if either standalone carbon tax or up front subsidy would be feasible or sufficient to persuade consumers to switch. For the purposes of the study and to keep the variables within reason, the research will focus on an average property in Bridgend. It was noted in phase 1 that some discrepancy existed between national average consumptions and the actual gas used in the Bridgend network. This will be researched in this phase to understand how local variations may affect consumer behaviour. Phase 1 identified that the standard of insulation has an impact on the investment a consumer may have to make and the payback period. For this study, it will be assumed that 'lower cost' insulation has been fitted, such as loft insulation. These typically have a faster payback, whereas solid wall insulation payback may be between 60 and 90 years, and hence seem extremely unlikely to be fitted. For a carbon sourced heat network, it is assumed (per the Bridgend proposals) that a natural gas CHP engine will be installed, providing a 30% carbon efficiency gain compared to centrally generated electricity and locally installed gas heating appliances.

Preceding Projects

Nominated Contact Email Address(es)

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 the next price control period being post 2021).

The DECC (Department of Energy and Climate Change) heat strategy has a vision of gas heating being replaced by lower carbon sources, such as air source heat pumps (ASHP) and heat networks. Heat networks can utilise a carbon heat source such as gas (via a Combined Heat and Power (CHP) unit), which provides a more efficient solution than central generation of electricity and individual gas boilers. As an alternative, it can utilise a low carbon heat source. This may be 'waste' heat from perhaps a local industrial process or more likely, from geothermal energy or from a local water course using a very large heat pump. These latter options come with a high additional up front cost.

Phase 1 research and modelling on a bottom up basis of the Bridgend network has revealed that with current government policies little or no change to the provision of heat will occur due to the high cost the consumer or building owner would face and with little prospect of payback in a reasonable time.

Phase 2 research explored consumer willingness to pay in relation to changing energy sources and estimated tolerable payback periods from a series of real projects that have been proposed historically going back nearly 25 years. It detailed the parameters and variables available to planners and policy makers needed to influence consumers. It explored the scale of these parameters and considered any other factors than might influence consumers, detailing the likelihood and frequency of these occurring.

Method(s)

This Phase 3 project aims to understand what home energy policy would be required that would satisfy the consumer willingness to pay criteria above.

In order to encourage consumers to switch to lower carbon energy sources, one option is to set financial incentives and penalties related to energy use and the installation of lower carbon heating systems. Examples of current and previous policies that have been utilised are:

- A one off up front contribution, for example, £5k contribution to the purchase price of an electric vehicle, or free loft insulation.
- A payment for each kilo watt of energy displaced by a lower carbon or more efficient system, for example, an incentive similar to the renewable heat incentive (RHI).
- A carbon tax levied through the unit price of the fuel, for example, the fuel duty escalator.

The scope of this proposal excludes the more radical policies such as banning carbon fuelled heating appliances, but less dramatic mandatory improvements in efficiency have been used before, such as the requirement to only fit condensing boilers, mandated levels of home efficiency for new homes or Euro 5 engines in cars. These have achieved public acceptance as they have not been unreasonable and have paid back the extra cost over the lifetime of the object.

Scope

The project will utilise the three policy options above, but as the variations of up front contribution, RHI and carbon tax would be infinite, some of the variables will be fixed to aid the analysis:

Carbon tax – three variables will be analysed on a cost per tonne basis.

- Zero – as is
- £12 per tonne – the approximate market rate of carbon and that which consumers can 'offset' their emission now.
- £70 per tonne – the approximate DECC non traded rate representing the societal damage caused by carbon.

Upfront government contribution

- Zero – as is
- £5k – the current rate applied to electric vehicles (this represents between 25%-10% of the cost of a typical electric car, and between 25% - 50% of a low carbon heating system).
- Other variable payment e.g. to be assessed during the research

This will leave the unit subsidy variable and would represent the level of RHI needed to satisfy the consumer willingness to pay for air source heat pump and heat network. Heat network is split between those with a carbon source and those without as the carbon reduction is significantly different.

In addition, illustrations with zero RHI will also be modelled to understand if either standalone carbon tax or up front subsidy would be feasible or sufficient to persuade consumers to switch.

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Phase 1 identified that the standard of insulation has an impact on the investment a consumer may have to make and the payback period. For this study, it will be assumed that 'lower cost' insulation has been fitted, such as loft insulation. These typically have a faster payback, whereas solid wall insulation payback may be between 60 and 90 years, and hence seem extremely unlikely to be fitted.

For a carbon sourced heat network, it is assumed (per the Bridgend proposals) that a natural gas CHP engine will be installed, providing a 30% carbon efficiency gain compared to centrally generated electricity and locally installed gas heating appliances.

Objective(s)

To research whether current energy policies (e.g. RHI) allow us to move to a low carbon energy future & consider the impact on costs and reliability of supply.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

A report that examines current policies and details potential considerations e.g. incentives, grants, loans and taxation on carbon emissions that may facilitate a low carbon energy future for GB.

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.

Examples used of previous new gas and alternative energy installation may be taken from Wales and the South West of England.

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 - £31,680

Internal costs - £10,560

Total cost - £42,240

Project Value claimable under NIA (90% of total cost) - £38,016

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.

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 a Research Project

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

This is a 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