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

Jul 2015

Project Reference Number

NIA_NGGT0071

Project Registration

Project Title

Spatial district heating analysis and impact on gas and power demand

Project Reference Number

NIA_NGGT0071

Project Licensee(s)

National Gas Transmission PLC

Project Start

April 2015

Project Duration

1 year and 1 month

Nominated Project Contact(s)

Stephen Marland, Tony Nixon, Nixon
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Project Budget

£136,000.00

Summary

Heat / district networks currently provide less than 2% of UK heat, however; have been identified as providing benefits to a low carbon energy pathway (initial studies suggest growth between 14% to 40% of heat demand would be possible). Studies have lacked geographical and heat source constraints that have significant bearing on the economic viability of future network infrastructure.

There is limited co-ordinated public information / evidence concerning the location and development of future heat networks. Consequently, heat networks are not well represented within National Grid's Future Energy Scenarios, which in turn underpins National Grid Transmission's power and gas capital investment processes. The lack of evidence has led to development uncertainties influencing long term investment and risk decision making processes. The lack of clarity on the prospects at a specific locations could lead to sub-economic investments by developers, LA, Government and both Transmission and Distribution networks.

Third Party Collaborators

Buro Happold

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

Investigate the scale and location of district heating in the UK and consequential impact on power and gas systems. The exercise will produce geographical mapping of heat networks and other relevant information needed to support National Grid's Future Energy Scenarios – downstream capital planning processes. The model will then be used to assess the theoretical potential (range) for balancing services.

Method(s)

To provide a public report with supplemental data tables including

Stage 1 - Spatial Modelling

- Background to where district heating currently resides on a geographical basis, but also the assumed level of heat / power contribution (or to what extent this offsets demand) as of the starting position at 2014.

- Reference the initiatives underway to promote or encourage heat networks (locations of planned schemes) – link into existing stakeholders to align outputs i.e. Greater London Authority etc.

- Identify the upper limits of potential heat network growth set to existing heat density levels and to assumed levels achieved through insulation potential (i.e. if we assume housing stocks are insulated to the maximum extent, aligned to National Grid scenarios assumptions will the heat density reduction impact on the economic growth potential)

- The model should consider how the impact of discount rates on the viability of the investment in heat networks e.g. public sector, regulated utility and competitive market based

- The modelling should consider the range of scenarios aligned to National Grid reference scenarios and relevant system wide inter-relationships i.e. retail prices, carbon intensity of power, location of infrastructure etc.

- Identify sources of heat supply within the context of the scenarios i.e. CHP with CCS, Marine based heat pumps, waste energy (comparative use versus bioSNG).

- Make a judgement on how the level of heat networks could grow with new housing / commercial building developments based on potential location of new housing developments – and most effective use of low carbon heat (urban versus new build cost to develop).

- Validation and detailed review of a selected number of areas to ensure wider economic modelling assumptions remain robust.

- Reports to include geospatial mapping as an output highlighting areas of high potential (areas that make absolute sense to develop heat networks economically in majority of scenarios), areas that have a low potential (sub-economic developments / low potential for low carbon networks), areas that have moderate potential (articulating what would be required to promote development).

Stage 2 – Transient Modelling

- Undertake annual time based modelling in order to understand the impact of the penetration of heat networks in the wider UK energy context, particularly on the electricity transmission network through provision of storage and network services.

- Assess hourly scenarios for power supply exceeding demand and potential for large scale DSR (time shifting) to identify the viability of balancing services from heat to power networks. Review potential benefits with other stakeholders – DNOs, to identify follow up recommendations

Report on viability of balancing services to NGET and future innovation potential studies

Scope

Heat / district networks currently provide less than 2% of UK heat, however; have been identified as providing benefits to a low carbon energy pathway (initial studies suggest growth between 14% to 40% of heat demand would be possible). Studies have lacked geographical and heat source constraints that have significant bearing on the economic viability of future network infrastructure.

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Objective(s)

To inform scenario development and downstream investment decision processes within National Grid.

To provide a platform to engage other interested parties including iDNs, DNO, regulators and Government.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Heat Network projection range to be included in the Future Energy Scenario with reference to location.

Application in investment decision making processes.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

This is a desk based project.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

The project will be driven by desk top modelling from Buro Happold and UCL – London

Modelling will cover all Great Britain (excludes Northern Ireland)

Output reports to be shared with all energy networks via the ENA Gas Futures Group

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£136,000

Split equally between gas transmission, gas distribution and electricity transmission businesses.

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)

Project remains at lower TRL levels and a desk top information level to ensure demand modelling remains accurate and holistic. Improved accuracy in long term modelling should lead to reduced risks associated with investing in economic and efficient energy systems. Developing heat networks information will also provide a platform for wider stakeholder engagement and potentially future research studies in energy storage technologies.

Please provide a calculation of the expected benefits the Solution

N/A

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

This will not be necessary as the desk top study (reports) will be shared – whilst we do not envisage the need for additional scenarios should this be required they can be accessed or reproduced using the same modelling technique / or through additional studies with the vendor.

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

Not applicable – information only and will be shared / placed into public domain

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

The study will be published and shared with DNs, TOs and DNOs

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

Providing an evidence base to support future gas and power scenario / forecast information. Assist with power storage / balancing developments.

☑ 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