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# NIA Project Registration and PEA Document

### Date of Submission

Oct 2014

### Project Reference Number

NIA_NGN_068

## Project Registration

### Project Title

Sustainable Multi Storey Communities

### Project Reference Number

NIA_NGN_068

### Project Licensee(s)

Northern Gas Networks

### Project Start

October 2014

### Project Duration

2 years and 1 month

### Nominated Project Contact(s)

Tom Bell (Head of Social Strategy), Chris Goodhand (Innovation Manager)

### Project Budget

£125,000.00

### Summary

To review current multi storey building status within the Newcastle City “Pool”, including technical, physical building and utilities data, previous or current or future amendments/interactions with, presence/absence of applicable residents associations.

Community Based Engagement: Initial and on-going community dialogue, Interaction which will mediate –articulated existing demand profiles, social appraisal of options and rationale based on articulated demand/ baseline utilities/inarticulated demand.

Review of current funding landscape and regulatory environment - including opportunities and barriers.

Analysis of baseline pre-collected data within 'pool' (e.g. utilities and buildings related ). How do these relate to wider scenario in the UK? How does this direct use?

Provide a report and business case on combined social technical and economic analysis - including initiatives, non-energy values, built environment, re-bundling of value chains.

Provide recommendations for future projects, early stage technologies and related research.

### Nominated Contact Email Address(es)

innovation@northerngas.co.uk

### Problem Being Solved

The need to deliver a low carbon economy target of 80% reduction in greenhouse gas emissions (based on 1990 levels) by 2050, and to decarbonised electricity generation by 2030, while maintaining secure and robust energy supplies and addressing issues of fuel poverty and aging infrastructure poses significant challenge to the UK energy sector. The future role of the gas network to support large scale transition to the low carbon economy has a large number of uncertainties, especially sounding fuel poverty in a community /

social housing context.

At present the domestic requirement for energy is 30.7% of the UK's energy demand (pre-dominantly supplied by gas), and domestic heating accounts for almost 20% of the UK's CO2 emissions. Conventional (i.e. energy sector based) approaches to reduction of green-house gas emissions and alleviation of fuel poverty are mostly focused on

a) physical energy efficiency measures ,

b) accessibility to more affordable energy (heating) sources,

c) incorporation of renewable energy technologies to supplement energy use, and

d) encourage awareness of energy usage

Often these approaches are implemented in relative isolation by single stakeholder's or small groups of stakeholder's (e.g. Local authorities, arm's length management organisations, individuals) who utilise the existing energy schemes (which are defined in part by technology push) to fulfil their own direct monetary and non-monetary needs (or obligations). These may address the obligations of others indirectly but these benefits will not necessarily be quantified or reported. Although this approach has been successful in terms of collective uptake (and has resulted in partial reduction in green-house gas emissions and alleviation of fuel poverty) within low and medium-rise buildings, more limited success (both in terms of uptake and in realising wider goals) is often stated in large complex systems such as multi-storey communities.

Multi-storey communities provide a unique combination of large scale complex buildings (in terms of overall design and space) which have diverse and high density occupation and a high collective demand for both direct and indirect resource consumption and provision for waste production (which spans utilities and may be constrained by the structure and function of multiple regulatory frameworks). Therefore these communities naturally have multi-stakeholder interest and interdependence (spanning for example the needs and objectives of residents, local authorities, arm's-length management organisations, private landlords, and multiple infrastructure and utility providers).

The complexity of building fabric, current energy source and resident behaviour provides a real challenge to reduce energy costs to the neediest while at the same time increasing their comfort levels at the lowest possible carbon environment.

## Method(s)

In conjunction with Northern Powergird, we have formed as a collaborative partnership with Newcastle University Sustainability Centre and Durham University are the North East's leading centre for this type of work. Northumbrian Water are also participating in this project to providing technical knowledge and share in the potential learning. The work will also study the role existing energy supplies have to play in the current lifestyle, the transition from existing to future sources and its role longer term to determine its impact on the UK's heat solutions. This is project is related to NIA_NGN_ 079 Low Carbon Energy Solutions with Thirteen as the sharing of learning across technologies and behaviours is seen as crucial.

To undertake a research study into the current funding landscape/how this relates to the social & technical solutions applicable to case studies and undertake an analysis of current gaps.

Analysis of potential building related improvements and energy reduction measures based on inarticulated/articulated demand profiles.

Statement of provisional technical solutions available and applicable to case study Multi storey communities - including cost benefit analysis

This project will consist potentially of 4 consecutive stages, each stage informing the next and communicating the findings and their implications to wider entities e.g. industrial, regulatory and/or funding bodies. Outcomes may be particularly pertinent to the objectives of the newly formed UK Regulators Network (UKRN), especially with reference to the 'cross-sector infrastructure engagement' and 'explaining the benefits of economic regulation'

## Scope

To review current multi storey building status within the Newcastle City "Pool", including technical, physical building and utilities data, previous or current or future amendments/interactions with, presence/absence of applicable residents associations.

Community Based Engagement: Initial and on-going community dialogue, Interaction which will mediate –articulated existing demand profiles, social appraisal of options and rationale based on articulated demand/ baseline utilities/inarticulated demand

Review of current funding landscape and regulatory environment - including opportunities and barriers.

Analysis of baseline pre-collected data within 'pool' (e.g. utilities and buildings related ). How do these relate to wider scenario in the UK? How does this direct use?

Provide a report and business case on combined social technical and economic analysis - including initiatives, non-energy values, built environment, re-bundling of value chains.

Provide recommendations for future projects, early stage technologies and related research.

## Objective(s)

Develop a detailed knowledge and understanding of the current situation (with regard to multi storey communities in the North East); including the attitudes, needs, priorities and perspectives of stakeholders (including Residents, Northern Power Grid, Northern Gas Network, Northumbrian Water Ltd, Newcastle City Council, Your Homes Newcastle and Newcastle University), the physical and technological status of the multi-storey communities within a North East Wide 'pool', the options available to multi storey communities, and the responsibilities, regulatory limitations or accessibility to existing funding steams.

The project will also seek to identify and scope some concrete stakeholder-friendly, socio-technical interventions that allow Networks to have the future energy systems that better serve the inhabitants and owners of the multi-storey dwellings.

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

n/a

## Success Criteria

Preliminary decision support /tree tool informing industry partners on the current options available

Development of a potential strategy for further investigation areas and benefits of these investigations

An Initial combined social technical and economic analysis - including initiatives, non-energy values, built environment, re-bundling of value chains

Initial business case development describing findings, results and informing future and related projects

It is anticipated that together this will provide direct further investigation into the approaches that may be suitable within differing sites, scales, and provide sufficient information to either identification of appropriate pre-existing funding streams to implement change, or evidence to put to central government and industry regulators to request change to funding streams (DECC, Ofgem, Ofwat).

## Project Partners and External Funding

n/a

## Potential for New Learning

n/a

## Scale of Project

The research project will cover difficult communities in multi storey buildings within Newcastle City Fuel Poverty "Pool".

Stage 1

Qualitative and quantitative analysis of the social, physical and technological status of the multi storey communities within a defined North East wide 'pool' (but with broader UK wide applicability – in terms of building and community structure, function, provision to Britain's 6,500 high rise residential blocks)

- a clear understanding of the attitudes, perspectives and priorities of the individuals and communities living within selected multi-storey communities, including tenants with and without experience of retrofit, tenant associations, articulated and unarticulated demand profiles, the willingness of the communities to be flexible in their energy practices

- analysis and evaluation of quantitative physical and technical data available from multiple stakeholders

Investigating barriers and opportunities open to the group including quantitative and qualitative analysis of monetary and non-monetary benefits to individual stakeholders (and combined) in exploring 'conventional' and 'non-conventional' approaches.

- Linking to an audit of what benefits could be/size of improvements in the area:

- Guiding prioritisation of resource aiding development of a pre-limitary integrated evaluation tool (using multi-stakeholder data) for delivery in stage 2

A statement on novel contractual agreements between partners (in terms of how best to configure, measure redistribute rewards).

- Identification of and application to appropriate funding streams to support stage 2-4 (e.g. Horizon 2020, EPSRC, TSB).

- Implementing energy metering data collection to assist base-load identification, peak time and renewable feasibility studies.

- Identification of building-related improvements that could offer energy reduction measures (e.g. building physics survey) on glazing, insulation quality and air tightness.

- The deployment of environmental sensors in some or all of the target areas to establish the prevailing conditions

- Provide output of technical options and cost feasibility referenced above along with social feasibility analysis

Stage 2 - Community Based Engagement

- Development and delivery of a design and decision support tool to inform stage 3

- Identification of potential multi-storey communities within a defined 'pool' for stage 3 and 4

- Functional specification statement – to guide potential technology and service providers (including target cost thresholds)

- Delivery of a policy paper exploring the barriers, challenges, opportunities and evidence base for development of non-conventional approaches to investigating sustainability options for multi –storey communities

- Recommendation for sustainable building technologies with the highest environmental value for the cost of implementation. This would entail building-contained solutions (e.g. CHP/PV) or integration into the wider network (e.g. district heating potentials).

- Developing virtual models of target buildings to conduct comparative carbon and energy studies of areas of fabric improvement conducted in stage 1.

- Identification of the most effective improvement strategy, be it load-reduction, efficiency measures, renewables.

- Engaging residents of the principles of environmental/energy decisions made and building consensus for the implementation of the physical changes/actions required.

Stage 3 – Implementation of small scale change –Pilot-scale

- The installation of the first set of recommended changes (retrofits, smart metering, environmental monitoring, renewable integration) to bring about energy efficiency together with monitoring measures to enable impact analysis against base-model case.

- Conducting follow-up surveys (or sampling tool deployment) aimed towards identifying any behavioural change associated with implementation.

- Utility end action recommendations (i.e. If time-variant utility pricing can bring about desired behaviour)

- Given the nature of the proposed developments, a role (such as energy/renewable monitoring officer) might be able to be proposed delivering energy reporting and raising occupant's awareness).

Stage 4 –Implementation of large scale change – Full scale

- Installation of changes as directed by the developed design and decision support tool (e.g. retrofits, smart metering, environmental monitoring, renewable integration) to bring about energy efficiency together with monitoring measures to enable impact analysis against base-model case.

- Conducting follow-up surveys (or sampling tool deployment) aimed towards identifying any behavioural change associated with implementation.

- Utility end action recommendations (i.e. If time-variant utility pricing can bring about desired behaviour)

- Publishing basics and justifications for the solutions implemented in stages 2 and 3 together with medium-term (preferably annual) energy results of the improvements made and lessons learned. This could take the shape of a concise report outlining major findings for public and private consumption.

- Making the energy (/environmental) monitoring information publically available for other stakeholders to replicate the best lessons learned.

## Technology Readiness at Start

TRL2 Invention and Research

## Technology Readiness at End

TRL3 Proof of Concept

## Geographical Area

The research will be undertaken within the Newcastle City area covering communities within Multi Storey Buildings.

## Revenue Allowed for the RIIO Settlement

None

## Indicative Total NIA Project Expenditure

External Funding Newcastle University Innovation Fund -£20,000 Northern Gas Networks - £64,000 Northern Powergrid - £20,000 Network Support/Internal Funding NGN - £16,000 NPG - £5,000

# 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)

Any change in the future delivery of energy to multi storey buildings will be difficult both for the customers and the networks. This study will inform the networks, customers, providers and industry on what incentives and challenges need to be addressed to reduce reliance on the existing energy mix and make a transition to alternative sources.

It will provide a knowledge based report for future cross utility projects in the Newcastle Area that would meet building owners and customer requirements around early stage technological changes.

## Please provide a calculation of the expected benefits the Solution

Research Project

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

Fuel poverty is a significant issue across the whole of GB and this research will inform energy providers and government on the challenges it faces with a significant section of the community.

## 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

Coherent and consistent economic regulation across utility sectors is required to provide economically robust strategies to enable communities to move to the low carbon economy. Difficult communities residing in multi storey buildings provide.

Networks need to understand cross-sector issues related to future affordability of services and work on consumer empowerment to ensure regulated energy and water supply markets have the information and other tools necessary to engage effectively to support transition to new source. By working with communities in difficult buildings and with significant economic challenges the learning from this project has the potential to deliver learning both locally and national on future approaches.

Networks anticipate that change will be determined by collective customer pull rather than technological push. It is anticipated that this approach will inform the future needs for cross regulatory provision and funding source requirements for delivering change in these systems. There will also be potential to explore the applicability to wider (e.g. district) systems, in terms of scale, (break points of exploitation), and potential for replication.

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

NGN's Innovation Strategy is designed to undertake Research and Development in areas that have a long term influence on its business objectives and social obligations. This study is part of a series of studies into the future of the gas network and how it will perform under a low carbon economy. The GDN's also have a responsibility towards alleviating fuel poverty and with the North East having the largest percentage population in this arena we would aim to make a series lead on acting locally, while influencing nationally.

NGN's strategy also aims to work with a wider diverse sector and Ofgem would like this to take into account academia. Newcastle Sustainability Centre (in collaboration with Durham University) are the North East's leading academic centre for fuel poverty research and work closely with both Northern Power Grid and Newcastle City Council who are partners in this project.

☑ 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