

NIA Project Registration and PEA Document

Date of Submission

Apr 2017

Project Reference Number

NIA_NGN_208

Project Registration

Project Title

IntEGReL Phase 1

Project Reference Number

NIA_NGN_208

Project Licensee(s)

Northern Gas Networks

Project Start

April 2017

Project Duration

1 year and 4 months

Nominated Project Contact(s)

Keith Owen

Project Budget

£300,000.00

Summary

During phase 1 the project will:

- cover workload associated with the development of the Low Thornley
- be the interface between NGN, CESI and the other stakeholders (EIC, Energy Systems Catapult, other utilities and SMEs)
- Develop funding bids and secure the necessary capital to develop the infrastructure needed at site
- Connect CESI lab to the NGN SCADA system and bring the NPg SCADA to Low Thornley – This initial piece of work establishes the Low Thornley site as connected into the CESI research lab portfolio and allows researchers to explore the similarities and differences in behaviours across power and gas systems to identify the potential areas of optimisation, to invest smartly and reduce cost.
- To establish the “Gas Battery Storage Concept” Convert the Diesel Generator to Gas and to run on demand rather than only when power fails – environmental win, cost win and enables the independent power generation aspect of the research to start. Supports the research into constraint management on the power sector (similar to those experienced in the wind and Solar industries) and therefore helps identify options to manage the constraint effectively without having to turn down generation.
- CESI and NPg install their differencing battery systems to enable energy storage at site, again in support of the gas battery concept and allows comparison of technologies and their application to understand which adds most value and in what scenario. This can then be cross referenced with the gas battery concept to establish a cost comparison and value proposition in the long term for future investment.
- NPg install monitoring of power network at site so we can begin to map power and gas network behaviours and support the drive for a whole systems understanding of the interactions and possibilities by combining our asset strategy.
- NPg install their CLNR battery system at site to increase storage energy capability
- Siemens install their Spectrum system and begin to merge the gas and power information and config to develop gas / power system operator function.

- Bring in a specialist management team from CESI to establish the above work, develop the funding streams (EU, Innovate UK etc.), and outline the legal framework and steering model.

Preceding Projects

NIA_NGN_345 - Customer Energy Village: Project 1: Energy Efficiency

Third Party Collaborators

CESI

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

Within the UK there are currently no research and development facilities available to provide support and the capability to test and demonstrate at scale, technology that crosses between the different energy vectors of gas, power and transport and as such offers the potential for different investment strategies, lower costs for network customers and lower carbon outcomes.

It is difficult and costly therefore for SMEs to move their innovative technology from TRL1-3, through to TRL9, with most never reaching market. This is of significant disadvantage to UK plc and our customers, who through implementation of new technology can expect to see an improvement in cost of energy in the long term. The IntEGReL project aims then to bring together the Electricity, Gas and transport energy vectors to explore opportunities for improved investment models, technology which connects energy vectors to greater advantage both in terms of cost and resilience than would be possible following the existing silo path.

Method(s)

NGN have established a working partnership with the National Centre for Energy Systems Integration (CESI) {which is led by Newcastle university but includes Edinburgh, Herriot Watt, Durham and Sussex Universities} and Northern Powergrid to realise this UK research, development and demonstration Centre for Industry, with a particular focus on Whole Systems, Cross Vector technologies.

The primary aim of the center is to support and encourage innovation in cross vector technology and by doing so exploit the benefits of a whole systems approach to energy strategy in the UK. The recent paper on "Smart Power" by the National Infrastructure Commission is clear that *"smart power – principally built around three innovations, interconnection, storage, and demand flexibility – could save consumers up to £8 billion a year by 2030, help the UK meet its 2050 carbon targets, and secure the UK's energy supply for generations."* Now whilst this is a power related paper and the savings are reflective on efficiencies on the power networks, by and large these are our customer too.

Through smart use of the gas network, integrating the enormous capacity and capability possessed by the gas network into the operation of power and transport networks will undoubtedly bring those savings home to network customers sooner and at even greater levels perhaps than the commissions paper suggests.

In order to develop and establish the facility, NGN will collaborate with CESI and NPg to manage the site evolution from its existing state, through design and construction to become a functioning centre for SMEs and the wider academic and energy utility community.

The project will include the Installation of hardware, software and links between Low Thornley (Above Ground Installation site) and Newcastle University for NGN SCADA and Northern Power grid SCADA, to allow cross system analysis of behaviours and in turn develop a combined System operator function based on the significant knowledge and experience of NGN as a DSO. By bringing together the power and gas networks different long and short terms strategic developments can be undertaken to identify the most cost effective solution to network constraint management (for example). This aims to identify the potential for strategic planning and investment across the power and gas systems.

These technologies offer significant benefits to industry and energy utilities in bringing about effective solutions to:

Carbon reduction,

Storage,

Flexibility,

Resilience

Security of supply.

Benefits in any of the above areas will then lead to cost reductions through improved planning and deployment of new technology, which in turn will flow through to benefit network customers. This also ties into the government's specific aims for Industrial strategy, improving the export capability of UK plc, developing home grown IP, enhancing the skills of the UK workforce and creating new high skilled jobs and potentially new markets for business.

Scope

During phase 1 the project will:

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Objective(s)

Project objectives are:

- Management of site design, construction and launch of the IntEGReL site
- Initiate starter projects to inspire SMEs and demonstrate the capability at
- Creation of the investment plan detailing proposed developments over the next 2 – 5
- Develop relationships with Energy System Catapult, EIC, IGEM, IET, etc in the context of the site
- Project Steering group meetings, report and communications.
- Installation of SCADA systems

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Success criteria

- Establish the research and development facility at the Low Thornley
- Identify and connect a wide range of participants and
- Successfully submit funding applications which are factored into the overall investment plan and linked to development and ambitions for the site.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project covers technology that crosses between the different energy vectors of gas, power and transport and is applicable to all GDN's, SMEs large industrials and the wider UK energy infrastructure.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

NGN network, based at Low Thornley

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

NGN External expenditure - £225k

NGN Internal expenditure - £75k

Total NGN expenditure - £300k

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 work does not immediately give savings, but does have the potential to allow for a more diverse gas mixture which will lead to significant carbon reduction throughout the gas distribution networks. The project aims to test technology to bring effective solutions to carbon reduction, Storage, Flexibility, Resilience and security of supply relating to network licencees. Benefits in these areas could then lead to cost reductions through improved planning and deployment of new technology, which in turn will benefit the customer.

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

The project addresses an industry-wide issue and its results will therefore be of benefit to all other Network Licensees.

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

The project is a Research Project which will identify work streams whose costs are unknown at this stage. An estimate for rolling out the method across the GB can therefore not be provided.

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

RIO-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

In the initial phases of development small scale projects will be undertaken to support evolution of systems and processes. Even at this early stage learning will be apparent and documented.

Existing CESI research processes may be adopted to report and control each project.

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

The project to create a new facility for the UK where SMEs and wider industry can bring concepts, problems and technology to site and implement solutions at scale will bring significant advantage to the UK Network Licensees and wider energy industry.

- ☒ 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