# NIA Project Registration and PEA Document

### Date of Submission

Jan 2014

### Project Reference Number

NIA_NGGD0011

## Project Registration

### Project Title

Demand Scaling

### Project Reference Number

NIA_NGGD0011

### Project Licensee(s)

Cadent

### Project Start

October 2013

### Project Duration

0 years and 6 months

### Nominated Project Contact(s)

Marcus Sharpe – Project Manager and Andrew Newton – Innovation Portfolio Manager

### Project Budget

£183,731.00

### Summary

The scope of this project includes:

Stage 1: Development of a basic proof-of-concept statistical demand modelling tool. This will model loads based on DDS Tags, and provide Validation day Scaling Factors for two example networks. This will include both standard model output (in the form of Scaling Factors) and detailed node-by-node diagnostic data, which together will allow assessment to determine if there is value in further developing the scaling model for use in the business. If the assessment of these example networks is that the model produces usable results in principle, the project will proceed to Stage 2, described below.

Stage 2: Development of a functioning prototype spreadsheet including both demand modelling and scaling functionality.

### Nominated Contact Email Address(es)

Innovation@cadentgas.com

### Problem Being Solved

National Grid Gas Distribution plans it's below 7 bar networks in accordance with industry guidance document IGE/GL/1, which requires that network analysis models are periodically validated against actual network performance. National Grid Policy T/PL/NP/16 and Management Procedure T/PM/NP/29 define the requirement in detail.

Having confirmed the validity of the network model against actual network performance data it is then necessary to extrapolate the demand on the model from the level at the validation condition to the peak 1 in 20 six minute demand condition required for use in planning the network, as defined in IGE/GL/1. Over time a number of approaches to extrapolation have been applied, all of which can lead to an over or under estimate of the 1 in 20 peak six minute demand condition, potentially resulting in over or under investment in the network.

This project therefore seeks to develop a more robust, transparent and intuitive method of extrapolating from a validation demand condition to the 1 in 20 peak six minute demand condition.

## Method(s)

This project seeks to develop a statistical demand methodology, based on learning from work carried out under a previous Innovation Funding Incentive (IFI) project, through use of a substantial quantity of actual consumer demand data collected, to provide improvements to the accuracy of network analysis.

The method relies on training a statistical model against actual six minute meter point demand data logged during winter 2009/10 and winter 2010/11. The model is likely to rely on 'day of the week', 'month of the year' and Composite Weather Variable to assess what percentage of the peak 1 in 20 six minute demand conditionb occurred on the network validation day for each category of demand, thus enabling extrapolation to the peak
demand condition.

The new demand model tool will require population with meter point data taken from the existing Demand Derivation System (DDS). The tool would be presented to the user via an interface, with the output likely to be a simple set of scaling factors to be applied to the demand data in the network model to give the 1 in 20 peak six minute demand condition.

### Scope

The scope of this project includes:

- Stage 1: Development of a basic proof-of-concept statistical demand modelling tool. This will model loads based on DDS Tags, and provide Validation day Scaling Factors for two example networks. This will include both standard model output (in the form of Scaling Factors) and detailed node-by-node diagnostic data, which together will allow assessment to determine if there is value in further developing the scaling model for use in the business. If the assessment of these example networks is that the model produces usable results in principle, the project will proceed to Stage 2, described below.

- Stage 2: Development of a functioning prototype spreadsheet including both demand modelling and scaling functionality.

## Objective(s)

The aim of this project is to create a proof-of-concept off-peak demand model for below 7 bar networks, along with algorithms for scaling these demands to peak. In addition, a working prototype spreadsheet tool containing these models will also be produced.

Both the demand model and the scaling model will use selected consumer data from DDS and produce output in the form of Scaling Factors, with one set representing validation day demand and a further set for 1:20 peak demands.

If successful this will enable delivery of a consistent, robust and transparent demand model tool capable of providing a method of extrapolating from a validation condition to the 1 in 20 peak six minute demand condition. This could potentially be further developed to extend the use of the tool and to implement the software within business systems, such as GBNA.

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

n/a

## Success Criteria

Success of this project will be the development of a new peak demand model that is proven to be consistent and readily applicable to network models.

## Project Partners and External Funding

n/a

## Potential for New Learning

n/a

## Scale of Project

The scale of this project includes performance analysis of the model during phase 1, on two of National Grid's network analysis models, currently defined as Shepshed and Burnley, followed by a working prototype in phase 2 which can be applied to any National Grid network analysis model.

## Technology Readiness at Start

TRL3 Proof of Concept

## Technology Readiness at End

TRL5 Pilot Scale

## Geographical Area

Phase 1 applied to two example network analysis models.
Phase 2 working prototype can be applied to any National Grid network analysis model.

## Revenue Allowed for the RIIO Settlement

No Revenue Allowed for in the RIIO Settlement

## Indicative Total NIA Project Expenditure

£183,731 total NIA project expenditure

# 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)

Example Mains Replacement project designs have been re-evaluated assuming a reduction in the network peak 1:20 demand of 10% for temperature sensitive demands as a result of this project. The resulting reduction in network pipe flows and pressure loss allows smaller mains replacement pipe sizes. This showed a potential saving in project costs of between 2.1 and 5.1%.

Over the eight year RIIO period assuming a mains replacement expenditure of £3bn and extrapolating this saving across all mains replacement projects would result in a saving in the range £63m to £153m.

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

Base Cost (Mains replacement expenditure over RIIO period £3bn) minus Method Cost (Cost of smaller diameter mains replacement pipe sizes, up to £2.85bn) = up to £153m

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

This Method could be applied by all Network Licensees if successful, in order to more accurately model network demand.

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

The spreadsheet tool would be deployed as either:

1. A standalone Microsoft Excel spreadsheet at negligible cost, or
2. 2. As an enhancement to an existing suite of Engineering Toolbox applications presented via the National Grid Desktop system, at a cost of no more than £20,000.

## 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

All Network Licensees have a requirement to model their networks using network analysis
and an associated need to model network demand. The new tool could therefore readily be
applied by other Licensees.

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

Not Apllicable

☑ 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