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

Dec 2013

Project Reference Number

NIA_NGN_066

Project Registration

Project Title

Off-Take Reform / Alarm & Demand Management

Project Reference Number

NIA_NGN_066

Project Licensee(s)

Northern Gas Networks

Project Start

January 2015

Project Duration

2 years and 6 months

Nominated Project Contact(s)

Keith Owen

Project Budget

£39,627.00

Summary

This project seeks to identify and determine if past data can be used to create profile demands for weekends and bank holidays. As well as analysing specific data sets to see if any patterns appear which enable us to better forecast demand and indicate the health of our assets. We will do this by using the following:

- Where possible use seven years of data for broadest comparable data
- Use as many as 23 off takes for more accuracy and determine to patterns and analyse erratic off takes to create a full picture of the behaviour
- Using such broad range of different types of off takes and covering data from 23 sites we are covering up to 95% of the different sizes in U.K
- Data sets we have provided are specific to the requirements we are wanting.

Third Party Collaborators

Newcastle University

Enzen

Schneider Electric

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

The information used by the Northern Gas Networks to determine the impact of weekends and holidays on the demand forecasting process, do not accurately reflect the actual demand profile customers actually portray. Northern Gas Networks needs to research actual demand patterns over these periods to develop specific algorithms to more accurately predict consumer demand.

Pressure and operational system alarms create significant reporting issues for networks to ensure compliance. The large volumes of data generated from alarm activity, has the potential to reduce costs on asset investigation and provide input into asset health strategy. Networks do not have the capacity to research this data for patterns in operational performance that could be used to predict future performance.

Current modelling techniques on pressure controlled off-takes cannot accurately predict behaviour with significant human interventions required to maintain supply balance. Better utilisation of available data has the potential to provide a systemised model to increase the accuracy of the offtakes modelling process, thereby reducing the number of corrective actions needed to maintain an accurate supply balance and minimising the errors in capacity profile submissions to the National Grid.

Resubmitting off take notifications can result in inefficient use of capacity. This inefficiency impacts across industry stakeholders and on customer costs. Precise control of capacity request from the NTS system will improve the efficiency of the entire gas system by making better use allocated capacity. By research the inaccuracies within the control process should minimise the human interactions and improve capacity strategies.

Method(s)

1. Undertake mathematical and statistical analysis on temperature and demand data and use analytical modelling techniques to analyse the data.

2. Undertake mathematical and statistical analysis techniques to historical alarm activities to analyse data to determine if any patterns exist within the data.

3. Analyse seven years of historical diurnal demand data from 23 NGN offtakes to determine if any patterns exist within the data and if asset behaviour affects these patterns.

4. Employee a post graduate mathematical specialist to research control techniques to determine if we can create control algorithms to better support code compliance.

Scope

This project seeks to identify and determine if past data can be used to create profile demands for weekends and bank holidays. As well as analysing specific data sets to see if any patterns appear which enable us to better forecast demand and indicate the health of our assets. We will do this by using the following:

- Where possible use seven years of data for broadest comparable data.

- Use as many as 23 off takes for more accuracy and determine to patterns and analyse erratic off takes to create a full picture of the behaviour.

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- Data sets we have provided are specific to the requirements we are wanting.

Objective(s)

· Deliver a statement on data supplied by xoserve regarding suitability for use on holiday and weekend factors.

· Provide an independent review on accuracy of the data with recommendations on suitability of models to determine these factors.

· Provide techniques they have used for evaluating existing profile data sets and determine if it is accurate for use in profiling demand.

· Provide an clear assessment of alarm management data and provide evidence of statistical patterns, should these exist in the

data, along with commentary.

· Generate a modelling technique that can accurately profile a pressure controlled offtake and be specific to each individual site.

· Produce a control algorithm to support accurate control of offtake regulators

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

· Produce a more accurate demand profile enabling an improved security of supply and better informed supply/demand balancing

· Better informed investment strategies in GD2 if analysis done alarm data indentifies that certain assets are generating errors

· Improved management of pressure controlled offtakes

· Improve performance of UK Gas Balancing – Primary System Capacity – improved within day performance resulting in reduced penalties to shippers.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

All networks hold a significant amount of demand, alarm and profiling data which provides little learning on what really affects future events and predicting future scenarios. NGN holds around seven years of robust data, prior to this period additional analysis would add little value, which may hold statistical patterns that could inform future operation of the system.

This form of mathematical and statistical analysis can only be provided by highly skilled university post graduate or professional specialists. Newcastle University have with their specialist faculty significant knowledge in this form of modelling, using large quantities of data. NGN believe using less data in the analysis will not provide the completeness and robustness to highlight any patterns.

This stage of the project will take around seven months to complete, using less data would not reduce this duration or costs as the models used identify these patterns within large data sets.

The learning developed as a result of this analysis can then be more easily interpreted by others as local and annual issues will be flattened out of the results. This should make it easier for other GDN's to replicate the techniques adopted.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

The data will all relate to demand sets within North & Yorkshire LDZ's over the past 7 years. The data associated with offtakes will only be obtained from the 23 NGN offtake stations. This provides a complete set which will provide a robust analysis.

Revenue Allowed for the RIIO Settlement

System Control £4.92m over 8 years of RIIO GD1

Indicative Total NIA Project Expenditure

This will be fully funded via NIA as follows: External Funding £70,000 Internal Funding £13,250 Total Funding £83,250

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 will provide significant benefits to customers be reducing the amount of in day gas is purchased to manage the UK gas networks. This directly impacts customers as this in day gas is purchased directly by shippers at the highest price on the day. Any reduction in the amount purchase has a direct impact on shipper's customers.

Project Rating 13/25

Please provide a calculation of the expected benefits the Solution

This is a research project at a very low TRL level.

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

Any models adopted by NGN as a result of this project will be easily replicable by other networks as the data used is standard data sets used by all GDN's to manage the network. The number of sites will be directly proportional to the number of offtakes within the GDN and the type of control systems employed.

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

As this is a research project we cannot at this stage accurately forecast the implementation costs however this is likely to be around £400,000 for the uk.

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 the work completed under this research will be shared with other GDN's to incorporate within their own algorithms and modelling techniques.

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

We described in our strategy how we would research our system control operations so that they better represent the obligations set on the network. This will improve our knowledge of the impact of assets, demand profile, behaviours and data presentation has on the performance of NGN to control its major supply system.

☑ 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