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## NIA Project Registration and PEA Document

### Date of Submission

Apr 2015

### Project Reference Number

NIA\_NPG\_005

## Project Registration

### Project Title

Activating Community Engagement (ACE)

### Project Reference Number

NIA\_NPG\_005

### Project Licensee(s)

Northern Powergrid

### Project Start

April 2015

### Project Duration

2 years and 10 months

### Nominated Project Contact(s)

Andrew Spencer (01977 605672)

### Project Budget

£1,750,000.00

## Summary

The scope of the project is to scale up and trial the GenGame direct control DSR product for residential customers, to run a feasibility trial for up to one year to test and refine the product and, if successful, to expand up to 2000 customers and run the trials up to December 2017 to test for sustainability over a longer period. The data from the trials will be used to develop the predictive planning tool.

### Nominated Contact Email Address(es)

yourpowergrid@northernpowergrid.com

## Problem Being Solved

The growth in low carbon technologies (LCTs) such as heat pumps, electric vehicles and PV systems will increase thermal loading and cause voltage issues on distribution networks. Traditionally, capacity has been delivered by providing higher-rated assets or new circuits through capital investment but DNOs are trialling smarter network and customer solutions to reduce/defer network reinforcement costs. Specifically, the consumption peaks due to increased load and overvoltage due to embedded generation outputting at times of low load remain key opportunities for innovation towards smarter networks.

40% of peak demand is residential and so householders can play a key part in the success of demand side management but engaging solutions are needed to achieve residential and community support and make more demand-side resource available. This project is about activating community engagement, hence its name. Key issues for DNO to address are:

- a) Whether residential participants can be recruited in sufficient numbers in the places required to address the localised network constraint;
- b) Whether participation can be sustained over time and reliably delivered when needed;
- c) Whether the costs of recruitment and operation are less than the counterfactual reinforcement;

d) Whether it is possible for network planners to predict the DSR potential from a particular geographic area based upon knowledge of the customer types connected to the network.

The ACE project will trial an innovative dynamic direct control residential DSR proposition called the GenGame to test whether these recruitment and participation problems can be addressed by this method and whether the data from the project can be used to develop a predictive planning tool.

## Method(s)

We will use an emerging residential DSR proposition called the GenGame to target specific areas on our network across a range of demographics.

The GenGame was initially developed with TSB funding for a small scale trial and proved successful in engaging customers to volunteer domestic loads for curtailment using self-install remote monitoring and control kits in return for financial incentives accessed via participation in a league table.

For the ACE project, the value of DSR is to be aggregated and paid into a community prize fund. Points will be awarded to individual participants based upon the load that they offer for control and the response that they provide during a load control period.

Participants are able to choose a community cause for which they would wish to raise funds and are able to aggregate their points in a community group league table. These aggregated points determine the position of the community group on the league table and their probability of winning funding from the DSR prize pot.

This approach is designed to encourage individual participants to sign up to the proposition and then either join existing groups or form new groups to raise funds for community causes, the intended result being engagement of a wide cross section of the community to deliver high levels of access to controllable demand for the DNO.

We will use the support offered by Durham County Council and local voluntary organisations to identify an initial list of community groups willing to engage with the project but access to the proposition will be open to anyone. Observing the natural spread and uptake by certain demographic groups, as well as the effectiveness on specific network constraints will, hopefully, lead to an effective and scalable product that can be predicted by a planning tool and rolled out across all DNOs in locations where the tool shows it would be economic.

## Scope

The scope of the project is to scale up and trial the GenGame direct control DSR product for residential customers, to run a feasibility trial for up to one year to test and refine the product and, if successful, to expand up to 2000 customers and run the trials up to December 2017 to test for sustainability over a longer period. The data from the trials will be used to develop the predictive planning tool.

## Objective(s)

The primary objective is to incentivise a wide range of residential customers to become engaged in sufficient numbers within specific geographic areas to deliver a large enough DSR response to defer network reinforcement.

The secondary objective is to develop a tool for designers to predict the residential DSR potential in an area with sufficient confidence to know whether this is a strong enough case to consider deploying The GenGame as an alternative to reinforcement.

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

n/a

## Success Criteria

- **Cost effective** (cost compared to traditional reinforcement)
- **Easy to promote and recruit** (based upon speed and effort of recruitment)
- **Quick deployment** (ease of registration, equipment deployment and set-up);
- **Reliable** (size of loads offered and limited use of the override facility)
- **Sustainable** (test for sustained engagement over a 2 year period);
- **Targeted and Predictable** (statistically robust analysis of response over a range of demographics to obtain the data required to develop predictive planning and design tools)

## Project Partners and External Funding

n/a

## Potential for New Learning

n/a

## Scale of Project

The small-scale GenGame trials secured householder enthusiasm and substantial portions of their domestic demands, but this was based on a very small number of participants over just a few months.

Trialling on more homes for a longer duration in specific areas is needed to test its potential to provide a service to DNOs for targeted residential DSR.

The feasibility study to be undertaken during year 1 will help fine tune the proposition with a few hundred participants and assess its potential across a wider range of demographics based upon rate of take-up and initial customer feedback.

The sustainability trials will recruit more customers (up to 2000 if possible) and test for continued engagement across longer timescales to provide statistical robustness for the development of predictive planning tools and allow the development of alternative variants to improve the customer experience and also to address a range of future anticipated network constraints.

## Technology Readiness at Start

TRL2 Invention and Research

## Technology Readiness at End

TRL7 Inactive Commissioning

## Geographical Area

The feasibility phase of the project will take place in Weardale, County Durham, located in areas of network where network constraints could emerge with the increase in connected low carbon technologies.

The encouraging support received from Durham County Council and Voluntary Organisations Network North East (VONNE) will provide useful recruitment support in this area.

Recruitment may extend out of Weardale depending on circuit selection but is expected to be contained within County Durham.

## Revenue Allowed for the RII Settlement

Zero

## Indicative Total NIA Project Expenditure

The funding requirement is £1079k (90% from LCNF/NIA funding and 10% from Northern Powergrid).

£60k has been spent in Q1:2015 under LCNF Tier 1, meaning that the NIA funding requirement for the completion of this project is **£1019k** - £917k (90%) from NIA and £102k (10%) from Northern Powergrid.

## 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)

If the solution is proven to be an effective way to tap into the potential DSR capacity of residential customers it will mean that all DNOs will be able to implement the GenGame DSR solution in network areas where peak demand is forecast to exceed network capacity.

The value of the saving would depend upon the cost of the deferred reinforcement and the number of years over which the reinforcement could be deferred. This will vary site by site and would depend on the growth rate of LCTs and the degree of clustering. If residential DSR can be shown to be viable at half the price of I&C DSR then it is estimated that it could save about £28m per annum at GB scale relative to the adoption of I&C DSR due to a) being a lower cost alternative that makes DSR a viable option sooner than it would otherwise be and b) being available in most locations when I&C resources may not.

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

This is a small scale demonstration that will generate modest benefits at Project scale but, if proven to be successful, could deliver significant benefits at GB scale.

If the customers recruited at Project scale are able to collectively reduce peak loading by, say, £200kW which might defer reinforcement costs of, say, £250k by 8 years then the counter-factual baseline solution would be to try to achieve this reduction from an I&C customers at a cost of less than £8k per annum (£40/kW/yr).

A DSR cost any higher than £40/kW/yr would make the reinforcement the most efficient option.

If the GenGame residential DSR proposition can be shown to cost, say, half the cost of I&C DSR then the incremental benefit of residential DSR at Project scale would be approximately £4k per annum or approximately £12k over the life of the Project.

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

The method applies to residential customers which are a customer type common to all DNOs, whatever the network type. The trial will cover a broad range of demographics and the purpose of the trials is to determine whether the GenGame direct control DSR proposition has universal appeal or is only likely to be successful for certain demographic types. We therefore need to run the trial to find out which demographics will respond positively to the proposition. We believe that if the trial is successful for certain demographic types that this success should be replicable across GB if applied to the same demographic types in other DNO areas.

Residential customers, because of their location on the network, can contribute to addressing constraints at LV through to 132kV although the level of aggregation required to get a significant peak load reduction is likely to favour its use alongside I&C DSR for addressing constraints at EHV and above.

It is estimated that the Solution could provide benefits in the region of £28m per annum at GB scale based upon a 10% take-up rate.

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

The project partners are hoping to develop the GenGame into a DSR platform that stimulates a residential aggregation market to enable residential customers to provide DSR services to network operators, system operators and suppliers. It is intended that the proposition will be able to be run on any smart home energy system and which are becoming more prevalent and which will reduce in cost over time.

It is expected that the cost to a DNO will therefore only be the DSR payments to customers (at a target £/kW/year price of less than I&C DSR), from which the operator of the GenGame would take a percentage to cover recruitment and operating costs.

### **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 project will develop a direct control DSR service that DNOs will be able to procure directly from the developer.

It will also develop knowledge about the effectiveness of such a proposition for different customer / community types which will enable decisions to be made on where best to deploy the technique.

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

n/a

- 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