

## NIA Project Registration and PEA Document

### Date of Submission

Jul 2015

### Project Reference Number

NIA\_WPD\_006

## Project Registration

### Project Title

Sunshine Tariff

### Project Reference Number

NIA\_WPD\_006

### Project Licensee(s)

National Grid Electricity Distribution

### Project Start

July 2015

### Project Duration

1 year and 8 months

### Nominated Project Contact(s)

Matthew Watson – WPD Innovation & Low Carbon Engineer

### Project Budget

£305,000.00

## Summary

The project will have 2 phases; the first will investigate and report on the commercial viability of the tariff, exploring current and future value streams to fund it. Whilst there is clear value to the generator we also want to explore the value for both supplier and DNO. Phase 2 is the domestic demand side response trial. With a tariff subsidised by the supplier, we will investigate the effects of the tariff on demand, exploring the extent and reliability of any increase. Four levels of intervention will be trialled, tariff only, tariff & feed-back, basic automated water heating and fully automated flexible load switching. The tariff will be managed and administered by Tempus however the customer engagement will be conducted by the local energy cooperative WREN.

We envisage that this type of connection could be of particular interest to community energy groups such as WREN who don't have the movability of commercial developers but would have the links to change customer behavior.

No generator will be connected as part of the trial due to the inherent financial risk.

## Problem Being Solved

Distribution Network Operators have an obligation to provide connections to customers in the most cost effective manner. However, due to the high penetration of distributed generation, several areas now require extensive reinforcement before additional generation can be connected. This can add significant time and costs to projects and can often make them unfeasible.

Even with the introduction of alternative connections, where reinforcement costs are avoided on the acceptance of export constraint, the curtailment can be too severe for projects to be viable.

As such there is continued interest in ways of connecting additional generation at minimal costs without compromising the security and quality of supply to existing customers.

## Method(s)

This project will investigate the feasibility of an “offset” connection agreement. With such an agreement, connection to a constrained network will be accepted with evidence that additional demand can be sourced to offset the generation.

By incentivizing domestic demand shifting to times of peak PV output (10am-4pm, April to September), generation should be absorbed locally and have no effect on constraints at higher voltage levels.

This project will trial a reduced “Sunshine Tariff” and determine the effect on demand profiles and its viability as the basis of a connection offer.

## Scope

The project will have 2 phases; the first will investigate and report on the commercial viability of the tariff, exploring current and future value streams to fund it. Whilst there is clear value to the generator we also want to explore the value for both supplier and DNO. Phase 2 is the domestic demand side response trial. With a tariff subsidised by the supplier, we will investigate the effects of the tariff on demand, exploring the extent and reliability of any increase. Four levels of intervention will be trialled, tariff only, tariff & feed-back, basic automated water heating and fully automated flexible load switching. The tariff will be managed and administered by Tempus however the customer engagement will be conducted by the local energy cooperative WREN.

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## Objective(s)

The project will address the following questions:

1. Whether and how an offset connection agreement could be structured to be commercially viable for a generator?
2. Whether and how an offset connection agreement could be structured and implemented to provide confidence to a DNO that the network will remain within operating limits?
3. What mix of low tariff, behavioural signals and technology options would be most effective in shifting demand?
4. What scale, longevity and reliability of demand side response would be achieved by the most effective method?

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

n/a

## Success Criteria

1. Understanding of feasibility of an offset connection agreement for both DNO and developer (including legal arrangements)
2. Understanding of the capacity, longevity and reliability of domestic demand side response
3. Recruitment of over 200 participants in the trial, on time and on budget
4. Retention of at least 80% of participants through to the end of the trial
5. Learning gained in the project successfully disseminated.

## Project Partners and External Funding

n/a

## Potential for New Learning

n/a

## Scale of Project

48 households have been recruited in Wadebridge, Cornwall, to take part in the trial. This number is based on the size of the town and experience to date of the local community energy group in recruiting households for energy initiatives.

Due to the low recruitment, research will focus on qualitative research rather than quantitative analysis.

## Technology Readiness at Start

TRL5 Pilot Scale

## Technology Readiness at End

TRL7 Inactive Commissioning

## Geographical Area

The study area considered is the area fed from Wadebridge Primary substation. As there are no other in-feeds to the local network in normal running, any generation increases could be directly offset by demand on the same network.

Wadebridge is in an area where the renewable energy resources (wind and sun) are very good and consequently, the distribution network is constrained and the EHV network is generally considered to be at capacity. The potential increase in demand would allow extra local generation with zero net effect on the higher voltages.

Wadebridge was also selected due to the presence of the Wadebridge Renewable Energy Network (WREN), a community energy cooperative with over 1100 members. WREN has recently had a proposed 250kW solar array project postponed due to high grid connection costs.

Other factors include the desire to connect additional local renewable generation to a constrained 11kV network and a large number of off-gas-grid customers.

## Revenue Allowed for the RIIO Settlement

None

## Indicative Total NIA Project Expenditure

£274,500

## Project Eligibility Assessment Part 1

There are slightly differing requirements for RII0-1 and RII0-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RII0-2 / RII0-1).

### 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 RII0-2 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 (RII0-1 projects only)

Restrictions in grid capacity have large financial consequences on generation projects. With a standard connection the cost of reinforcement is passed onto the customer and can stretch to millions of pounds. Using the example of WREN's proposed 250kW scheme these were approx. £700k. Alternative connections allow for the reinforcement to be avoided at the expense of potential curtailment. Whilst the project capital costs are significantly lower, the cost of lost generation can be significant. With a timed connection WREN's site expects to lose £390k worth of generation over the project lifetime (approx. 50% of output). An offset connection could allow the reduced capital costs whilst also reducing the lost energy.

The Low Carbon London trial found that households increased demand by an average of 0.05 kW in a half hourly settlement periods during off peak times as a result of a reduced tariff, and that the more proactive households exceeded 0.15 kW. If 25% of households in the UK shifted by the average 0.05 kW over the summer months, this could release up to 325MW of capacity for solar PV projects. If similar benefits to the project in Wadebridge were achieved this could save either £910 million of reinforcement costs or £508 million in constrained energy.

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

The below costs are based on the 250kW, 11kV connection provided to WREN for a PV array.

##### Full connection:

- **Cost of connection;** £700k covering both sole use assets and apportioned costs of 33kV network upgrade.
- **Curtailment;** None but initial delay to connection of 1-2 years

##### Timed connection:

- **Cost of Connection;** £24k for sole use assets
- **Curtailment;** Apr & Sept = 30% of output 10:00-16:00  
May to Aug = 0% of output 10:00-16:00  
This equates to approx. 50% of export or £390k.

##### Offset connection:

- **Cost of Connection;** £24k for sole use assets and £55k to fund the tariff (10% of predicted profits)
- **Curtailment;** Constrained as above if DSR does not match generation. Assuming 90% of generation is matched, the curtailment would cost £78k

The base cost for the scheme would be a timed connection offer.

Base cost = Timed connection = £24k+£390k=£394k

Method cost = Offset connection = £24k+£55k+£78k=£157k

Financial benefit = £394k-£157k=£237k

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

~n offset connection agreement could be suitable in all license areas. It is likely to be more appropriate for community energy projects, as it requires local engagement and the ability to change behaviours over a period of time. A study for DECC estimates that there will be 3 GW of community energy projects by 2020. This would be equivalent to 12,000 projects of a similar size to WREN's. With the distribution network becoming increasingly constrained across the UK, a significant portion of this could benefit from an "offset" connection.

Commercial DG developers may also see the benefit in an offset connection agreement. Following the rollout of smart meters, time of use tariffs are likely to become more widespread, making local tariffs that are linked with local generation more feasible.

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

As the method is based on commercial solutions rather than technical innovation, the costs of rolling out the method across the UK would be relatively low. Once initial frameworks and agreements are established subsequent installations shouldn't be capital intensive. At most a disconnection relay and a communication link with the DNO or supplier would be needed. There will be ongoing costs of funding the tariff which must be borne by the generator however other value streams may be identified to help contribute (phase 1 of the project). Again these may require the redesign of certain billing systems however once established should have very few maintenance costs

Finally there may be additional costs for supplier to administer extra local tariffs, however this is already incorporated into the business models of several suppliers.

## Requirement 3 / 1

Involve Research, Development or Demonstration

A RII0-1 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 learning generated is directly applicable to all Network Licenses as generation connection is a part of a DNO's core business. If an offset connection agreement is proven to work, other DNO's may be interested in providing this alternative or something similar to enable connections to go ahead that would otherwise have made projects unviable.

An offset connection agreement might also provide a solution to the additional difficulties faced by community developers in getting an affordable generation connection to the network. This is something of interest to DECC and Ofgem and is being explored through the Smart Grid Forum Work Stream Six.

Should an offset connection prove viable, standard techniques and legal agreements shall be determined and made available to all Network 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)

The Sunshine tariff project addresses both the Low Carbon Networks and the Smart Grids & Meters areas of WPD's innovation strategy. The Project is detailed in section 6.8.10

☒ 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