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

May 2017

Project Reference Number

NIA_NPG_016

Project Registration

Project Title

Silent Night – Hybrid EV Generator

Project Reference Number

NIA_NPG_016

Project Licensee(s)

Northern Powergrid

Project Start

May 2017

Project Duration

3 years and 3 months

Nominated Project Contact(s)

Andrew Webster (Project Manager)

Project Budget

£420,000.00

Summary

The output of this project will be 2 or 3 prototype vehicles with battery inverter generator units of 40kVA output installed in fleet (or very similar) electric vehicles that can be used on a network faults affecting an estimated 1 to 7 domestic customers on single or three phase networks across our regions, ideally it will be suitable for single and looped premises and end of LV network faults. The system will be fitted with an inverter making it suitable for single or three phase operation and protection panels.

It is intended that this project will demonstrate the efficacy of this approach for all generator applications with the target that 50% of the current fleet could eventually be replaced.

Third Party Collaborators

Turntide Technologies Ltd

Off Grid Solutons Ltd

Nominated Contact Email Address(es)

yourpowergrid@northernpowergrid.com

Problem Being Solved

The use of standard diesel generator sets to provide power is generally extremely fuel inefficient and noisy in certain environments. Generation requires to be sized for the peak assessed load resulting in the unit running well below capacity for most of the time.

Consequently running cost, noise and CO2 emissions are in excess of what could be achieved with a more efficient method of generating temporary power. Northern Powergrid deploys generators approximately 2500 times each year on fault activities.

Hybrid solutions, using electric vehicles, and/or small scale generators in tandem with electrical storage look promising alternatives to

standard diesel generators but have limitations with size and transportability due to long trailer solutions.

Method(s)

The project will develop a fleet-vehicle mounted hybrid technology unit that will be rated at 40kVA three phase, corresponding to a standard domestic supply mains cable, allowing the equipment flexibility to supply individual houses or small clusters of them in the event of a network fault or planned power outage.

In these situations the provision of supply via the hybrid unit will give a large benefit in terms of effected customers' satisfaction and for their neighbours, along with the environmental benefits in fuel consumption, noise and emissions.

The developed system will be installed in two or three separate vehicles which will then be operated alongside the current restoration generation fleet for around two years.

The project will then assess the characteristics, both operational and economic of such technology, particularly compared with current standard generator solutions. Recommendations as to whether to adopt this will be made.

Scope

The output of this project will be 2 or 3 prototype vehicles with battery inverter generator units of 40kVA output installed in fleet (or very similar) electric vehicles that can be used on a network faults affecting an estimated 1 to 7 domestic customers on single or three phase networks across our regions, ideally it will be suitable for single and looped premises and end of LV network faults. The system will be fitted with an inverter making it suitable for single or three phase operation and protection panels.

It is intended that this project will demonstrate the efficacy of this approach for all generator applications with the target that 50% of the current fleet could eventually be replaced.

Objective(s)

Determine whether a 40kVA hybrid generator system can be safely installed in a standard sized fleet vehicle.

Develop and fully test communications, tracking and control systems ensuring compatibility with our current, or modified, operational approach.

Determine operational characteristics of such a vehicle

- Assess carbon footprint, fuel usage, support time, recharge motor utilisation, noise pollution etc, etc.
- Assess maintenance regime, battery life etc.

Determine the operating economics of such a vehicle, across the full asset life cycle, and make comparisons with alternative approaches.

Assess and make recommendations for broader adoption.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The project will be judged a success if:

Hyperdrive and Offgrid Energy can determine whether it is possible to integrate the assemblies within the vehicle and ensure drivability and safe payload carrying limits are satisfied.

Northern Powergrid can complete testing and authorisation of system design and functionality.

Northern Powergrid can assess the full system, in operation, and report its performance

Hyperdrive, Offgrid Energy and Northern Powergrid can complete and publish the closedown report and disseminate the knowledge generated to the industry.

These are successive criteria and the project may be successfully halted at any of these intermediate outcomes depending on results obtained.

Project Partners and External Funding

None.

Potential for New Learning

The potential for new learning is high. The project objectives are directly related to the development of that learning. The learning will be further developed post-project.

The project builds on the work undertaken by SSE in developing trailer mounted hybrid generator solutions. This project seeks to take that further by producing a more mobile system using the latest in vehicle battery technology and then assessing the effectiveness, both technically and economically of that solution to a major environmental issue.

Scale of Project

The project is small scale. Working with Hyperdrive, a specialist designer of electric vehicle systems, and with Off Grid Energy, with a track record of producing hybrid generator systems the project intends to produce two or three prototype vehicles using hybrid generator technology. These will be tested in real world restoration applications and an assessment of their technical, environmental and economic performance will be undertaken. This will be compared with the current standard generator solution.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Mobile solution to be trialled across Northern Powergrid's two licence areas.

Revenue Allowed for the RIIO Settlement

None.

Indicative Total NIA Project Expenditure

£420,000

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)

Anticipating a full roll-out across the GB network total savings would be in excess of £3.7m per annum with additonal but unquantified collateral environmental and nuisance improvement benefits.

Please provide a calculation of the expected benefits the Solution

Base cost for operation of generators (at 40kW)= 50*£0.8= £40/day

Method cost for operation of hybrid technology=30*£0.8= £24/day

Base cost- method cost)= £16/day

Total operational cost saving = £16/day*360 days* 3 units= £17,280 per annum.

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

The Method could be applied across all Network Licensees with particulalr initial appicability to LV networks. subsequent developments would be applicable to any part of the network that requires, from time to time, generator support for network restoration.

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

This project produces a substitution for a current generator technology. The project target is to have the new technology cost neutral when compared with current leasing and ownership costs. We anticipate that hybrid technology would replace diesel generator sets as part of the normal replacement cycle. Consequently roll-out costs would be minimal.

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 operate similar generator fleets. Consequently the learning generated will be relevant to all GB network operators and operating areas..

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

This project directly meets two of our stated innovation needs: reduced environmental impact and that of reducing the impact of interruptions on our customers.

☑ 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.

Whilst building on the work of a previous SSE project this work seeks to take those previous findings further and to develop a compact, cost effective and environmentally sound hybrid generator solution which provides greater options from an operational perspective than either the SSE development or current standard generators.

We can find no evidence of similar solutions in the marketplace. Collaboration with two of the UK's leading developers in this field (Hyperdrive and Off Grid Energy) also provides confidence that the solution is new and industry leading.

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