

Low Carbon Networks Fund: Screening Submission Pro-forma

Notes on completion

Before completing this form, please refer to the LCN Fund Governance Document.

The typeface, font size and colour for the text entry areas are predetermined and cannot be changed. Please ensure all content is contained within the boundaries of the text areas. The full-completed submission should not exceed 6 pages in total.

Ofgem will publish all the information contained within section 1.1 following the ISP deadline and we will publish the information contained within section 1, 2 and 3 following the Full Submission decision.

Section 1: Project outline

1.1. Project summary

Project title

South Liverpool Smart Grid Trial

Project purpose

Provide a narrative that explains the problem the Project, is seeking to address and the solution it is using to solve the problem. Detail how the project meets one or more of the specific requirements set out in paragraph 2.8 of the Initial Screening Process chapter of the LCN Fund Governance Document

ScottishPower Energy Networks (SPEN) are developing plans to create a Smart Grid trial within the densely populated inner city area of South Liverpool. The primary aim of the trial is to reduce the carbon footprint of the area by incorporating a number of active (smart) elements that are designed to reduce / manage energy demand and facilitate the connection of renewable / low carbon distributed generation. This area was identified as being an ideal site for a smart grid trial as part of the DNO funded EATL strategic technology programme (STP5). The area of the proposed trial is in the process of a major programme of urban renovation and regeneration. SPEN are been working closely with Liverpool City Council (LCC), and other stakeholders, to coordinate plans for a Smart Grid trial that will complement the regeneration programme. The trial is seeking to optimise the integration of low carbon distributed generation, energy storage and monitoring of energy usage within the Smart Grid area. The proposed smart elements have been selected on the criteria of using proven technology that can actively contribute to reducing the carbon emissions associated with the energy used by the 10,000 plus customers within the Smart Grid area. All of the proposed smart elements align with the “Key elements of a UK smart grid”, as listed in Box 10 of the DECC publication: The UK Low Carbon Transition Plan, July 2009.

By working with the local council and other stakeholders SPEN believe that this project represents an excellent opportunity for a UK DNO to cost effectively develop a Smart Grid trial that will deliver benefits to both local customers and to society in general. The key elements of the Smart Grid trial for SPEN are: customer engagement, facilitating the connection of distributed generation, energy storage, network monitoring, automation and control. This project will look at how these components are best integrated with the existing infrastructure as well as with each other.

Estimated Project funding

Please provide an approximate figure of the total cost of the project and the LCN funding you are applying for

Total cost of Project

£6.0M

LCN funding requested

£4.5M

1.2. Additional Project details

Funding commentary
<p><i>Provide a commentary on the accuracy of your funding estimate. If the Project has phases, please identify the approximate cost of each phase</i></p> <p>Phase 1, year 1: Customer Engagement – to be partially funded by project partners Network Monitoring Facilitate Connection of Generation Budget Cost ~£2.0M</p> <p>Phase 2, years 2 - 3: Installation of energy storage devices at 6.6kV and LV Facilitate the installation of distributed generation at 6.6kV and LV and EV charging points –DG funded by 3rd parties Installation of heat pumps – Heat Pumps funded by third parties (customers or project partners) Installation of Low Loss Transformers – funding of the marginal cost only Ongoing customer engagement – to be partially funded by project partners Network monitoring and validation of energy savings Analysis and dissemination of learning from project Budget cost ~£4.0M</p> <p>Project management costs and customer engagement have been included within each Phase.</p> <p>SPEN are currently in discussion with technology providers and other stakeholders (collaborators) to determine how much funding can be provided from sources other than the LCNF. Therefore the actual cost of the project is still subject to change depending on which company(s) / organization(s) SPEN select as partners.</p>
Project solution
<p><i>Provide specific details of the solution which you are trialling, including details of specific network conditions where the trial is taking place</i></p> <p>This trial is seeking to optimise the use of distributed generation, energy storage and energy usage, in order to minimise the carbon footprint of the 10,000 plus customers within the Smart Grid area. This trial is an expansion of a much smaller (Tier 1) trial that is planned to start in Q3 2010; the Tier 1 project was born out of a collaborative IFI project that identified a process for developing a small scale Smart Grid trial. The Tier 1 project is confined to a brown field site of some 1200 customers, and is designed to assess the behaviour of customers and the network, when presented with smart metering and small scale PV generation. The Tier 2 project will build on the stakeholder engagement of the Tier 1 project to support the trialling of the following smart elements:</p> <ol style="list-style-type: none"> 1. Integration of renewable generation and storage in such a way as to balance the benefits to the network and community, optimising the use of the energy generated by the distributed generation. Storage will be trialled at LV and HV substations and at a major LV customer's site. 2. Introduce a new layer of communication for the transfer and monitoring of network data on the HV and LV system in real time. Using this information to facilitate the connection of DG, minimise losses, balance loads, demonstrate carbon/energy reductions and enhance the utilisation and flexibility of the network. 3. Monitor the quality and load on the LV network, in order to reduce the duration of unplanned outages (faults); and to investigate the impact of micro generation on load flows and losses. 4. Collate data from monitoring to assess the impact of micro generation, heat pumps and electric vehicles on the network and energy utilisation. 5. Use collated information to validate the carbon savings attributed to the Smart Grid and influence future network design.

Section 2: Eligibility criteria

In the space provided below, please demonstrate below how your project meets all of the following eligibility criteria:

Accelerates the development of a low carbon energy sector

Demonstrate how the Project makes a contribution to the UK's Low Carbon Transition Plan, as set out by DECC. Outline carbon benefits which the Solution you are trialling delivers and explain why the solution accelerates the realisation of these benefits over and above conventional solutions. These benefits can be explained in a qualitative manner for the purpose of screening

The trial will assess how local energy storage can be used as a repository for energy generated from local distributed generation at times of low demand. With the intention that the same storage device can then be used as a source of supply to the local area at times of high demand. The primary aim of this aspect of the trial is to reduce the carbon footprint of the Smart Grid area by reducing network losses and reducing the need for centralised 'peak lopping' generation. As the trial develops the customers will be provided with updated information on how the scheme is working and how they can contribute to improving the efficiency of the process, ie the introduction of customer led demand side management, facilitated by information on and knowledge of the savings that their actions can deliver.

This approach is designed to encourage the concept of an energy cooperative within the Smart Grid area, where customers can see their role in participating in a more effective use of the locally generated energy. The monitoring of network loadings and condition will allow SPEN to optimise the capacity of the network and so facilitate the connection of additional distributed generation and / or environmentally friendly loads, such as heat pumps and electric vehicles.

This process will also help to influence how future networks are designed to facilitate new low carbon technology as well as improving our understanding of the existing network and how it can be operated with a lower carbon footprint.

Has a direct impact on the operation of the distribution network

Set out the Solution you are trialling and make a clear case as to how the Solution described in Section 1 directly impacts on the operation of your network

The primary justification for installing network monitoring, automation and control systems is the requirement for dynamic information on network loadings and voltage levels so that SPEN can understand the dynamic capacity of the network, in order to facilitate the low cost connection of additional distributed generation and environmentally friendly loads, such as heat pumps and electric vehicles.

An additional benefit of network monitoring is that SPEN will be provided with information that will enable the early detection of the onset of some network faults. This will allow SPEN to take preventative action to avoid unplanned customer disconnections. For all other faults the monitoring systems will provide faster detection and restoration. Therefore, it is expected that network monitoring will lead to a reduction in CI's and CML's.

The 6.6kV and LV networks in Liverpool are run as closed rings (interconnected network), which is almost totally unique in the UK. This arrangement creates complex power flows not seen in other licence areas and not visible to SPEN in most cases. The use of network monitoring in the Smart Grid trial is therefore an essential tool for SPEN to understand changes in network dynamics in the Smart Grid trial.

The use of storage and monitoring will both contribute to a better understanding of network loadings throughout any day, this information will greatly enhance the prospects of connecting additional loads at least cost, for example heat pumps and electric vehicles.

Focuses on a network solution which is at the trialling stage and which requires Second Tier funding

Demonstrate why you have not previously used this Solution (including where the Solution involves commercial arrangements) and why LCN funding is required to undertake it. This must include why you would not run the trial as part of your normal course of business and why the Solution is not R&D

The aim of this trial is for SPEN to make use of proven technology, ready for deployment in a trial environment: energy storage, customer behaviour and network monitoring within a Smart Grid, in order to optimise the capacity of the existing network. The intention is that the extra capacity will be available to facilitate the connection of more distributed generation and more environmentally friendly loads, such as heat pumps and electric vehicles.

To make the most of the opportunities to work with a broad range of stakeholders SPEN have proposed a project that spans the HV and LV networks within a densely populated urban area, this necessarily means a larger investment in network assets and customer engagement, beyond the much smaller scale Tier 1 project described earlier in this submission (Project Solution). Discussions with council representatives and other stakeholders during the preparation of this Tier 2 submission have emphasised the need for effective customer engagement, beyond that planned for the Tier 1 project. This needs to be employed from the very start of this project if the Smart Grid trial is to be well received and seen as complementary to the renovation and refurbishment works that are planned for this area, which is recognised as being one of the most deprived areas of the city.

All of these aspects mean that this will be a large project, in terms of the required assets (in particular energy storage, network monitoring and communications); stakeholder engagement and coordination; and the extent of the HV and LV network. These are best delivered as a single Tier 2 project in order to capture the learning from all these technologies at once. This project has the potential to deliver real and enduring benefits to both the local area and to UK society in general. For all these reasons this project requires second tier funding if it is to become a reality.

Has the potential to deliver net benefits to existing and /or future customers

Demonstrate that the Solution you are trialling has the potential to deliver net carbon and financial benefits to existing and /or future GB energy customers

Information collated by SPEN from the network monitoring, will lead to a reduction in the overall energy usage for the present levels of demand; and will also support the connection of new loads such as heat pumps and electric vehicles, without exceeding the capacity of the network. These actions should bring about a reduction in UK's CO2 emissions and a reduction in energy bills for the local customers.

As previously mentioned, the use of network monitoring, energy storage and the integration of distributed generation will both optimise the use of the network and facilitate the connection of low carbon technologies, such as heat pumps and electric vehicle. These actions will encourage the take up and support of environmental initiatives in a very deprived area of the City, complementing the actions and initiatives of the local council and other stakeholders.

By bringing new technologies and a Smart Grid trial into the Liverpool area, we believe that the Smart Grid trial would assist Liverpool in being one of the leading cities in EV deployment. Through the trial, the take up of feed-in-tariffs for electricity and the use of the renewable heat incentive, will encourage the use of low-carbon energy and will assist in bringing low-carbon jobs into the region.

Creates new knowledge that can be shared amongst DNOs	
<i>Explain the learning which you expect the Solution you are trialling to deliver. Describe the methodology you will use to capture the learning from the trial</i>	
<p>The use of storage and customer behaviour to optimise the integration of distributed generation could provide SPEN and other DNOs with an alternative to reinforcement when faced with the connection of a distributed generator that exceeds the capacity of the incumbent circuit. In addition, the use of network monitoring will lead to a better understanding of network loadings that could lead to a review of the assumed capacity of existing networks and design procedures.</p> <p>Quantative data will be captured as part of this project which can be used by the wider industry to influence future network design and integration of this technology. It is intended that the information gained during the course of this trial will be presented to other DNOs and academia, in order to support the introduction of other Smart Grid trials in the UK and possibly overseas.</p>	
Does the project conform to the default IPR arrangements set out in the LCN Fund Governance Document? (Y/N)	
<i>If no, then please describe the IPR arrangements and demonstrate how the learning from the Project can be disseminated to other DNOs taking into account any potential constraints or costs caused or resulting from, the proposed IPR arrangements</i>	
<p>Full IP arrangements have not been finalised with the project partners, however it is expected that this project may generate foreground IPR. If this is the case SPEN will ensure that the IPR arrangements comply fully with Ofgem’s requirements for LCNF Tier 2 projects.</p>	

Section 3: Additional information

Please use the following section to add any further detail you feel may support your submission
<p>The attraction for SPEN is the level of support for the Smart Grid trial that has been expressed by other major stakeholders: Liverpool City Council (LCC), The Mersey Partnership (TMP) and Plus Dane Group (PDG) registered social landlord in recognition of Toxteth being one of the most deprived areas of Liverpool. These organisations have been responsible for a huge amount of regeneration and refurbishment work in the area; this work has seen the development trusted relationships built between these agencies the local communities, something that will be crucial to the success of any Smart Grid trial. LCC have been extremely supportive of SPEN’s plans for a Smart Grid trial in the area, recognising the potential benefits that this trial could bring to a large and diverse range of customers, many of whom would be categorised as being in fuel poverty. Echoing the words of the ENSG Smart Grid Vision document, this project has been designed to the ethos of: "Think big, Start small, Scale fast".</p>

Section 4: External Collaborators

External Collaborators' details

Please use the space below to provide the name and business type of any External Collaborators who have contributed funds and /or resources to a Project, or describe the type of External Collaborators you may be seeking to attract

- EA Technology (Smart Grid Design & Project Management)
- Liverpool City Council (local council for the area)
- The Mersey Partnership (Inward investment & Economic generation - public & private partnership)
- Plus Dane Group (Largest registered social landlord in the area; working with LCC to manage the renovation and regeneration works in the area)
- Energy Storage Manufacturers (potential partners for the trialling of equipment and operating solutions, eg DNO leasing the storage devices)
- Network monitoring and communication technology providers
- Energy suppliers (smart meters, EDDs and customer engagement)
- Electric Vehicle charging point operators (in support of the 'Plugged in Places' initiative submitted by Mersey Travel)
- Commercial customers (eg new Eco supermarket planned for the area)
- Industrial customers (both within the area and in support of the area – EV manufacturers and PV panel manufacturers)
- Academia – local (University of Liverpool) and national (University of Strathclyde)

Section 5: DNO details

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