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 should not be changed. Please ensure all content is contained within the boundaries of the text areas. The full-completed submission should not exceed <u>6 pages</u> 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
Thames Valley Vision: Demonstrate how SSE can prepare to meet the anticipated 'low carbon customer' demands, at lowest cost, without imposing delays or impacting Quality of Supply (QoS).

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
SSE's core purpose is to 'provide the energy people need in a reliable and sustainable way.' Managing networks efficiently and effectively and investing in them appropriately is essential in order that we can fulfil this purpose. Our network in Bracknell, Berkshire is close to capacity and demands on it are projected to increase, not least due to the introduction of new low carbon technologies. We propose to model, monitor and manage an alternative option to traditional network reinforcement to decide whether there are more efficient and effective ways to reliably meet the needs of our customers over the next several years. We propose to: - Model and forecast how energy will flow in a low carbon distribution network to create load profiles applicable to a low carbon world and use this information to inform our investment plans.   - Monitor real time data on our systems to identify low carbon-related network constraints before they begin to have an effect on quality of supply.   - Manage our network by using newly installed technology and engaging industrial, commercial and domestic customers in programmes which will deliver real benefits to them.   - Engage stakeholders including energy suppliers and metering businesses in initiatives to deliver the best solution for the area.   - Share our findings to help inform decisions on network management and investment across the UK.

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	£25m	LCN funding requested	£18m

1.2.   Additional Project details

<table>
<tr><td>Funding commentary</td></tr>
<tr><td>Provide a commentary on the accuracy of your funding estimate. If the Project has phases, please identify the approximate cost of each phase</td></tr>
<tr><td>

The total project cost and LCN funding request has been developed from a detailed set of component project deliverables. These deliverables have been timelined, which could allow LCNF requests to be 'staged' according to when LCN Funding is made available – ie: Sept.2010, April 2011 etc. This will allow Ofgem to witness the progress made/ benefits seen in each stage prior to subsequent fund release; and allow SSE to amend the funding requests in light of learning points during the Project.

The deliverables include monitoring and energy storage devices, academic studies, comms (software and infrastructure) and operations systems , learning centre development costs and Demand Response (DR).

SSE anticipates significant funding (both 'in kind' and direct financial contributions) from our partners/ collaborators.

Project costs and funding requests proposed here may vary at the Bid Stage due to certain funding alternatives not materialising, some project deliverables still being subject to scope and scale clarification, and issues such as exchange rate fluctuation.

</td></tr>
</table>

<table>
<tr><td>Project solution</td></tr>
<tr><td>Provide specific details of the solution which you are trialling, including details of specific network conditions where the trial is taking place</td></tr>
<tr><td>

The new approach for a "low carbon ready network" is summarised as 'three Ms': Model, Monitor & Manage.

Model – forecast the low carbon network:
- With academic support, create new low carbon demand and generation profiles to indicate the impact of solar PV, heat pumps, EV charging together with a series of forecasts of likely customer adoption/take-up.
- A semi-automated network analysis process will be used to identify those HV/LV networks likely to require LR capex including the creation of HV and LV Load Indices.

Monitor – the modelled high loads and other network constraints:
- Retrofit LV SCADA at each LV distribution substation in the trial area, plus operational integration of data from 40-50 3-phase commercial/industrial and ~1000 domestic smart meters. Deploy HV/LV dynamic plant rating schemes, where appropriate.
- Deploy 'DCC-proxy' meter communications and data management service.
- Overall the monitoring exercise will encompass approximately 32,000 customers and will enable the identification of network constraints within both planning and operational time-scales.
- Use data to validate the modelling.

Manage – network constraints:
- Engage with both domestic and industrial/ commercial customers to highlight specific local network constraints and/or potential dispatchable demand.
- Install constraint management system(s) at selected operational locations (Control Centre, local grid/primary sites).
- Deploy storage solutions at selected operational and consumer (if practicable) sites.
- Deploy HV network automation to enable constraint management via network reconfiguration.
- Deploy constraint management using appropriate operational signalling to dispatchable operational and consumer devices via 'DCC-proxy' system(s).

</td></tr>
</table>

Section 2: Eligibility criteria

In the space provided below, please demonstrate below how your project meets <u>all</u> 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 focus of this project is to ensure more low carbon technologies can be safely and securely connected to the system in the most cost effective manner whilst at the same time promoting lower carbon solutions. It is conducted on such a scale and in such a manner that individuals, communities and businesses across the UK will see the opportunity and derive the benefit. As such, the project is directly aligned with making significant contributions to the Low Carbon Transition Plan:

These objectives will be met by:
- Monitoring an entire primary network from the Bracknell primary substation, down to an identified series of LV substations and the monitoring of <u>all</u> end-use points (domestic, business and street lighting) from one of those substations;
- Enabling more micro-generators to connect to the network by trialling solutions that will mitigate network constraints;
- Enabling the electrification of heating and transportation by permitting/ encouraging the connection of large numbers of electric vehicles and heat pumps;
- The development of suitable tariff structures and/or reward schemes to facilitate Demand Response;
- The use of micro storage to create synthetic loads that enable real demand and generation export situations to be created while at the same time evaluating the benefits of locally aggregated storage for network optimisation; and
- Creating a tracking and inferencing model that will identify the load consequences of new low carbon solutions, and matching those to the demographic take-up of such solutions.

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 solutions that are being proposed will allow the Bracknell network to be operated more efficiently and the anticipated demand growth managed more effectively. This will include how SSE will address future network planning and the technical and commercial arrangements available to select the optimum means to meet new demands. This will also address how the low carbon challenges affect the network. Specific examples include:

- New demand profiles will be tracked and their anticipated behaviours inferred by self-learning logic;

- The 'observability' of the LV network will be attained for the first time ever by means of sensors and modelling to ensure that quality and security of supply is effectively managed as new low carbon devices are connected;

- The new complexity of power flows will be tracked and understood, especially as local generation and storage sources appear throughout the network;

- Active network management including voltage control, fault level management and intelligent switching will be deployed and evaluated as needed to maintain operational security;

- It is anticipated that the learning from this project may lead to certain operational documents to be re-written eg. G83.

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 present DPCR5 business plan, as agreed with Ofgem, does not support the deployment of the solutions identified for LCNF.

These solutions are expected to be cost effective in comparison with traditional network investment However there are a number of risks which make this investment unattractive without the protection of the LCNF (shown below):

§ The behavioural response of customers, suppliers and other parties may not be as anticipated;
§ The broad range of complex relationships with stakeholders;
§ Uncertainty of network behaviour when scaled up
§ Interactions between different aspects of the project
§ Longevity and sustainability of the commercial arrangements that will be put in place
§ Areas of the trial that are on the boundary of existing regulatory frameworks that should be trialled under the relatively controlled environment of the LCNF

The network solutions that we envisage implementing has never before been applied in this way and we are therefore demonstrating something entirely new.

For the above reasons SSE would not implement this project without the availability of the LCNF and the risk protection and funding that Tier 2 provides.

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

SSE has identified the following potential benefits by stakeholder (including customer groups):

- Domestic Customers – Ability to connect and manage more cheaply and quickly new low carbon devices (for example, Electric Vehicles, e-heating, micro-generation, heat pumps); to have the choice of new pricing/tariff structures at lower cost; appropriate level of customer service; a reduction in fuel bills to Fuel Poor ; a reduction in cost of network reinforcement.
- I&C Customers – Meet CRC Energy Efficiency obligations quicker, cheaper and more easily; appropriate customer service; present new commercial opportunities for business e.g. selling storage capacity or DR.
- Local Government – Assist with CERT/ CESP and other energy efficiency obligations / Nottingham declaration on climate change / promote local development and provide leverage for inward investment.
- DNO – Review appropriateness of current regulatory framework to best accommodate the low carbon customer; lower 'low carbon network' investment than would be achieved by traditional means; gain clear understanding of how a smart network can best be planned, designed, deployed, operated and optimised to maximise use of low carbon technologies and minimise system losses and give a reduction in CO_2 emissions from local generation mix.
- Energy Supplier – Development of new pricing/tariff structures; customer reward mechanism.
- Regulator – Inform DPCR6 process and allow both regulator and DNOs to better plan for low carbon networks.
- TSO/TNO – Provide insight on operation of the UK network of the future to enable the low carbon economy, quantifiable benefits from DR and demonstration of interaction of a holistic generation portfolio.
- Technology Provider – Deployment of large-scale demonstration of innovative technologies to provide example for future customers; product proof, market evaluation and product evolution.
- Future/ New Opportunity - Identify potential new stakeholder roles eg. Distribution System Operator, ESCos etc.

Creates new knowledge that can be shared amongst DNOs

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

The project will generate answers to a number of important questions (shown below):

- What is the potential for DR to off-set the need for traditional network reinforcement?
- What are the most effective ways of gaining customer engagement?
- Does customer engagement result in a more effective DR service being available?
- How can 'active customers' be modelled for planning, operating and forecasting purposes?
- Can open systems be created to operationally support multi-vendor solutions effectively?
- To what extent can distributed micro storage benefit network management?
- Review industry governance, engineering, planning documents and codes of practice.

This project has the primary aim of producing a robust knowledge bank to inform future investment in Smart Grid technologies, in particular with a focus on the short to medium term. We expect the modelling tools and outputs to be used to inform investment in Smart solutions in DPCR6 and increasingly beyond this.

The learning from this project will be collected and disseminated via a local interactive learning centre supported by local universities, councils and communities. There will also be white paper studies and web articles where appropriate. Foreground IPR will be treated in accordance with Tier 2 governance.

Does the project conform to the default IPR arrangements set out in the LCN Fund Governance Document? (Y/N)	Y

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

N/A

Section 3: Additional information

Please use the following section to add any further detail you feel may support your submission

We feel that academic involvement is vital to the success of our project. We will therefore be working closely with the University of Reading, Imperial College and Strathclyde University. An additional benefit of this partnership is the support of added funding from the universities, the digital economy programme and legacy support from the Centre of Smart World Analytics (CSMA).

We also want our project to provide a scalable infrastructure to support the demonstration of future low carbon solutions, e.g. expansion of Arqiva's water meter project into Bracknell (currently centred in Reading).

We also have an aspiration at a later stage to enable smart water and gas demand/ consumption modelling, monitoring and finally management.

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
External Collaborators/ Lead Sponsors: Southern Electric Power Distribution (SEPD), KEMA, GE Digital Energy, Bracknell Forest Council, South East of England Development Agency (SEEDA) Project Supplier/ Component Collaborators: § Energy Suppliers - Good Energy, Scottish Power, npower, Southern Electric § Network Management - Smarter Grid Solutions, S&C § Housing Associations - Guinness Trust, Bracknell Forest Homes, Bracknell Residential Association § Comms - BT, Cable & Wireless, Arqiva, Electralink, Alcatel-Lucent § Monitoring - Nortech, Sentec, CURRENT Group § Renewables - Solar Century, Geothermal International, Anaerobic Digester co. § Energy Storage - Mitsubishi Electric, GE Digital Energy, S&C § Modelling - Digsilent, University of Strathclyde, Imperial College, Reading University All of the above have signed confidentiality agreements and have verbally expressed their commitment to the project. Discussions are ongoing with a view to securing further contractual agreement before 3 September 2010. It is anticipated that we have c40-50 I&C and SMEs contracted before final submission in September. External Funder: As majority supplier in the Thames Valley area, SSE supply has agreed to install 1000 smart meters regardless of the success of this bid.

Section 5: DNO details

Company
Southern Electric Power Distribution plc
Contact name
Brian Shewan
Contact Address
55 Vastern Road, Reading, Berkshire, RG1 8BU
E-mail
brian.shewan@sse.com
Direct telephone line
0118 953 4681
Position
Project Manager