

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 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

Corridor Manchester Smart City Project

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

This LCNF Project aims to lead the collaborative low carbon effort in the “Corridor Manchester” and to exploit the learning for the benefit of Greater Manchester, the North West and the UK. ENW will deliver this objective by retrofitting the existing distribution network in the Corridor with Smart Grid technologies and systems to:

- deliver extensive distribution network intelligence and remote management to provide active control of the increasingly diverse and dynamic load flows and manage local network constraints onto an existing network;
- introduce a Distributed Energy Management System (DEMS) to coordinate distributed energy resources with demand side controls, to reduce peak and overall net demand in the Corridor area;
- integrate remote management of Electric Vehicle charging points and Distributed Generation within the Corridor into the DEMS as managed energy assets and to address resulting load management and/ or power quality issues; and
- Deploy a Cyber security solution designed to maintain the integrity of the network assets, operational systems and data systems interfaced with the Project.

The Corridor area is of strategic importance to the development of the North West; the Corridor Partnership is a unique relationship between Manchester City Council, the University of Manchester, Manchester Metropolitan University and the Central Manchester Foundation Hospital Trust formed to promote the sustainable development and economic growth of the area. The Corridor Partnership seeks to increase the Gross Value Added (GVA) by 40% to £4.7bn by 2020 and create an additional 22,000 jobs. The Partnership has prioritised the acceleration of carbon abatement and has been designated as Greater Manchester’s “Low Carbon Laboratory” as the test bed for low carbon inventions. A recent study highlighted a potential 26MW load growth to deliver its GVA targets. Reinforcement of the distribution network would increase the area’s carbon footprint and restrict the Corridor’s ability to achieve Manchester’s 41% reduction in the carbon footprint target by 2020.

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

£9.7 million

LCN funding requested

£8.2 million

1.2. Additional Project details

Funding commentary

Provide a commentary on the accuracy of your funding estimate. If the Project has phases, please identify the approximate cost of each phase

The three year Project is broken down into the following discrete phases:

<u>Phase</u>	<u>Description</u>	<u>Cost</u>	<u>Indicative timing</u>
Phase 1:	Detailed specification and preparation	£1,198,000	(Jan 2011 to Apr 2011)
Phase 2:	Initial deployment, testing and outputs	£3,244,000	(May 2011 to Apr 2012)
Phase 3:	Full deployment	£3,737,000	(May 2012 to Dec 2012)
Phase 4:	Operation, assessment, reporting and dissemination	£1,493,000	(Jan 2013 to Dec 2013)

Indicative Project Total Cost £9,672,000

The figures above reflect preliminary discussions with vendors and partners regarding cost assessments of the proposed solutions and activities. We believe these initial projections are accurate to within a 25% tolerance. These figures are subject to further detailed contractual negotiations as part of the subsequent project planning process and several vendors have indicated they will fund themselves, at least, 10% of their expected costs to the Project.

Objectives and deliverables will be identified for each phase of the project. The learning from each discrete phase will be captured and disseminated via a closedown report for each phase.

As the trials in Low Carbon Laboratory accelerate further collaborative opportunities will be identified and so ENW expects to seek Low Carbon Network funding to deliver further Project(s) and/ or phases.

Project solution

Provide specific details of the solution which you are trialling, including details of specific network conditions where the trial is taking place

Within the Corridor area, the ENW network consists of one Bulk Supply Point and four Primary substations, distributing power across a 6.6kV network. Major reinforcement to the 6.6kV and 33kV distribution network would be necessary to accommodate the projected demand growth across the Corridor.

ENW will design and implement a fully interactive DEMS within this highly utilised inner city distribution network. This system will integrate and centrally manage a range of Distributed Generation and distributed energy resources we expect will be available across the Corridor to shape daily customer and network demand profiles and thereby manage network constraints with the aim of mitigating network reinforcement. This will include the integration of advanced and smart metering information and remotely controlled demand side management devices.

The Project includes the integration of new technologies and systems to enable ENW to deliver an integrated, remotely controlled network, incorporating network metering, network automation equipment, Electric Vehicle charging systems, Distributed Generation and Storage devices. In addition, ENW will employ, at HV, a PLC wide area data network system and at distribution substations on-load tap changing transformers to manage the voltage profile for clusters of micro Distributed Generation and automated fuse restorer for improving the quality of supply. ENW will establish best practice, and validate HV and LV modelling techniques, for the future design and operation of distribution networks. Such modelling techniques are in their infancy for Smart Grid requirements, and their development is a crucial ingredient of this project. A comprehensive access communications system will be deployed in the Corridor to deliver the necessary DEMS connectivity and extend control across the HV and LV distribution networks. As network intelligence is deployed a comprehensive Cyber Security solution will be designed and deployed to maintain the integrity of network assets and all operational and customer data systems.

The consortium partners will collaborate to explore innovative pricing structures and new commercial and regulatory arrangements across the energy supply chain for delivering demand side management measures at the distribution network level.

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 Project will be delivered in the Low Carbon Laboratory within the Corridor area which is the test bed for low carbon interventions for the Low Carbon Economic Area (for the Built Environment) Plan. It is a key objective of the Project to support this commitment by trialling various Smart Grid technologies within an existing distribution network that can support these low carbon goals. This Project will accelerate carbon reductions, deliver operational benefits, and provide extensive learning through the 'retrofitting' of Smart Grid technologies onto existing networks, which will be key to delivering the wider scale aspirations.

We consider the greatest challenge to be addressed, and the greatest benefit to be gained, is the development of an existing distribution system which creates an intelligent network that is able to deliver a demand side response from all customers. This initiative will help reduce dependence on centralised high carbon generation. We will introduce: demand side management within the Corridor; monitoring equipment on the LV network to, provide data which is currently not available and therefore enabling greater visibility of network operation and performance (in terms of quality of supply and losses); and new technology in the form of automatic on-load tap changing transformers to manage voltage fluctuations, pertinent with the introduction of micro-generation clusters which we expect will occur within the Corridor. The matching of local low carbon generation with local demand will play an important role in reducing dependence on centralised high carbon generation, including minimising the need for spinning reserves. The carbon reduction benefits arising from an intelligent distribution network that delivers balancing of distributed generation and demand will therefore be realised across the supply chain.

In addition, we are proposing to work with consortium partners to install smarter metering within newly refurbished housing stock, along with making available energy savings schemes and options for in-home smart appliances.

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 Corridor's development, through Electric Vehicle deployment and increasing levels of Distributed Generation, will result in major changes in demand patterns and levels that will introduce balancing and quality of supply issues. ENW intends to implement extensive remote monitoring and control of our HV and LV networks within the Corridor to manage network constraints and voltage profiles. To support this requirement a comprehensive access communications capability will be deployed across the HV and LV networks. This new communications network will interconnect and extend from the fibre communications backbone network that is already installed and providing current operational communications to our Primary substation equipment in the Corridor.

We will develop full operational visibility of our distribution network and we will maximise the benefits to be gained from the introduction of remote network control. As we deploy a range of network intelligence solutions, this will necessitate changes to our network management and Control Room environment, to support the significant increases in data volumes, and the integration of monitoring and control applications. These capabilities will be combined with the development of a centrally controlled Distributed Energy Management System (DEMS) that will integrate energy resources across the Corridor, including Building Management Systems, Distributed Generation, Storage equipment, data from consumer smart metering and demand side applications.

These extensive levels of networked intelligence integrated within ENW's operational systems will require a comprehensive Cyber Security solution. This critical aspect of the project will identify how complete integrity of power distribution systems and the increasing levels of related data systems can be maintained.

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

Demonstrate why you have not previously used this Solution (including where the Solution involves commercial arrangements) previously 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.

ENW's operational systems are effectively meeting the present distribution network requirements within the Corridor area. The LCNF offers the opportunity to investigate how significant expansion of network automation and control equipment and systems might help manage increasing demand and dynamic load profiles. The fund allows ENW to support a level of investment in deploying trial solutions that could not be sustained as part of normal operations.

The Project will integrate proven technologies in a manner which has not been trialled at scale before. We will deploy applications and technologies to deliver remote monitoring and management of HV and LV networks and thereby investigate how to optimally, through observation and modelling, meet the future distribution network requirements. We will also explore the basis for new commercial arrangements with National Grid Electricity Transmission, regional / local aggregation service operators, Suppliers and consumers. The fund provides a mechanism where the various supply chain partners can work on such issues together which would not otherwise be possible as part of business as usual.

ENW intends to utilise learnings from previously funded initiatives, such as IFI projects, to integrate the various technologies within a fully operational environment. ENW and the consortium partners intend to implement Smart Grid technologies at reasonable scale to assess how to effectively maintain quality of supply and service. These include:

- Enhanced HV and LV system modelling for planning and operational timescale activities;
- Distribution on-load tap changing transformer;
- LV Automated Fuse Restorer;
- HV PLC Wide Area Data network solution;
- Network line sensors; and
- Network meters, monitoring and automation equipment.

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 GB energy customers.

The objectives of this Project are to trial Smart Grid technologies and management solutions to gain an informed understanding of operational and commercial improvements which can be implemented across Greater Manchester, the North West and the UK. To achieve this we will focus upon the opportunities to introduce innovative customer energy management and pricing initiatives and we will assess how increased levels of network and distributed energy management might reduce carbon emissions and improve 'cost to serve' whilst maintaining service and quality of supply.

The retrofitting of the existing distribution network to develop an intelligent distribution network supported by a DEMS will demonstrate a range of benefits to the customers in the Corridor but specifically how to integrate and manage the resources across the Corridor to negate the need for network reinforcement. In conjunction with demand side management schemes we will understand the potential reductions in operational costs which could result in efficiencies across the energy supply chain. We will be targeting new commercial arrangements, in conjunction with our partners, to enable customers to make better informed decisions on reducing their energy costs and increasing their carbon savings.

A major aspect of modern living is how we move around; we will introduce Electric Vehicle charging points within the Corridor, which will provide important learning regarding Electric Vehicle deployment and utilisation and influence customer behaviour in providing support for purchasing next generation vehicles, therefore optimising the potential contribution to meeting low carbon reduction transport targets.

It is anticipated that heat pumps could be a disruptive technology and if not managed intelligently will accelerate the need for reinforcement across all the network voltages. We will explore how to integrate and manage these devices within our network to minimise the need for reinforcement.

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.

ENW will learn how to: collaborate with consortium partners and low/zero carbon communities to deliver low carbon solutions; retrofit and integrate Smart Grid technologies into an existing distribution network; integrate and utilise network and advanced metering data; manage and balance local demand with demand side management techniques; manage LV voltage profile using distribution tap changing transformer; accommodate Electric Vehicles through smart charging; accommodate electrification of heat; develop modelling techniques for the design and operation of HV and LV networks; develop and test commercial arrangements across the supply chain partners.

The Joule Centre is an acknowledged authority in the field of sustainable energy R&D and provides a facilitating role in leading collaboration between academic and industrial initiatives. The Joule Centre will facilitate direct involvement from a number of local academic institutions, including the proposed Smart Grid Development Centre at the University of Manchester, to provide the data capture, analysis, reporting and dissemination of outputs and learning from this Project. As learning is captured throughout Project life it will be documented in a series of Project briefing documents and engineering papers, which will be regularly published and presented at relevant industry conferences and working groups. We will develop our website to further disseminate Project information and will also look at setting up discussion fora for stakeholders to participate in dialogue to broaden participation.

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

The Project currently conforms to the default IPR arrangements set out in the LCN Fund Governance Document.

Section 3: Additional information**Please use the following section to add any further detail you feel may support your submission**

This Project is strongly supported by stakeholders within the City, Greater Manchester and across the North West region as it facilitates the transition to a low carbon society. Manchester City Council, the Association of Greater Manchester Authorities and the Northwest Development Agency all support this Project as it delivers actions across a number of change programmes and city region pilots: **Manchester: A Certain Future** which is Manchester's Climate Change Action Plan; the pilots including Greater Manchester Energy Group's **Sustainable Energy Action Plan** and **Low Carbon Economic Area (for the Built Environment) Plan** as the Corridor is profiled within the Greater Manchester strategy and its delivery programmes as a key investment site to trial and learn from low carbon interventions; and the region's **Low Carbon and Environmental Goods and Services Strategy** which aims to support and grow the Smart Grid industry in the region; and the regional **Climate Change Action Plan** which sets out the region's priorities for a low carbon future including developing a Smart Grid infrastructure.

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

Corridor Manchester (Non-for-Profit Organisation) and its Partners:

- Bruntwood (Commercial Property Company)
- Central Manchester University Hospitals NHS Foundation Trust
- Manchester City Council
- Manchester Metropolitan University
- Manchester Science Park
- The University of Manchester

Energy Supply Chain Partners:

- EnerNOC (Aggregator)
- RWE npower (Energy Retailer, Electricity Generator, Energy Services Company)
- National Grid Electricity Transmission (Transmission Network Owner, Transmission System Operator)

Technology Partners:

- Communications Infrastructure Provider
- ICT Systems Integrator with Cyber Security Provider
- Metering Infrastructure Provider
- Power System Modelling Provider
- Specific Network Equipment Providers eg Super Fault Conducting Limiter, Storage, EV refuelling points etc

General Management Partners:

- Project Management

Learning and Dissemination Partners:

- Joule Centre and North West Universities
- Smart Grid Development Centre at University of Manchester

Section 5: DNO details

Company

Electricity North West Limited

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Position

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