Corridor Manchester Smart City Project Addendum

Proforma box number/ Spreadsheet	**Where the latest information can be found**
Box 1	Response to **ENWL007** clarifies how Electricity North West will fulfil its statutory obligations for the connection of PV and CHP etc, if Tier 2 LCN Funds are not secured.
Box 3, Box 22 and Appendix 6	Response to **ENWL008** clarifies the status of ElectraLink within the Project.
Box 4	Responses to **ENWL032** and **ENWL033** provide additional information on the potential customer impact of planned and unplanned interruptions and clarifies Electricity North West's intends not to seek a derogation, licence consent or exemption to undertake the Project.
Box 13	Response to **ENWL034** updates the Box 13 of the Full Submission by providing extensive detail on the Successful Delivery Reward Criteria for the Project.
Box 17	Response to **ENWL009** provides further detail on the specific outcomes for each of the areas of new learning in the original Box 17.
Box 18	Response to **ENWL010** clarifies how our learning and dissemination partner, the Joule Centre, will work with the core Project team.
Box 22	Response to **ENWL012** provides further detail on SAIC's Programme/ Project Management experience.
Box 23	Response to **ENWL011** provides clarification of the role of the Joule Centre within the Project.
Box 26	Response to **ENWL013** provides additional information on existing plans supporting the introduction of low carbon enabling technologies.
General	Response to **ENWL030** describes how Electricity North West will engage with customers in the Project.
Appendix A	Response to **ENWL035** provides an amended Second Tier Funding Request worksheet of Appendix A – Corridor Manchester Smart City Full Submission Workbook which ensures it complies with the guidance notes.
Appendix A – Project Costs	Response to **ENWL003** provides the workbooks Corridor Manchester Technology Costs Workbook and Corridor Manchester Full Submission Workbook WIP which contain the underlying cost analysis supporting the figures presented in the Second Tier Funding Request worksheet of Appendix A - Corridor Manchester Smart City Full Submission Workbook.
Appendix A – Directs Benefits	Response to **ENWL004** provides the workbook Direct Benefits which contains the underlying assumptions presented in the Direct Benefits worksheet of Appendix A - Corridor Manchester Smart City Full Submission Workbook.
Appendix A & E	Response to **ENWL005** provides underlying calculations supporting the figures presented in the Net Benefits worksheet of Appendix A - Corridor Manchester Smart City Full Submission Workbook.
Appendix E	Response to **ENWL014** details the underlying assumptions on carbon savings for Demand Side Management.

Low Carbon Networks Fund
Full Submission Pro-forma

In completing this proforma DNOs should consider the regulation, governance and administrative processes set out in the LCN Fund Governance Document

Section A: Project details

Project Summary

Box 1: Please provide details of the Project, the Method and Solution

Corridor Manchester Smart City Project - The Problem

The challenge and prize for smart grids is real time interaction between networks and customers' demand and any generation they install. Managing this is a challenge for any new build, but achieving this interaction in existing urban environments is even more challenging. Electricity North West's (ENWL) LCNF submissions address both of these; the **Corridor Manchester Smart City Project** (CMSCP) – this project - focuses on the challenge of retrofitting smart grid technologies into a mature distribution network.

Distribution networks were not designed to facilitate new low-carbon technologies, comprised of intermittent localised generation and higher localised loads. The benefits of moving to a low-carbon society risk being diluted, or even negated, by the costs of upgrading and operating networks, including transmission, distribution and comms. Network operators need to understand how to design and operate future networks to meet new requirements, and to encourage customer actions to assist in managing a low-carbon electricity system whilst maintaining existing service levels. Customers of all types need to learn how to interact with networks, both to maximize their own carbon reductions, as well as responding to the networks' evolving needs.

Traditional network modelling tools cannot cope with interactive networks, and techniques need to be developed to plan and operate smart networks, particularly low voltage networks. Historically there has been very little accurate load data for these networks. Smart meters should make a radical improvement, but DNOs need to develop the techniques to manage and use this data both to determine future design policies and for network operation purposes.

The CMSCP footprint will include new electric vehicle refuelling infrastructure in public spaces, electrification of heat across the commercial office sector, connection of PV on roofs of refurbished domestic properties, and connection of CHP plant, primarily for heating. In spite of energy efficiency measures, significant economic growth is forecast within CMSCP, estimated at an additional 26MW, which would naturally lead to network reinforcement.

The Solution

The solution is to evolve the distribution network into a smart grid by:

- creating a test network for current and future smart grid developments;
- installing network monitoring devices required to prove system control and modelling techniques;
- implementing a Distributed Energy Management System (DEMS) to manage the interaction between network, customers and/ or third parties;
- implementing demand side management via an aggregator;
- connecting and managing the use of new electric heating loads and electric vehicle refuelling stations;
- implementing distribution system automation to manage dynamically HV networks;
- installing and testing a range of communication systems;

- developing network modelling tools and techniques for the planning and control of HV and LV smart networks;
- connecting domestic scale generation and prove voltage profile management using novel on-load tap changing distribution transformers;
- exploring the commercial framework for a universal demand side response; and
- sharing energy-efficiency best practice and implementing demand side management measures, to mitigate reinforcement requirements and reduce connection costs for new customers.

The Method

Establish a future-proof permanent test network serving real customers where both near term and future developments can be implemented and proved, fully supported by both academic partners, major customers, equipment suppliers, and other partners.

A Distribution Energy Management System (DEMS) is essential to manage distributed energy resources, to implement demand side control, to reduce peak demand and manage efficiently the introduction of new loads in the Corridor. The CMSCP partners are committed to pursuing and sharing best practice energy-efficiency initiatives and some partners will participate in demand side management contracts with an aggregator, building upon previous ground-breaking demand side management work undertaken by ENWL during 2009/10. The value offered to participants in the demand side management trial will be derived from offsetting reinforcement costs.

Recognising that there are limitations to the demand side response the consortium is able to deliver in this first step, the project will develop the commercial frameworks to deliver a universal demand side response capability that can support customers from industrial to domestic.

Power system modelling techniques will be developed that are capable of using smart metering data, but will depend for the calibration and proving on additional system measurements from substations and the LV network.

A range of communications technologies will be deployed in the Corridor for the necessary DEMS connectivity, and to extend communication across the HV and LV distribution networks for system monitoring and control. Four competing communication technologies will be evaluated for efficacy and economy. A comprehensive cyber security solution will be designed and deployed to maintain the integrity of network assets and all operational and customer data and systems.

The Project

To overcome the challenge of engaging with customers and the demand side, ENWL has developed the Corridor consortium made up of four technology partners for the technology components of a smart grid; seven end-customer and infrastructure partners; and four energy supply chain partners.

The CMSCP will lead the collaborative low-carbon effort in the Corridor Manchester and deliver a combined reduction in carbon dioxide of 52,000 tonnes by the Corridor Manchester partners. The Corridor has targets to increase its Gross Value Added by £2bn by 2020 and create 22 000 new jobs. The partners are: Manchester City Council (MCC), the University of Manchester (UoM), Manchester Metropolitan University (MMU), the Central Manchester University Hospitals NHS Foundation Trust (CMFT), Bruntwood and Manchester Science Park (MSP).

As the designated Low Carbon Laboratory, low-carbon initiatives developed under the Greater Manchester's Low Carbon Economic Area Status (for the built environment) will be tried and tested in the Corridor before being rolled out across Greater Manchester.

The Corridor partners have signed up to "Manchester: A Certain Future", the city's climate change action plan to reduce the city's emissions of CO_2 by 41% by 2020. The challenge for the consortium is to help the Corridor achieve its growth aspirations, at minimum cost, whilst the Corridor partners achieve their carbon reduction commitments.

Box 2: Please provide a description of the Project

Geography

This area on the south side of Manchester, centred on Oxford Road, is known as the Corridor Manchester and is represented by the Corridor Partnership, which is a unique relationship between MCC, UoM, MMU, CMFT, Bruntwood and MSP, and was formed to promote the sustainable development and economic growth of the area. The Corridor Partnership aspires to increase its Gross Value Added and the number of jobs in the Corridor by 40% by 2020. Appendix 1 contains the Corridor's Strategic Vision for 2020 and Appendix 2 provides background information on the Corridor Partnership and its partners. The Corridor area is 243 hectares.

ENWL's own Distribution System Management Centre (DSMC), ie the control room, is located within the Corridor and the area is served by an ENWL optical fibre network for the transmission of data and voice telecommunications to and from DSMC.

Network and works

The relevant network comprises one Bulk Supply Point (BSP), nine primary (33/6.6kV) substations, forty five HV (6.6kV) circuits containing one hundred and thirty six distribution substations (6.6kV/LV). Appendix B.1 shows the distribution network assets in the CMSCP area and Appendix B.2 contains the schematic line diagram of the existing 6.6kV distribution network within the area that will be affected by this Project.

It is proposed to install metering, monitoring and control equipment at key nodes on the HV network, HV/LV substations, the LV cable network, electric vehicle charging points, distributed generation locations and at some customers' premises. There is a total of 509 meters to be fitted, which will provide current, voltage and power factor information. To enable the control and load management of the high voltage network, 68 remote control switching points are to be retrofitted (Appendix 3) to the existing high voltage network, which will be automated to switch between different parts of the network, to avoid circuit overloads. Within the Corridor area, there is a proposal to refurbish 181 terraced properties. As part of the refurbishment there will be distributed generation installed, which, if uncontrolled, may result in unacceptably high voltages on the low voltage network. To control the network voltages where significant volumes of PV are planned, two new distribution transformers will be installed with on load tap changing devices. Appendix B.3 shows conceptually the CMSCP and Appendix B.4 contains the proposed telecommunications network infrastructure.

The DEMS is a central management platform which will receive information about customers' energy usage and distribution network status and will provide the integration, management and control functions necessary for a smart grid. The DEMS will be built on servers located in DSMC. It will communicate with the metering and control equipment installed on the network and initiate actions to maintain network operating parameters within limits and to maintain security of supplies to customers. It will be integrated within the DSMC's existing control environment to provide a man-machine interface to DSMC control engineers.

The communications technology being deployed includes a UHF Radio base station communicating with 30 distribution substation remote terminal units (RTUs); a WiMax base station communicating with 30 distribution substation RTUs; 15 Digital Subscriber Line (DSL) circuits communicating with 15 distribution RTUs on copper pilot cables; 15 HV power line carrier (PLC) circuits communicating with 15 distribution RTUs on 15 HV cables; and 15 LV PLC circuits communicating with 15 low voltage monitoring points using 15 LV cables. This infrastructure will connect to DSMC using ENWL's existing optical fibre network via two primary substations within the Corridor area. The entire network will be secured using ninety ruggedised firewall capable routers at the distribution substations and appropriate control routers

at the control centre. Robust cyber security measures will be built into the communications systems.

Customers

All six of the Corridor partners will collaborate on the CMSCP and each partner has agreed to commit personnel resources to support the delivery of the Project. In addition, each partner has identified a range of low carbon initiatives (eg energy efficiency initiatives, demand side response initiatives etc) that will be delivered as their contribution to the Project. This contribution, in financial terms, equates to £6.6 million over the life of the Project and is in addition to the Total Project Cost.

In addition to the CMSCP partners, who are all large customers in their own right, the Corridor Manchester contains approximately 10,000 end customers (split 1,441 business premises and 7,850 residential properties). We will see the participation of the larger of these customers through our relationship with Enernoc (see below)

Contracts

Although ENWL will work individually with each partner we will also work with the Corridor Manchester, as the single collective voice representing the Corridor. ENWL has signed a Memorandum of Understanding with the Corridor Manchester and each of the Corridor partners has signed a Statement of Intent which confirms their support and commitment to the delivery of the CMSCP. Appendices 4 and 5 contain a signed copy of the Memorandum of Understanding and an example signed copy of the Statement of Intent respectively. All the technology and learning and dissemination partners have signed a Memorandum of Understanding with ENWL which confirms their support and commitment to the delivery of the CMSCP. EnerNOC have extensive experience in the US in providing demand response to utilities. They are also currently active in GB as an aggregator in the electricity settlements balancing market. They will bring extensive experience to the project in assessing operation of an urban Demand Response Management System by visiting customers to identify interruptible load and installing monitoring and control equipment on customers' premises. The benefits of reinforcement deferment will be passed to EnerNOC to use to incentivise customers to vary their usage of the network at our request.

Box 3: Please outline the changes which you have made to the Project since the Initial Screening Process

Does the high level Solution being demonstrated and the high level Method being trialled in the Project remain the same as that contained in your Screening Submission? Yes/~~No~~

Since the submission of the Initial Screening Pro-forma, there have been three changes in the consortium members: SAIC, Alcatel-Lucent, GE and BPL Global have joined the consortium as lead service and equipment providers; ElectraLink, has joined the consortium and will provide the chair and secretariat responsibilities to the Universal Demand Side Response initiative. In addition, contractual arrangements regarding the Smart Grid Development Centre at the University of Manchester have yet to be completed and so respective proposals have been removed.

The Initial Screening submission included a network storage device located in the Corridor alongside the Universities where there are existing solar panels in order to trial the storage of the energy generated by these devices. Since receiving firm costs on a distribution substation sized network storage device we have learnt that the costs of such a device for this situation are prohibitive and so it has been withdrawn from the Project.

In conjunction with ENWL, Kelman have developed an LV fuse restorer unit, under IFI, and in the Initial Screening submission we included this device and its integration into the control systems. In developing the Full Submission we have examined the Corridor network in greater detail and decided that there are more appropriate test beds for this device elsewhere on the ENWL network.

Project Costs

These should be the same amounts as detailed in the Full Submission Spreadsheet tab entitled 'Second Tier Funding Request' included as Appendix A

Total Project Cost	£12.68 million
External Funding	£2.28 million
DNO Extra Contribution	£0.15 million
DNO Compulsory Contribution	£1.04 million
Second Tier Funding Request	£8.83 million
Project Completion date	03/2014

Derogations or exemptions

If awarded funding, will you require derogation, licence consent or exemption, or any change to the regulatory arrangements in order to undertake the Project or cater for contingencies? Yes/~~No~~

Box 4: If Yes, DNOs must provide a summary of the details of the derogation, licence consent or exemption, or change to the regulatory arrangements required

ENWL believes it will not require any derogation, licence consent or exemption to undertake this Project. However, ENWL will seek a dispensation against its CRC 45 obligations for planned interruptions, in respect of the installation of the new equipment onto the distribution network within this Project as the expected impact of this activity is about £300,000. We would potentially also seek exemption for any significant unplanned interruptions from the failure of the new equipment in its early operational life.

Section B: Project Management

DNOs must provide an organogram outlining roles and responsibilities in the Project and the organisational structure. This must be included as Appendix C.

Contact details of DNO Principal Project Manager:

Name and Title:	**Simon Brooke, Low Carbon Projects Manager**
Telephone:	**01925 846858**
Email:	**simon.brooke@enwl.co.uk**
Address:	**Electricity North West Limited** **304 Bridgewater Place** **Birchwood Park** **Warrington** **Cheshire** **WA3 6XG**

Box 5: Please provide details of your Project plan

DNOs should outline up to ten key milestones associated with their Project.

Date	Milestone
03/2011	Phase 1 complete: Programme Management Office established, finalised Project Plan and concluded commercial arrangements. Phase 2 initiated.
10/2011	Preliminary assessment of Cyber Security operation analysis.
12/2011	Initial public seminar on Project progress and early outputs, results and learning.
12/2011	Initial Network Automation.
01/2012	Implementation and configuration of DEMS system.
11/2012	Initial implementation of LV/HV modelling and design techniques complete.
02/2013	Phase 2 complete: Installation of 25% of communications and distribution network equipment; and configuration to DEMS system. Phase 3 initiated.
07/2013	Metering Systems implementation complete.
02/2014	Phase 3 complete: Deployment of remaining 75% of communications system. Assessment / report of Demand and Load aggregation operation and learning for future regulatory commercial structures.
03/2014	Phase 4 complete: Project close-down report published. Project Conference to launch reports and findings delivered.

A full Project plan, presented as a Gantt chart, must be provided as Appendix D: DNOs must include a month by month breakdown of the activities associated with a Project; milestones, delivery of outputs and deliverables, dependencies, critical path, responsibilities, phases and key decision points.

Project Budget

DNOs must complete the Full Submission Spreadsheet tab entitled 'Second Tier Funding Request' and include it within Appendix A

Box 6: Please provide a breakdown of your total employment costs for the total Project which you are project managing and highlight where these are funded by, or provided by others

Total employment costs should include all the costs used for labour, including pensions but excluding Contractors (whose costs are detailed separately). Personnel with the same role can be grouped together

Staff type	Total Costs	Person days	Funding
Executive Sponsor	£10,000	36	Funded by DNO Compulsory Contribution.
Project Director	£330,000	780	Funded by DNO Compulsory Contribution.
Lead technologists – communications, IT, power equipment, network modelling, control room systems	£747,000	1,170	Partly funded by DNO Compulsory Contribution.

Staff type	Total Costs	Person days	Funding
Financial Administration	£90,000	390	Funded by LCN Fund.
Installation team – distribution network equipment	£603,000	1,357	Funded by LCN Fund.
Installation team – telecommunications equipment	£385,000	865	Funded by LCN Fund.

Box 7: Please outline the main Equipment costs required for the total Project which you are project managing

Item description & No. of units	Function in Project	Cost per unit	Total Cost	Funding	Direct Benefit
Distributed Energy Management System (1)	Distribution network and distributed energy management system	£1,241,000	£1,241,000	80% funding from LCNF 20 % funding from External Collaborator	Deferment of reinforcement
Distribution Automation and Monitoring Equipment (68)	Retrofit automation equipment control of HV switchgear, including current transformers	Average £6,360	£432,000	80% funding from LCNF 20 % funding from External Collaborator	Deferment of reinforcement
Consumer sub-Meters and Substation Monitors (444)	Monitoring of load, demand, voltage, including current transformers	Average £1,580	£698,000	80% funding from LCNF 20 % funding from External Collaborator	Deferment of reinforcement
EV refuelling stations (20)	Electric vehicle refuelling stations in public spaces	£4,100	£82,000	100% funding from LCNF	

Item description & No. of units	Function in Project	Cost per unit	Total Cost	Funding	Direct Benefit
Demand Side Response Equipment (4) On-load tap change transformer (2)	Customer demand side management equipment New on-load tap changing transformer to manage voltage profile	£40,000 £22,550	£205,000	80% funding from LCNF 20 % funding from External Collaborator	Deferment of reinforcement
Ruggedised Network Routers (120)	Telecommunications network control devices	£4,000	£480,000	80% funding from LCNF 20 % funding from External Collaborator	Deferment of reinforcement
UHF Radio System and WiMax System (base stations and cpe) (1 of each)	Telecommunication network solutions	£222,000	£222,000	80% funding from LCNF 20 % funding from External Collaborator	Deferment of reinforcement
Digital Subscriber Link Modems (15) PLC equipment (base system and cpe) (15)	Telecommunications network solutions	£2,540 £5,100	£114,600	80% funding from LCNF 20 % funding from External Collaborator	Deferment of reinforcement

Box 8: Please outline the Contractor costs required for the total Project which you are project managing

Contractor	Role in Project	Funding	Expected length of contract	Total Cost
SAIC	Provision of: 1. Programme Management Office 2. Systems Integrator role 3. Cyber Security Solution	80% from LCN Fund and 20% from SAIC	40 months	£1,271,000
Alcatel-Lucent	Provision of: 1. Systems Integrator role for communications infrastructure; and 2. Communications network equipment	80% from LCN Fund and 20% from Alcatel-Lucent	40 months	£563,000
GE	Provision of: 1. Systems Integrator role for distribution network equipment; and 2. Distribution network equipment	80% from LCN Fund and 20% from GE	40 months	£156,000
Arqiva	Provision of: 1. Long range radio communications solution	26% from LCN Fund and 74% from Arqiva	40 months	£570,000

Box 9: Payments to users or Customers

Please outline the details of any payments you wish to make to users or Customers as part of the Project.

Type of user or Customer	Payment per User	Total Payment	Funding
Demand Customers (Large Users)	£4.60/kVA	£390,000	Funded by LCNF Fund

Box 10: Other costs for the total Project which you are project managing. This should be categorised into the following categories: IT costs, Contingency costs, IPR costs, decommissioning costs, abnormal travel costs and costs associated with public engagement and dissemination of learning

Cost Category	Cost Item	Cost
IT	Hardware eg servers etc	£226,000
IT	Network Modelling software development	£90,000
Contingency	Contingency	£1,006,000
Decommissioning	Provision for decommissioning equipment	£53,000
Consortium partners	Personnel resources (contribution in kind)	£675,000
Public Engagement	Website development and Smart Grid forum	£108,000
Learning/Dissemination	Interim reports, close down report, conference	£146,000

Cost over-runs & Unrealised benefit

Box 11: Please detail any cost over-run you anticipate requiring for the Project and express this as a percentage of the funding you are requesting

ENWL has considered the risks associated with this Project and concluded that these risks can be managed and so does not require the protection against cost over-runs.

0%

Box 12: Please detail the level of protection required against Direct Benefits in excess of the DNO Compulsory Contribution

ENWL is seeking the default level of protection of:

50%

Successful Delivery Reward Criteria

Box 13: Please set out your proposed Successful Delivery Reward Criteria

Successful Delivery Reward criterion	Evidence
Network Automation Deliverables – Design, implementation and operation of network automation at HV. Conclude selection of sites and initial deployment of network automation completed by December 2011, and full deployment completed by January 2014. Limited automation of HV networks is currently undertaken, widespread deployment will provide new learning which will be disseminated throughout the DNO community.	Initial deployment (25%) of HV network automation completed by December 2011. Full deployment (75%) and integration with DEMS completed by January 2014.
Telecommunications Network Assessment Deliverables - Design, implementation, operation and evaluation of four alternative telecommunication architectures and technologies for a range of monitoring and control applications across the HV and LV networks. Initial deployment completed by December 2011 and full deployment completed by December 2013. Delivery of interim outputs at three month intervals throughout each phase and at key milestones.	Initial deployment (25%) by December 2012. Review of initial deployment by March 2013. Full deployment (75%) completed by December 2013. Comprehensive evaluation of each telecommunication architecture and technology against a range of criteria including cost, quality of service and operational efficiency completed by March 2014.
Demand Response System evaluation Deliverables - Design and implementation of a comprehensive Distributed Energy Management System (DEMS) to co ordinate diverse energy assets across a defined urban area. Deployment will be completed by January 2012; integration into existing control room systems will at this stage is minimal. Learning is expected to be gained at each stage May 2011, build stage, December 2011 and deployment stage, January 2012, all of which will be key milestones for dissemination of learning.	Design phase completed by May 2011 Build phase completed by December 2011 Deployment completed by January 2012 Provision of a toolset which enables management of demand, from which further techniques and procedures will be developed throughout the project lifecycle.
Remote monitoring within urban HV and LV networks Deliverables - Design implementation and operation of a remotely controlled system of HV and LV intelligent monitoring devices. Initial deployment completed by June 2012 and full deployment achieved by May 2013. Learning will be focussed on the deployment and operation of monitoring on HV and LV networks and the provision of increased and improved data. The learning will be disseminated at three month intervals and at the above key milestones.	Initial deployment (25%) completed by June 2012 Full deployment (75%) completed by May 2013. Provision of additional network operation and performance data from completion of initial deployment phase. Collation and management of increased data volumes. Integration into control room and planning processes. Refinement of planning and operational techniques and processes.

Successful Delivery Reward criterion	Evidence
Modelling of HV and LV network Deliverables – Modelling tool that will perform load flows and fault level analysis on urban HV and LV networks with smart grid capabilities. Initial deployment will be achieved by November 2011, utilising data as it becomes available from the installed monitoring devices. New modelling and planning techniques will be developed throughout the project lifecycle. Learning to be based upon identification and deployment of the modelling tool and evolving techniques.	Identification of appropriate modelling tool by July 2011. Initial network modelling commences by November 2011. Continuing capture and management of metering data. Development of draft design specifications by July 2013. Check-point to evaluate outcomes of modelling techniques. Continuing development of policy and procedures for future network modelling.
Cyber Security Solution Deliverables – Cyber Security System (CSS) applied to CMSCP data network. CSS will be deployed in three stages; the initial stage of assessment will be completed pre-award of LCN funding; follow-on stage to implement initial solutions by October 2011; final stage to implement enhanced solutions by February 2014. Each stage will provide learning to our dissemination partner for onward sharing with the DNO community.	Initial CSS assessment completed pre-LCNF award. Initial solutions implemented by October 2011. Deployment of enhanced solutions by February 2014. Continuing collation and dissemination of learning through each phase. Definition of optimal CSS solution by March 2014.
Integration of Electric Vehicle refuelling system DEMS Deliverable – Deployment of urban electric vehicle refuelling stations integrating monitoring and management applications within wide area DEMS. The initial phase of deployment to be completed by March 2012, with the full deployment being achieved by December 2013. New knowledge will be gained in the installation and operation of refuelling stations, which will be shared through our dissemination partner.	Initial deployment (50%) and integration with DEMS by March 2012. Full deployment (100%) and integration by December 2013. Full integration within DEMS. Operational and economic evaluation to identify optimal HV and LV planning criteria to support EV deployment.

Section C – Evaluation Criteria

Accelerates the development of a low carbon energy sector

Box 14: Outline how the Solution accelerates the development of a low carbon energy sector

To reduce the dependence on centralised high-carbon generation and fossil-fuel transport, this CMSCP uses demand side management (DSM), co-ordinated energy efficiency and a smart-grid approach to facilitate electric vehicle charging points, local generation and increased demand without network reinforcement. The future growth of inflexible low-carbon generation envisaged by the Low Carbon Transition Plan (LCTP) (eg nuclear and large-scale wind) means demand-side actions on existing urban networks (as in the CMSCP) will be increasingly important for system balancing. The CMSCP prepares for the future requirements of a national low-carbon energy system.

The general economic growth in the Corridor is expected to lead to an unconstrained new demand of tens of MW, plus integrating the needs of electric vehicle refuelling. The CMSCP project will initially provide 20 EV refuelling points as a test bed for this integration. Encouraging electric vehicles will lead to additional electricity demand in the Corridor, but will reduce overall carbon emissions compared to fossil-fuel use, saving 130 t CO_2e/yr by the end of the project and providing network understanding of this new type of load.

The CMSCP will deliver a co-ordinated response by the Corridor partners and the distribution network to address the increasing electrical energy requirements, particularly at peak, by

- The CMSCP partners investing nearly £7m in a range of energy-efficiency measures on their own sites, such as changes to lighting, air-conditioning, building-management systems and metering, expected to deliver nearly 90GWh in electrical energy savings over their lifetime, equivalent to nearly 52,000 t CO_2e saved. These energy-efficiency related demand reductions will also spread demand across the day, leading to generation and network benefits. The project will deliver a co-ordinated understanding of these demand reductions and their network impacts.
- The development via the project of commercially-viable demand-side management approaches, both to further reduce demand and shift it to off-peak periods. Both reducing demand and shifting it from peak to off-peak are envisaged to deliver CO_2 reductions. Electricity users in the Corridor will be paid for delivering demand-side response.

The LCTP envisages smart grids requiring a significant increase in monitoring and information flows, between both customers and network operators, but also for the network itself. Two-way flows of energy have not previously been controlled to harmonize with distribution network requirements at these voltage levels. The LCTP envisages customers rewarded for supporting the networks and co-ordinated customer behaviour to reduce the need for network upgrades. The CMSCP will demonstrate how networks will need to be modified for the new interactions between customers and the electricity industry in a lower-carbon energy system. Despite the expected demand growth, the facilitation of changes in customer behaviour (energy efficiency, demand-side response), coupled with ENWL's ability to reconfigure its Corridor network in real time, this project will defer £7.9m in reinforcement, associated with hundreds of tonnes of embedded carbon.

Appendix E provides further detail on the assumptions behind the text above.

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

DNOs must complete the spreadsheet tab 'Net benefits' within the Full Submission Spreadsheet and include as Appendix A.

Box 15: Please provide a qualitative account of the net benefits which the Solution has the potential to deliver if rolled out across GB.

The net benefits of this Solution are:

- enabling significant carbon emissions reductions via co-ordinated energy efficiency, network management, DSM and electric vehicle connections;
- reducing network reinforcement costs by using DSM and 'smart' network management to defer or avoid reinforcement costs in heavily loaded urban environments – thereby reducing both net costs to customers, and disruption; and
- doing the above while not constraining the growth aspirations of city centre partnerships.

The CMSCP demonstrates the challenges and solutions in supporting economic growth within a legacy urban environment at the same time as driving down CO_2 emissions. CMSCP proves the integration of technologies and operational systems to form a smart distribution network. The scale of this project is essential to ensure adequate coverage of the variety of network issues encountered in urban areas, such that sufficient challenges can be solved and added to the baseline of techniques needed as smart grids continue to develop over the next decade.

The CMSCP is of a variety, density and scale that means results from here may be applied to any central urban area in GB. Hence for the aspects relevant to heavily-loaded urban networks (electric vehicle recharging and DSM) the net benefits of the project across GB have been scaled up from the Manchester Corridor to similar areas in the 66 cities in GB (see Appendix E for further detail). The costs of the CMSCP are added to the costs of replicating the project 65 times. The carbon benefits are 66 times the original project. For the specific aspect of the partners' co-ordinated energy-efficiency measures in the Corridor area, the demand reduction has been scaled up from the industrial and commercial electricity demand in the Corridor to its value across GB.

Summary of quantified costs in 'net benefits':

- Proposed total cost of CMSCP;
- Dissemination and project management costs to further 65 cities - start in 2015;
- 20 EV refuelling points in further 65 cities – start in 2016;
- DSM payments in further 65 cities – start in 2016;
- Network costs in further 65 cities – e.g. monitoring, automation, communications, excluding innovation costs within CMSCP, not reinforcement costs.

Summary of quantified carbon benefits in 'net benefits':

- Electrical demand reduction x 66;
- Enabling use of electric vehicles x 66;
- Demand side management x 66;
- (embedded carbon benefits of avoiding reinforcement are negligible in
- comparison).

Summary of quantified other benefits in 'net benefits':

- Deferment of network reinforcement in CMSCP project;
- Defer or avoid network reinforcement in 65 further city centres.

Direct Impact on the operation of the Distribution System

Box 16: Explain the way in which the Project/Solution has a Direct Impact on the Distribution System

The smart grids challenges for DNOs include the historic lack of detailed knowledge about HV and lower voltage networks, about what customers are doing in real time, and the resultant effects on the network and on other customers. At the same time, decarbonisation of energy means that customer demands and behaviour will be very different, driven by both customers' own low carbon agenda, but also by the electricity sector trying to reduce carbon content of its activities.

DNOs in future will have to design and operate their networks to cater for this. This means that they will have to create tools and techniques for system management, and customer interaction, that they have not needed ever in the past. And because of the scale of the interaction required ultimately, ie across 25 million end customers in GB, much of this will have to be automated.

Specifically for the CMSCP we will;

- Develop modelling techniques that allow us to plan future HV and LV networks. Current techniques do not cater for multiple loading patterns, unbalanced LV loads, multiple distributed loading points on LV networks and high penetration of distributed generation. These are all required to plan smart networks. For the operation of smart networks, ie the new intelligence to schedule demand and generation to keep the network within limits, techniques are required that can do the analysis in real time, or quasi real-time.
- Develop techniques for managing metering data in high volumes. To undertake the analysis above, either in planning timescales or in real time, requires significantly more data from points on, and particularly the extremities of, the network. Ultimately we would expect the GB rollout of smart metering to provide much of this, together with an increased set of measurements from our network. For this project, we will use enhanced network measurements to develop the systems that in future can be driven in the main by smart metering data.
- Learn how to maximize the use of the existing network. By having the capability to control network assets for the first time en masse, ie HV switches and the effective transformation ratio of distribution transformers, we have the capability to alter network running conditions to better suit loading conditions in real time, thereby avoiding significant network reinforcement.
- Evaluate competing communication methods to establish those which are most cost beneficial for urban networks, and how to efficiently implement the necessary cyber security.
- Develop interaction between end customers and the energy sector with the objective of creating real and observable interaction between customers' appliances (including their generation and also electric vehicles) and processes, the local network and wider electricity sector players (ie National Grid, suppliers and aggregators). Some of this will be underpinned by commercial arrangements, whilst some will simply demonstrate the opportunities available.
- The CMSCP provides a perfect environment to develop a self-healing network that depends on embedded generation to maintain supplies.
- Integrate the above processes into new management systems. In particular we need tools to manage the interactions, at scale, in real time. We will use the experience of constructing the DEMS and integrating it into DSMC to ensure the CMSCP can be scaled up across Greater Manchester and the rest of ENWL.

Generates new knowledge that can be shared amongst all DNOs

Answers to this section should be detailed in boxes 17 to 19

Box 17: Explain the new learning which will result from a successful Project

Overall the learning and dissemination partner for CMSCP is the Joule Centre which will lead the consortium's approach to capturing the learning from the project. The Joule Centre's research students will work in each initiative ensuring that at each stage learning is documented and captured. This is elaborated in Box 18 below.

A key factor of CMSCP is the interaction between ENWL, customers and other electricity sector players such as aggregators, Suppliers and National Grid. Although the CMSCP partners are individually unique, we believe that the development of the relationships will be replicable throughout GB. In particular we are working hard to create ways that customers can interact with the whole range of electricity industry companies. We intend that our learning and developments are pushed into the industry formal structures (such as BSC and DCUSA) so that new working demand side arrangements can be institutionalised.

We have already stressed the need to develop modelling tools. Whilst there are differences between DNOs, we believe that the fundamentals of the techniques, data and data updating techniques will be readily applicable to all DNOs. These details are easily captured in the specifications and performance requirements that will accompany our developments.

We need to integrate smart charging of EVs within our overall network management. Working with the Greater Manchester Passenger Transport Executive's Plugged in Places consortium we will discuss developments with manufacturers, installers and other interested parties to find the right balance between control, usability and cost. Developments here should be informed by trials elsewhere in GB that are more advanced. However the level of integration with our smart grid is likely to include new learning points which we will capture and disseminate.

The question of communication methods is currently one of the most open, with a significant number of competing technologies available. This question is complicated by the emergence over the next couple of years of the national communication system to underpin the GB smart metering rollout. In the long term we believe that a significant part of our future data requirements will come via this route, but there will always be a need to collect data from the DNO's network, particularly at HV (ie where there is no smart metering). It is essential that DNOs establish the most efficient communication media for this. We are less persuaded that there will be a single solution here – not least because it could depend on the availability, penetration and longevity of commercial services. Again the range of solutions we identify as either good or bad should be readily applicable to other DNOs' needs.

An integral part of the communication question is cyber security. Each comms method will have to bear efficiently the security overhead. We will ensure that this is fully tested. These arrangements can easily be described and disseminated.

Each of the above are challenges in their own right. To manage them all in real time requires integration within the DEMS. The specification, building and operation of the DEMS will be documented and available as a reference model. The detail of our DEMS is likely to have aspects unique to ENWL and its legacy systems. However the majority of our learning should be easily adapted to all DNOs and their systems.

Box 18: Outline the arrangements for disseminating learning from the Project

The Joule Centre will provide the Project with links to the technological, social and economic research skills in the north west universities and will facilitate access to industry leading simulation and laboratory based facilities, where applicable.

The Joule Centre will take the lead role in capturing and documenting new learning, in managing the extraction of data and the production of relevant information and materials, and creation of the delivery channels for the dissemination of the learning from the Project.

The CMSCP plans to deliver the following dissemination activities:

- The development and maintenance of an ENWL LCNF Project web-site providing information on Project Plan, deliverables and activities. A section of the website will contain a data repository with the opportunity for individuals to access the data generated from the Project. A notice board will be created on which we will invite public and industry dialogue on the Project, its progress and the achievement of its objectives;
- The organisation and delivery of public events, seminars and conferences targeting both public and industry audiences. These will aim to disseminate the results, concepts and ideas originating from the CMSCP. Some of the events will be directed towards a professional audience, others for local politicians and civil servants. A number will be specifically directed towards public and consumer engagement;
- The production and dissemination of appropriate analysis and reports, in order to provide detailed information to Ofgem, BIS, DECC, Northwest Local Economic Partnerships, schools and educational establishments, other DNOs and the wider population;
- The Joule Centre will take a lead role in forming a Smart Grid Forum and an association of public and private interests that will support the development of a Smart Grid sector. This will aim to provide information on the project activities in order to advocate the wider the participation of industry and commerce in the underlying carbon reduction and energy efficiency goals;
- Support of the proposed Smart Grid Development Centre, to be located at University of Manchester, which will include a facility dedicated to presenting the scope and status of the project including the overall context of the LCNF objectives;
- Direct invitations to local schools and educational institutions to visit the CMSCP to attend presentations on the project activities and how the underlying Carbon reduction objectives can deliver wide ranging socio-economic benefits; and
- To ensure the CMSCP partners activities are closely linked with the smart-grid activities of Manchester, Liverpool and Bolton universities and in particular their relevant TSB, ETI, EPSRC, ESRC, EU, and international based research projects.

Box 19: Outline the arrangements for Intellectual Property Rights (IPR)

Does the Project conform to the default arrangements for IPR? Yes/~~No~~

ENWL and the CMSCP collaborators have agreed that all project activities will conform to the default arrangements for IPR.

ENWL and the project collaborators will employ proprietary background IPR within the project in relation to the following areas:

- Distributed Energy Management System;
- Network Monitors and metering devices;
- Powerline communications systems;
- Cyber Security applications;
- On load Tap Changing Transformer; and
- Distribution Network Modelling Application.

It is possible that ENWL and the CMSCP collaborators will jointly develop Foreground IPR in the following areas:

- Development of LV and HV network modelling and planning solutions;
- Integration of PLC communications systems within LV / HV networks;
- Load management and aggregation within LV / HV networks; and
- Cyber security solutions within power distribution operations.

Involvement of External Collaborators and external funding

Does the Project involve External Collaborators and/or external funding? Yes/~~No~~

Box 20: If you have been unsuccessful in attracting External Collaborators and/or external funding to the Project, please detail your endeavours to do so

Throughout the development of the CMSCP and consortium partnership, we have explored the availability of network storage with various equipment manufacturers and have been unsuccessful in attracting a partner who could offer a cost effective solution to support this element of the project's original aims and objectives.

Whilst network storage devices are available, we consider the costs are prohibitive at this stage in their development and would not provide sufficient supporting benefits; we have therefore decided to remove this requirement from the Project.

Box 21: Where funding is provided by a third party that is not an External Collaborator, DNOs should provide details of the funder. If there is more than one External Funder, details of others can be included as an appendix:

Organisation name	We do not have any External Funders for this Project; therefore this section is left intentionally blank.
Type of organisation	
Amount of funding	
Funding arrangements	
When funds will be provided	
Conditions of funding	
Risks / uncertainties	
Details of contract or agreement	

Box 22: Details of External Collaborators

DNOs should provide details of the 6 main parties who are collaborating with them on a Project. Details of any further External Collaborators should be included as an appendix.

Organisation Name	Alcatel-Lucent Telecom Ltd (ALU)
Relationship to DNO (if any)	None
Type of Organisation	Communications solutions, equipment and service provider.
Role in Project	ALU has joined the Corridor consortium to fulfil the Systems Integration role for the communications infrastructure development and will be solely responsible for the delivery of the communications network and data integration from the network devices (sensors and meters) in the network.
Prior experience brought to Project	ALU (Euronext Paris and NYSE: ALU) is the trusted partner of service providers, enterprises and governments worldwide, providing solutions to deliver voice, data and video communication services. A leader in fixed, mobile and converged broadband networking, IP technologies, applications and services, Alcatel-Lucent leverages the unrivalled technical and scientific expertise of Bell Labs, one of the largest innovation powerhouses in the communications industry. ALU has vast experience of working with utilities around the world and is able to bring this experience to the CMSCP.
Funding	ALU has agreed to contribute 20% of the total costs of its services and equipment to the project.
Contractual relationship	**Will the DNO have a contract in place which ensures the External Collaborator complies with the LCN Fund Governance Document?** ~~Yes~~/No ALU has signed a Memorandum of Understanding with ENWL which specifies the scope of the service they will provide.
External Collaborator benefits from the Project	Communications and data management are key to the management of a more intelligent distribution network. The approach to communications and data management in CMSCP is of great interest to ALU as they will trial various communications technologies to determine the performance, (technical & commercial) of each against the intelligent applications to be deployed and trialled in the distribution network. The learning to be gained from these will be of great benefit to ENWL, ALU and the industry generally.

Organisation Name	Arqiva
Relationship to DNO (if any)	None
Type of Organisation	Arqiva is a telecommunications company which provides much of the infrastructure behind television, radio, satellite and wireless communications in the UK and has a significant presence in Ireland.
Role in Project	Arqiva has joined the ENW consortium to provide the communications infrastructure to communicate with distribution monitoring and distribution automation equipment. Arqiva will provide secure communications services based on Long Range Radio, using its own radio spectrum, to provide remote monitoring and automation of nominated sub stations and distribution equipment. Arqiva's communication solution offers a dedicated, universal, secure, resilient solution that is uniquely suited to the requirements of critical infrastructure. Arqiva will report on the performance of the comms solution to demonstrate its suitability as a potential national comms solution for smart grid and smart metering.
Prior experience brought to Project	Arqiva has in-depth expertise in providing managed radio communications services for the broadcast, media and communications industries and has made significant investment in developing an existing widely deployed radio solution for smart metering and smart grid. This includes a smart grid demonstration network in Reading covering about 200,000 homes, supported by the DECC capital grant scheme. Arqiva is certified under BS EN ISO 9001, LMRQAS and BABT. It maintains a policy of continuous improvement for all products and services.
Funding	Arqiva has agreed to contribute 74% of the total costs of its services and equipment to the project.
Contractual relationship	**Will the DNO have a contract in place which ensures the External Collaborator complies with the LCN Fund Governance Document?** ~~Yes~~/No Arqiva has signed a Memorandum of Understanding with ENWL which specifies the scope of the service they will provide.
How funding relates to benefits from Project	Arqiva will gain insight and experience from the deployment and testing of radio communications within an inner city environment. Arqiva will be able to measure and report on key performances indices including coverage, end-to-end message latency; data integrity; system security and service reliability.

Organisation Name	BPL Global
Relationship to DNO (if any)	None
Type of Organisation	Software solutions and services provider
Role in Project	BPL Global has joined the Corridor consortium to provide its Distributed Energy Resources Management Platform and application to the Project.
Prior experience brought to Project	BPL Global provides an integrated suite of software solutions and services to electric utilities and their customers enabling an intelligent grid to more efficiently manage demand, integrate distributed energy resources, improve service reliability, and optimize cost and capital productivity. The solutions are designed for interoperability with other systems and equipment deployed by a utility.
Funding	BLP Global has agreed to contribute 20% of the total costs of its services and equipment to the project.
Contractual relationship	**Will the DNO have a contract in place which ensures the External Collaborator complies with the LCN Fund Governance Document?** ~~Yes~~/No BLP Global has signed a Memorandum of Understanding with ENWL which specifies the scope of the service it will provide.
How funding relates to benefits from Project	Deployment of a subset of the BPL Global products will enable an initial deployment to be achieved by a DNO and provide valuable learning for further developments.

Organisation Name	GE Digital Energy
Relationship to DNO (if any)	None
Type of Organisation	Trans-national conglomerate delivering solutions, products and services across a range of industry sectors including Electrical Transmission and Distribution.
Role in Project	GE has joined the Corridor consortium to fulfil the Systems Integration role for the distribution network infrastructure development and will be solely responsible for the delivery of the network devices (eg sensors, automation equipment, meters etc) and network modelling tool development.
Prior experience brought to Project	GE provides a wide assortment of integrated equipment and systems to ensure safe and reliable power delivery. Electrical distribution and control solutions manage power in a variety of residential, commercial and industrial applications. GE Digital Energy's experience is also enhanced through other on-going smart grid trials and demonstrations throughout the world; other teams in GE Energy are active in both the research and development of related technologies including energy storage, low-carbon thermal and renewable generation, advanced network monitoring and diagnostics and possible 'disruptive technologies' at four Global Research Centres.
Funding	GE has agreed to contribute 20% of the total costs of its services and equipment to the project.
Contractual relationship	**Will the DNO have a contract in place which ensures the External Collaborator complies with the LCN Fund Governance Document?** ~~Yes~~/No GE has signed a Memorandum of Understanding with ENWL which specifies the scope of the service it will provide.
How funding relates to benefits from Project	Engagement with a DNO in the provision of specific equipment and also to undertake the key role as Power Technologies System Integrator.

Organisation Name	SAIC
Relationship to DNO (if any)	None
Type of Organisation	SAIC is an international organisation delivering products and services across a range of industry sector including the Utilities and Smart Grid sectors.
Role in Project	SAIC has joined the ENWL consortium to fulfil a number of key roles to ensure successful delivery of this project. These roles include overall Programme Management, Systems Integrator and to provide a Cyber Security solution covering the new communications and distribution network infrastructure. SAIC has extensive experience across their global capabilities of undertaking these key roles.
Prior experience brought to Project	SAIC has extensive experience in developing and deploying Cyber Security solutions within a number of global network operators; the background to this experience and domain expertise is in working with the US government and defence agencies over an extensive period of time. SAIC have demonstrated a significant level of knowledge and experience within the Utilities sector and specifically within the domain of Smart Grids and have extensive experience in managing programmes of this level of complexity and innovation.
Funding	SAIC has agreed to contribute 20% of the total costs of its services to the project.
Contractual relationship	**Will the DNO have a contract in place which ensures the External Collaborator complies with the LCN Fund Governance Document?** ~~Yes~~/No SAIC has signed a Memorandum of Understanding with ENWL which specifies the scope of the service it will provide.
How funding relates to benefits from Project	SAIC will gain insight into the delivery of an innovative and creative project with the collaboration of others and in working closely with a DNO and its partners to ensure success, which will further develop their Smart Grid practise, industry experience and demonstrate their Cyber Security credentials to the benefit of the GB utility industry.

Organisation Name	All other External Collaborators are referenced in Appendix 6.
Relationship to DNO (if any)	
Type of Organisation	
Role in Project	
Prior experience brought to Project	
Funding	
Contractual relationship	
How funding relates to benefits from Project	

Box 23: Other partners

This Project is strongly supported by stakeholders within the City of Manchester, Greater Manchester and across the North West region as it facilitates the transition to a low carbon society.

Manchester City Council and the Association of Greater Manchester Authorities support this Project as it directly enables the delivery of the Greater Manchester Strategy; in particular its priority to achieve a rapid transformation to a low carbon economy. The Corridor is profiled within the Greater Manchester Strategy as a key investment site at which to trial and learn from low carbon interventions, and features strongly in economic and low carbon priorities and programmes. The transition arrangements for the North West Development Agency recognise the strategic importance of both the Corridor and smart grids.

The consortium will help lead the collaborative low carbon effort in the Corridor which will assist with the delivery of actions under:

1. Manchester: A Certain Future which is the City of Manchester's Climate Change Action Plan;
2. Greater Manchester Energy Group's development and implementation of a GM Energy Plan; this project is profiled as a priority in component studies
3. Low Carbon Economic Area (for the Built Environment) Plan

Work to develop this project was informed by the North West's Climate Change Action Plan and is aligned with its Low Carbon and Environmental Goods and Services Strategy, which identified smart grids as a priority.

Relevance & Timing of Project

Box 24: Please outline why the learning from the Project is relevant to Network Operators

The distribution network within the Corridor area is meeting the current requirements placed upon it and ENWL is fulfilling its obligations, in terms of quality and service, to the customers connected to it. With the delivery of "Manchester: A Certain Future", in response to the Low Carbon Transition Plan we expect to see increased deployment of renewable distributed generation and the introduction of low carbon enabling technologies such as electric vehicles and heat pumps. There will be an increase in distributed generation from schemes developed by commercial organisations to assist companies in meeting their carbon reduction commitments. Additionally the introduction of Feed-in-Tariffs will promote the installation of small-scale and domestic generation which will also affect the operation of the distribution network. For DNOs the challenges of the change in network characteristics and power flows are significant if they are to continue to provide robust and secure supply.

A key element in the Project is a review of current design policies and architecture given these new challenges and opportunities. These changes also affect operational practices, health and safety procedures and new commercial arrangements. We intend to utilise learning from previously funded initiatives, such as IFI projects, to integrate the various technologies within a fully operational environment at a reasonable scale.

This learning alongside that from other DNOs' LCNF projects will feed in directly to our requirements in DPCR6.

A key goal is for us is to develop system modelling techniques appropriate for smart grids, especially at LV. Current system modelling tools are tailored for higher voltage networks, with parameter and data requirements very different from those available from existing or future LV network data. A particular challenge for modelling the LV network is the unbalanced nature of the load between the three phases. It is our intention to develop models for these networks based on new proposed measurements, smart metering and new approaches to modelling techniques.

To date industry developments such as domestic metering and renewable generation schemes have not integrated in any significant way with the operation of distribution networks; the focus has been from a retail perspective. The LCNF fund has introduced the opportunity to have a holistic view of such developments and investigate how the network will be able to appropriately balance supply and demand in an environment with increasingly dynamic load and two-way power flows. We 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, 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.

During the life time of this project, we recognise that technology advances will be made and new or changed technologies will become available. We consider that the structure of the project, and approach that we will adopt, will enable us to consider new developments as they become available and factor these into future project phases or bring these within the current scope. The decision to do so will be made on a case-by-case basis and will focus on the additional benefits such changes could bring to the project and when would be most appropriate for these changes to be made.

Demonstration of a robust methodology and that the Project is ready to implement (answers should be detailed in boxes 25 to 27)

Box 25: Please demonstrate that the Project has a robust methodology and can start in a timely manner

ENWL has been designing a Smart Grid Project with the Corridor Manchester for nearly 12 months, with positive contributions being made by all partners to help in formulating the projects objectives.

The CMSCP has been developed by identifying the key players from across the locality and the industry sector, determining who could support the required technologies and initiatives and also bring new thinking and innovation to the project. Selection of our preferred partners was undertaken by the ENWL LCNF Steering Group via a presentation and selection process, culminating in the appointment of the preferred partners into the project. We have developed the consortium and the Project to the position where we have agreements under Memorandum of Understandings (see Appendix 4) that has ensured that all our partners have a detailed understanding of the Project requirements. The continuing dialogue with partners regarding the timing, costs of provision of services and equipment, involvement and funding of personnel and agreeing the overall levels of investment provide a high degree of certainty and robustness to the Project Plan, outlined in Appendix D. We are planning all the preparation steps prior to the LCNF bid award so that we can mobilise without delay.

The Project plan sets out the phased approach that the CMSCP has determined will bring the highest success. The phases cover firstly the finalisation of contracts with partners and vendors and finalisation of the detailed project plan with all resources and responsibilities clearly identified. The next phase is the initial limited deployment of specified technologies and a period of testing and operation in order to understand the issues and learn the lessons for practical full deployment. All lessons learnt will be applied to the wider scale deployment of the technologies ensuring as far as possible that this is managed efficiently and to Project timescales.

The phased approach detailed in the project plan is aligned with the analysis of the key technical, engineering, resource and project management risks. The plan is designed to mitigate as far as possible the identified risks. Through considered discussion with consortium partners and suppliers, the available resources, technologies and equipment have been identified and costed and the project plan carefully matched to this. In several key areas there is already ongoing work through specific IFI projects eg on-load tap changer and cyber security, some of which should become first tier LCNF projects before being deployed within Corridor Manchester Smart City Project. The use of prior projects for certain technologies and equipment gives a high confidence for successful deployment.

There will of course be ongoing project management risks throughout each phase of the project and the plan has been staged to try and minimise these to the greatest extent possible. Throughout the project the ongoing risk identification and management as part of the project governance ensures appropriate oversight and mitigating actions.

The Executive Programme Board which represents the CMSCP is confident that the rigour and thoroughness applied to the process of building the project plan and costs gives appropriate assurance. Those areas which have greater uncertainty are those associated with the completely new technologies that are to be used. Given those uncertainties appropriate contingencies have been included and the confidence in these is such that there will be no request for any cost over runs made for the Project

Box 26: Please provide details of the risks associated with the Project

The table below describes and ranks the key risks associated with the CMSCP. A comprehensive review of the Project and its deliverables has been undertaken, in conjunction with all partners, which has resulted in the following risks being identified and a risk rating established.

The risk management methodology, as described in box 27, has been applied to identify, review and rate all Project risks. Further risks have been identified, which have a lower rating than those described below. All risks will be fully encompassed within the project management approach and will be managed and reported as per agreed procedures.

Where appropriate, additional risks relating to this project have been raised within the ENWL Risk Register.

No.	Item	Likelihood	Impact Rating	Impact Area	Mitigation	Risk Rating
1	There is a risk that the impact of the Government's October spending review on public sector organisations (MCC, CMFT, UoM, MMU & MSP) will lead to limited or no funding to continue with Smart Grid trials, energy efficiency initiatives or DSM.	4	3	Environment	Electricity North West will be working with affected partners to understand any potential impacts on the Corridor project and try to mitigate or minimise these wherever possible.	12
2	There is a risk that lack of availability of ENW commissioning resources impacts scheduled project activities leading to delays.	3	4	Project	Ensure effective resource plan is developed and necessary ENW resources are committed to the project at a senior level.	12
3	There is a risk that the project fails to achieve its predicted Low Carbon Saving because of inaccurate estimates or significant change. This could lead to loss of reward, loss of reputation and environmental impacts.	3	4	Financial/ Reputation/ Environment	Monitoring of carbon impacts to be ongoing to ensure early identification of issues.	12
4	There is a risk of problems with the financial control of the project because of the new requirement for and management of separate bank accounts. This will require all new processes for management of procurement, suppliers, payment control and cashflow across the project partners leading to possible impacts in all these areas..	3	4	Financial	Develop effective financial controls in conjunction with Electricity North West finance directorate. Ensure robust and regular audit regime.	12
5	There is a risk that poor project management causes cost overruns leading to loss of reputation, damage to project and loss of any successful delivery reward.	2	5	Finance/ Reputation/ Project	Ensure appropriately skilled PM resources are appointed into the project. Governance and risk regime should ensure issues picked up early.	10
6	There is a risk that main equipment suppliers fail to deliver (smart box/EV charger/Meters) due to technology, specification or integration issues. This may lead to impacts financially, ability to hit milestones and ENWL reputation.	2	5	Project/ Financial/ Reputation	Include effective delivery clause with agreed contracts. Agree delivery dates as soon as possible. Possible alternates identified for more common equipment.	10
7	There is a risk that a key equipment suppliers business fails particularly smaller, newer high technology companies. This could lead to loss of key items of equipment and an impact on project milestones.	2	5	Project/ Financial	Upfront procurement process for checking financial viability of suppliers. Close liaison with possible affected companies and sourcing of alternates where possible.	10
8	There is a risk of the project losing an external collaborator / technology partner for external reasons beyond its control. This could lead to project delays and financial impacts.	2	5	Project/ Financial	Identify potential secondary partners who could be called upon if risk materialised.	10

Box 27: Please provide details of the risk monitoring procedures you will put in place for the Project

The CSMCP will be managed by an integrated Programme Management Office (PMO), staffed by consortium partners and will report to the Executive Programme Board comprising senior management from ENWL and senior members from key partner organisations. The CMSCP will be subject to robust governance and management, ensuring stakeholder sign-on prior to the commencement of the Project and continuing communication and reporting as the Project progresses. All reporting will be based on a RAG (Red, Amber, Green) status against all key objectives including schedule, budget, deliverables and learning capture.

ENWL has chosen SAIC to create and manage the Programme Management Office for this project. SAIC brings to the project proven programme management skills and methodologies and has extensive experience in operating within the UK private and public sectors. Their approach to managing the project lifecycle is designed to be flexible enough to adapt to differing requirements, but sufficiently robust to ensure adherence to agreed schedules, budgets and ensuring delivery of agreed objectives. In addition, we have selected GE as our Power Technology partner, Alcatel-Lucent as our Communications Technology partner and the Joule Centre as our Learning and Dissemination partner. Within the CMSCP we believe we have a team who can not only deliver to the projects requirements, but can develop innovative thought leadership to enhance the learning of the project.

Embedded within our project management methodology is the capability to manage risks and issues; for this we have adopted the successful processes currently in operation within ENWL. Our proven processes have gained industry wide accreditation and are recognised as being robust. The Risk and Issues Model employed considers risks and issues that are business-as-normal and those specifically related to the project all of which will be articulated in a common format, viz: "There is a risk or issue that *undesirable* will happen, leading to *consequences,* because of *trigger or compounding factors*."

Within the risks model, likelihood and consequences will each be given a score from 1 to 5, and the resulting product of these two ratings used to score and rank the risks on the project. The model has been used for many years and has been found to both be robust and recognised as an exemplar approach. The format of the ENWL scoring matrix is presented in Appendix 7. The scoring matrix will be used by the Project Board and Executive Programme Board to continually review Project risks, their mitigating action(s) and controls, and to ensure that risks are managed in priority order. The risk model describes the methodology for determining an 'uncontrolled' risk score. However, if control measures are applied, aimed at reducing the hazard and/or mitigating the risk, it should be possible to produce a 'controlled' risk score that is lower than the 'uncontrolled' risk.

The governance processes, to be operated across the consortium partners, will regularly review risks and issues and either remove these if agreed mitigation has occurred and/or bring new issues or risks to the attention of the Executive Programme Board. The Board will agree management actions, which may lead to the project being halted until such time as sufficient mitigation has occurred to enable on-going management of the risk or issue, or to halt the project and defer further commitment until agreement has been reached with Ofgem on how to proceed.

Section D: Appendices

Please list all the appendices you have attached to this pro-forma and outline the information which they provide. Where these appendices support any information provided in the pro-forma, that information should be adequately referenced

Appendix A	**Full Submission Spreadsheet**
Appendix B	**Maps and network diagrams**
Appendix C	**Organogram**
Appendix D	**Project plan**
Appendix E	**Information sources referenced in Box 14**
Summary	Executive Summary of Optional Appendices
Appendix 1	Corridor Manchester's Strategic Vision to 2020
Appendix 2	Introduction to Corridor Manchester and the Corridor partners
Appendix 3	Corridor Manchester Substation Analysis
Appendix 4	Corridor Manchester's Memorandum of Understanding
Appendix 5	Example Statement of Intent
Appendix 6	Details of Further External Collaborators
Appendix 7	ENWL's Risk Scoring Template