Northern Gateway Smart Grid Project Addendum

Proforma box number/ Spreadsheet	Where the latest information can be found
Box 1	Response to **ENWL016** clarifies how Electricity North West will fulfil its statutory obligations for the connection of the biomass generation and the new headquarters building, if Tier 2 LCN Funds are not secured.
Box 1 & Box 3	Response to **ENWL015** provides additional information on the interface arrangements with an IDNO network.
Box 2	Response to **ENWL025** clarifies the scope of the activity to define new planning and tools and techniques.
Box 4	Response to **ENWL006** explains Electricity North West's thoughts on managing an unforeseen technical infringement developing during the implementation of the Project. Response to **ENWL031** provides additional information on the potential customer impact of unplanned interruptions and clarifies Electricity North West's intends not to seek a derogation, licence consent or exemption to undertake the Project.
Box 5	Response to **ENWL017** clarifies the timetable for the dissemination of learning for the Project.
Box 7	Response to **ENWL024** explains Electricity North West's reasons for installing a Superconducting Fault Current Limiter device as part of the Project.
Box 8	Response to **ENWL026** corrects an error identified in Box 8 of the Full Submission and contains amended Boxes 7, 8 and 10.
Box 13	Response to **ENWL027** explains why the cyber security solution is a key element of the Project. 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 15	Response to **ENWL018** provides further information on the rationale for selecting nine urban centres for the development of large biomass projects as the wide scale deployment of the technology.
Box 17	Response to **ENWL019** describes Electricity North West's approach to the evaluation of the various telecommunications technologies to be deployed in the Project.
Box 18	Response to **ENWL020** provides further detail on the dissemination of the learning from the Project. Responses to **ENWL021** and **ENWL028** clarify Electricity North West's support for the proposed Smart Grid Development Centre at the University of Manchester.
Box 22	Responses to **ENWL022** and **ENWL029** clarify how our learning and dissemination partner, the Joule Centre, will contribute to the Project. Response to **ENWL023** provides further detail on SAIC's Programme/ Project Management experience.
Appendix A – Project Costs	Response to **ENWL001** provides the workbooks Northern Gateway Technology Costs Workbook and Northern Gateway Full Submission Workbook WIP which contain the

	underlying cost analysis supporting the figures presented in the Second Tier Funding Request worksheet of Appendix A – Northern Gateway Smart Grid Full Submission Workbook.
Appendix A – Directs Benefits	Response to **ENWL002** provides the workbook Northern Gateway Net Benefits which contain the underlying assumptions of the Net Benefits worksheet of Appendix A - Corridor Manchester Smart City Full Submission Workbook, and an amended Appendix E which contains a corrected NPV calculation.

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

Northern Gateway Smart Grid Project - The Problem

The challenge and prize for smart grids is real time interaction between networks and customers' demand, and any generation they install. The overwhelming majority of the distribution network is already installed and it is a challenge to transform it into a smart grid. Conversely any area of significant new build for a distribution network provides a very valuable opportunity to implement new approaches that can be incorporated in similar new developments, but are less easy to install and prove on existing networks.

The Northern Gateway is an area of major urban investment and redevelopment which includes extensive new build, including infrastructure, in an urban regeneration area. A key feature of this project is the installation of large (for urban centres) renewable generation, and also sophisticated building management systems. These are developments with which DNOs have had little interaction in the past. The Northern Gateway development will introduce significant increases in demand and fault levels, and considerable changes in usage and power flows across the local distribution network. This will provide excellent opportunities to install new equipment unhindered by retrofit considerations, but with the possible added complexity of managing the interface arrangements with an independent DNO (IDNO).

Traditionally distribution networks have not been designed to facilitate new low-carbon technologies comprising intermittent localised generation and higher localised loads. To avoid the benefits of moving to a low-carbon society being negated by increased costs of upgrading and operating networks, both transmission and distribution network operators need to understand how to design and operate the future networks to meet these new requirements. In particular, they must allow for customer actions to assist in managing a low-carbon electricity system whilst, at the very least, 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 provide the capabilities necessary for analyzing smart networks, and techniques need to be developed to plan and operate them, 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 Solution

The solution is to deploy new smart grid design integrated with the existing network. We will:

- install network monitoring devices required to prove system control and modelling techniques;
- implement a Distributed Energy Management System (DEMS) designed to interact with Building Management Systems and to manage the interaction between network, customers and/ or third parties;

- implement distribution system automation to manage the HV network dynamically, including for the establishment of generator supported power islands;
- install a superconducting fault limiter to manage the fault levels;
- install and test a range of communication systems;
- develop smart network modelling tools and techniques for the planning and control of HV and LV networks;
- explore the commercial framework for the provision of generation and demand side response to manage the power flows across distribution network and investigate the commercial interactions with the provision of heat.

Method

The project will deploy a Distributed Energy Management System (DEMS) to provide a real-time view of available energy resources, committed resources, current state, alarm status, historic load and predicted load. This will deliver integrated distributed generation management and active demand shaping across the local distribution network.

A range of communications technologies will be deployed 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. 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.

A range of distribution network assets, small and large scale generation, and building management system solutions will be integrated via the DEMS into ENWL's Distribution System Management Control (DSMC) centre. This will also provide remote control and management of consumer metering and demand management technologies.

Additional integrated distribution network intelligence will be installed to provide a remotely configurable distribution network that is able to meet the operational issues arising from a more dynamic and diverse distribution and demand profile. These intelligent devices will provide remote management and control of a Super Conducting Fault Current Limiter, HV automation equipment, HV network monitoring and distribution transformer monitoring.

Project

The Northern Gateway will transform the north east side of central Manchester. The Co-operative Group, who owns the land, will oversee the development of the Northern Gateway. In the first phase a new Co-operative Group headquarters, which is designed to be carbon neutral, and a 17MW biomass generation plant will be connected to the local distribution network. The prestigious headquarters will set the sustainable design standard for the remainder of the development. The aim of the Northern Gateway Smart Grid Project (NGSGP) is to understand the future demands of the distribution network from a low carbon society and to trial tools and techniques for the design and operation of the network.

There is also the potential to explore the interface arrangements with an IDNO network should the Co-operative Group choose an IDNO to provide and retain ownership of the connection infrastructure.

Box 2: Please provide a description of the Project

Geography

The Northern Gateway development incorporates the transformation of buildings, land and local infrastructure across a 20 acre site in central Manchester. The first phase of this derelict land development includes:

- The creation of the Co-operative Group's 400,000 ft^2 Head Office building which is designed to achieve BREEAM 'Outstanding' status that will set the standard for sustainable design across the remainder of the development; and
- The deployment of a 17MW biomass Distributed Generation plant within the local distribution network. The Northern Gateway, as an area of major urban investment and redevelopment, will introduce significant increases in demand and considerable changes in usage and power flow across the distribution network. Current planning tools and demand profile data are likely to need redefinition as a result of these changing requirements.

The Co-operative Group's current head office complex is located across seven buildings on the north side of Manchester City Centre (Appendix 1 – Introduction to the Co-operative Group). One of the buildings, CIS Tower is supplied at 6.6kV by three dedicated circuits supplied from Ancoats North primary substation. The present maximum capacity is 6MVA. There are plans to erect a single new Co-operative Group head office, and to redevelop the existing building and the surrounding land. Appendices B.1 and B.1.1 shows the NGSGP footprint and the distribution network assets contained within the footprint.

The new HQ head office will be supplied by two 6.6kV circuits supplied from Ancoats North primary substation. The Co-operative Group's proposed maximum capacity for the new supply is 3MVA. The new head office building will contain 800 kW of CHP generation which will run in parallel with the ENWL's 6.6kV network and 1800kW of standby generation which will run in island mode. There are, however, proposals to connect the standby generation in such a way that it can also run in parallel with the ENWL network. Appendix B.2.1 shows the schematic line diagram of the existing 6.6kV distribution network of the NGSGP centred on Ancoats North primary substation.

A further application has been made by the Co-operative Group for the connection of 17.4MW of distributed biomass generation to be connected to the distribution network. The point of connection for the biomass generation is at 33kV onto the Redbank – Strangeways 33kV circuit. Appendix B.2.2 shows the schematic line diagram of the proposed connection arrangements for the biomass generation plant.

Ancoats North primary substation, from which the Co-operative Group is currently supplied, has three 11.5/23MVA transformers installed with a total firm capacity of 37MVA. It is proposed to install metering, monitoring and control equipment at key HV/LV substations. There is a total of 6 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, 11 remote control switching points are to be retrofitted (see Appendix 3 for further details) to the existing high voltage network, which will be automated to switch between different parts of the network, to avoid circuit overloads. Appendix B.3 shows conceptually the NGSGP and Appendix B.4 shows the proposed conceptual telecommunications network infrastructure.

Customers

In addition to the supplies to the Co-operative Group, there are 23 x 6.6kV circuits supplying 81 distribution substations fed from Ancoats North. The total number of customers supplied from Ancoats North primary substation is 7,600.

Contracts

The NGSGP will explore the potential for an urban distribution network to both support and actively facilitate the utilisation of Distributed Generation and other Distributed Energy resources, in order to achieve the following:

- Reduce peak demand across urban networks that would otherwise exhibit increasing and fluctuating load / demand;
- Define the optimal process for management of Distributed Energy sources within the local distribution network, to reduce the need for high carbon content electricity generation;
- Maintain service and power quality levels as Distributed Generation and demand within a specific distribution network become more diverse and dynamic; and
- Minimise major capital investment in network reinforcement.

The Co-Operative Group, as the owner of the main building developments and the generation, will enter into contracts with Electricity North West in relation to its BMS operation interactivity with ENWL's DSMC. Similarly the development of new generation operating regimes to support the network will be backed by contracts.

ENWL has signed a Memorandum of Understanding with the Co-operative Group which confirms their support of and commitment to the delivery of the NGSGP. Appendix 2 contains a signed copy of the Memorandum of Understanding.

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 four changes to the consortium members: SAIC, Alcatel-Lucent , BPL Global and GE have joined the consortium as lead service and equipment providers; there is uncertainty over the Smart Grid Development Centre so this has been removed; there is the potential involvement of an independent distribution network operator in the Project, depending upon the Co-operative's Group decision on the provision of connections infrastructure; and we have agreed with The Co-operative Group that they will manage the relationship with their energy supplier and so this has been removed from the Project. The Initial Screening submission included a network storage device located alongside the new headquarters which would be used to store the surplus energy generated overnight by the biomass plant. 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.

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	£10.3 million
External Funding	£1.7 million
DNO Extra Contribution	n/a
DNO Compulsory Contribution	£0.86 million
Second Tier Funding Request	£7.5 million
Project Completion date	03/2014

Derogations or exemptions

If awarded funding, will you require a 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

Electricity North West believes that it should be possible to undertake this project without the need for derogation or exemption. However as the detailed design of the project is in relation to operation of the generation in the project to support the distribution network it might be necessary to seek derogations against ER P2/6, the Distribution Code and exemptions for the operation of the IIS scheme. In the case of P2/6 and the D Code it is possible that some aspect the project might cause a technical infringement of the drafting of these documents. We do not expect that there would be any material deviation from the general principles of compliance, rather that there would be some quirk of the historic drafting that causes a theoretical compliance problem. In the case of IIS, it might be prudent to argue for a suspension of the full effects of the scheme where customer interruptions are caused by failure of generation to support the network. Under trial conditions adverse effects would be designed out as far as possible, but the option to temporarily suspend IIS might be a cheaper option than designing in expensive features to drive this risk beyond where is sensible for a trial. In all cases, as our designs progress, we will keep Ofgem abreast of our thinking and only apply for derogations in the case of clear need.

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
06/2011	Phase 1 complete: Programme Management Office established, finalised Project Plan and concluded commercial arrangements. Phase 2 initiated.
11/2011	Preliminary assessment of Cyber Security operation analysis.
12/2011	Initial public seminar on Project progress and early outputs, results and learning.
06/2012	Initial deployment of network automation complete.
07/2012	Implementation and configuration of DEMS system; installation of 25% of communications and distribution network equipment.
10/2012	Initial implementation of LV/HV modelling and design techniques complete.
11/2012	Phase 2 complete: Deployment of 25% of communications systems and distribution network equipment. Phase 3 initiated.
10/2013	Metering System implementation complete.
11/2013	Phase 3 complete: Deployment of remaining 75% of communications system. Assessment / report on 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	£746,000	1,170	Part funded by DNO Compulsory Contribution, part funded by LCN Fund.

Staff type	Total Costs	Person days	Funding
Financial Administration	£96,000	390	Funded by DNO Compulsory Contribution.
Installation team – distribution network equipment	£440,000	991	Funded by LCN Fund.
Installation team – telecommunications equipment	£256,000	577	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
Superconducting Fault Limiter (1)	Manage distribution fault level	£2,000,000	£2,000,000	Funded by LCN Fund	None
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 BPL Global	None
Distribution Automation and Monitoring Equipment (12)	Retrofit automation equipment for control of HV switchgear, including current transformers and remote terminal units	Average £15,500	£185,000	80% funding from LCNF 20 % funding from GE	None
Consumer sub-meters and substation Monitors and BMS (12)	Monitoring of load, demand, voltage, including current transformers and remote terminal units	Average £30,600	£367,000	80% funding from LCNF 20 % funding from GE	None

Item description & No. of units	Function in Project	Cost per unit	Total Cost	Funding	Direct Benefit
Ruggedised Network Routers (48)	Telecommunications network control devices	£4,000	£192,000	80% funding from LCNF 20 % funding from Alcatel-Lucent	None
UHF Radio System and WiMax System (base stations and cpe) (1 of each)	Telecommunication network solution	£222,000	£222,000	80% funding from LCNF 20 % funding from Alcatel-Lucent	None
Digital Subscriber Link Modems (10) PLC equipment (base system and cpe) (10)	Telecommunications network solutions	£2,540 £5,100	£76,400	80% funding from LCNF 20 % funding from External Collaborator	None

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 3. Cyber Security Solution	80% from LCN Fund and 20% from SAIC	40 months	£955,000
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	£390,000
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	£192,000
Arqiva	Provision of: 1. Long range radio communications service	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
Generation customer (For the trial of network support)	£109,000	£109,000	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	£229,000
IT	Network Modelling software development	£90,000
Contingency	Contingency	£893,000
Decommissioning	Provision for decommissioning equipment	£20,000
Consortium partners	Personnel resources (contribution in kind)	£583,000
Public Engagement	Website development and Smart Grid forum	£72,000
Learning and Dissemination	Interim reports, close down report and conference	£98,000
		£
		£
		£
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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

Electricity North West 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

Electricity North West 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 June 2012, with full deployment being completed by November 2013. 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%) completed by June 2012. Full deployment (75%) and integration with DEMS completed by November 2013.
Distributed Generation integration within DEMS Deliverable - Deploy and test new and existing technologies to enable the effective and efficient integration of small and large scale generation plant within existing urban networks. Installation of SCFL by February 2012. Significant learning will be gained from this phase of the project, which will be captured and disseminated via our partner throughout the project.	Installation of SFCL by February 2012 Operational assessment of the effects and impacts on 33kV and HV networks to end of November 2012. Identification of the optimal network operational practices to support wide scale renewable Distributed Energy sources.
Building Management Systems (BMS) integration within DEMS Deliverable – Deployment of remote control interfaces to BMS and other similar systems through ENWL's DSMC centre. Design and agreement of integration approach by January 2012, with implementation into control room environment by July 2012. Review, assessment and learning phases to be conducted through to October 2012.	Design approach agreed and completed by January 2012. Implementation of BMS interface into DSMC by July 2012. Review period to assess control capabilities in conjunction with Co-op Group completed by October 2012. Operational and economic evaluation of benefits arising from utilising BMS resources as part of urban aggregation.
Cyber Security Solution Deliverables – Cyber Security System (CSS) applied to NGSGP 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 November 2011; final stage to implement enhanced solutions by May 2013. 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 November 2011. Deployment of enhanced solutions by May 2013. Continuing collation and dissemination of learning through each phase. Definition of optimal CSS solution by March 2014.

Successful Delivery Reward criterion	Evidence
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 network. Initial deployment completed by June 2012 and full deployment completed by September 2013. Delivery of interim outputs at three month intervals throughout each phase and at key milestones.	Initial deployment (25%) completed by June 2012 Review of initial deployment by September 2012 Full deployment (75%) completed by September 2013 Comprehensive evaluation of each telecommunication architecture and technology against a range of criteria including cost, quality of service and operational efficiency by March 2014.
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 December 2012, 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 August 2011. Initial network modelling underway by December 2012. Continuing capture and management of metering data Development of draft design specifications by September 2013. Check-point to evaluate outcomes of modelling techniques.
Remote monitoring within urban HV networks Deliverables – Design, implementation and operation of a remotely controlled system of HV intelligent monitoring devices. Initial deployment of monitoring devices will be completed by June 2012 and full deployment achieved by October 2013. Learning will be focussed on the deployment and operation of monitoring on HV networks and the provision of increased and improved data. This 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 October 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.

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

This project will use a Distribution Energy Management System (DEMS) to enable remote control of connected DG to balance generation with demand, to facilitate both the local production and use of low carbon electricity and its operation in co-ordination with the local distribution network. Facilitating the connection and output of low carbon DG is cited in the DECC Low Carbon Transition Plan (LCTP) as part of the UK strategy to reduce carbon emissions, and it also addresses the targets within the UK Renewable Energy Strategy.

The Northern Gateway project will involve a 17MW biomass plant, a renewable generator located in a demand centre. This brings carbon benefits in terms of its low-carbon renewable output, estimated at an annual carbon saving of 41,080 tCO_2e (see Appendix E) and with the potential to reduce losses by serving local demand.

There have been few urban biomass projects of this scale in the UK so far, but no disaggregated statistics are available; there was only 300MW of 'plant biomass' of *any* scale or location installed in the UK by the end of 2009 (see Digest of UK Energy Statistics, 2010). Dedicated biomass plant connected to distribution networks in the UK has mostly been either in the <1MW scale; proposals for plants >10MW are predominantly in rural areas. The project is an important demonstrator of the challenges and solutions in integrating a relatively large and controllable generator in an urban distribution network.

The Project will deliver a better understanding of how to enable businesses (and communities) to support the transition to a low carbon economy through adoption of distributed renewable generation within the local distribution network. It will develop a commercial framework to support and benefit customers through participation in renewable generation and demand side management schemes. The project will improve usage of the whole network in meeting demand, potentially limiting the need for more reinforcement of the grid and associated costs for customers.

On a local scale, biomass can provide sufficient low-carbon renewable energy to meet zero-carbon development requirements within building regulations and planning permission. On a national scale, the balanced 'Pathway Alpha' in DECC's 2050 pathways analysis identifies a major role for energy crops on 10% of UK land, and bioenergy plants spread across the country. On the local and national scale, biomass is useful because its output *can* be controllable to match electricity system needs, rather than dependent on variable wind or solar output or inflexible as in the case of large nuclear plant. In tackling the network integration and management of small and large scale distributed renewable generation, the project will reduce reliance on energy imports and address the issues of intermittency and voltage management arising from large-scale adoption of renewable generation in an urban environment. The Northern Gateway project prepares for the future requirements of a low-carbon energy system.

Carbon reductions arise from an intelligent distribution network that delivers the balancing of distributed renewable generation with demand across the network. The project will introduce active generation control techniques to minimise the potential network overloads associated with the output of distributed renewable generation in combination with changes in the local demand levels, or with unavailability of network assets due to fault outages.

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:

- carbon, renewables and fuel-diversity benefits of encouraging the use of large-scale power from biomass, which is a key technology to deliver power at scale for a lower-carbon energy system;
- reducing losses by co-locating generation at a demand centre;
- demonstrating the use of Distribution Energy Management System to deliver these benefits; and
- developing optimised operational and network design practices to facilitate the accelerated adoption of a sustainable low carbon UK generation-mix.

The Northern Gateway demonstrates the challenges and solutions in integrating a relatively large generator in an urban distribution network. The relative scales of this generator, demand and network are important in terms of the learning this project will generate. There have been few urban biomass projects of this scale in the UK so far, and this technology may not be suitable for every urban centre. Thus although there are 66 urban city centres in the UK, we assume here that this situation can only be replicated in 9 urban city centres, due to issues such as transport of biomass feedstock and the scale of the urban redevelopment.

Summary of quantified costs in 'net benefits':

- Proposed total cost of Northern Gateway project
- Dissemination and project management costs to a further 10 cities;
- Network costs in a further 10 cities – eg monitoring, automation, communications, excluding innovation costs within Northern Gateway; and
- Payments for managing generation in a further 10 cities.

Summary of quantified carbon benefits in 'net benefits'

- Output of biomass generator, replicated in urban locations across GB.

Summary of quantified other benefits in 'net benefits'

- n/a.

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 data about lower voltage networks, about what customers are doing in real time, and the effects on the network and on other customers. Decarbonisation of energy means that future customer demands and behaviour will be driven by both customers' own low carbon agenda, and also by the electricity sector in reducing the carbon content of its activities.

DNOs will have to design and operate their networks to cater for this. There are new opportunities to support the network from generation, both under normal operating condition, thus avoiding reinforcement, and to maintain supplies when the network has suffered a fault.

DNOs need to create new techniques for system management and customer interaction that have not been needed in the past. The scale of the interaction, ie ultimately across 25 million end customers in GB, means that much of this will have to be automated.

Specifically for the Northern Gateway we will:

- Develop contracts with the owners and operators of generation to support the network under normal and network outage conditions, and build the control capability to support DNO requirements. This will include the ability for the generator to support the network in island mode. There are a number of technical and commercial challenges to overcome. The project provides the perfect test bed for technical solutions; the partners are committed to establish appropriate commercial arrangements.
- Incorporate fault current limiter technology into system management. There are several ways in which the technology can be deployed in theory. This project will analyse real operational behaviour to refine deployment strategies.
- Future urban redevelopment will follow a pattern where the majority of non-domestic buildings will have very sophisticated building management systems (BMS). This is a huge resource of controllable load. We will use Partners' building management systems as part of the overall demand control process for the network. We will use experience of constructing the DEMS and integrating it into DSMC to ensure the project can be scaled up across Greater Manchester and the rest of ENWL.
- Develop modelling techniques that to plan future networks. Current techniques do not cater for interactive (or islanded) generation, multiple loading patterns or multiple distributed loading points on networks. All are required to plan smart networks. Operation of smart networks, ie the new intelligence to schedule demand and generation to keep the network within limits, requires techniques that can do the analysis in real time, or quasi real-time.
- Learn how to maximize the use of the existing network. The capability to control network assets for the first time en masse, especially HV switches, gives the capability to alter network running conditions to suit better 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.

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

A key feature of this project is the interaction between ENWL, customers and other electricity sector players. Although the project 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 foresee that many customers with large urban presence and demand will start to use renewable generation (like biomass) in urban centres. The opportunities explored in this project, appropriately showcased, will be a further encouragement to the take up of this technology

Fault current limiting technology has long been proscribed in GB. The advent of superconducting technology overcomes the historic safety fears. This installation will be used both to explain the deployment and the economic benefits, as well as promote the technology to a sceptical industry.

For larger customers, ie those with substantial buildings, the integration of building management systems and the smart grid is a key low carbon resource. Our integration of Partners' BMSs with our network management will be ground breaking. The specification, building and operation of the DEMS, and its integration with Partners' BMSs 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, particularly in relation to integration with third party BMSs, should be easily adapted to all DNOs and their systems

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.

Although there are no detailed plans regarding EVs in this phase of the project, we need to anticipate the integration of smart charging of EVs within our overall network management. This will need discussions and developments with manufacturers, installers and other interested parties if the right balance between control, usability and cost is to be found. Again 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 that can be shared with all interested parties.

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 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 communications 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.

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 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.

In addition the Co-operative Group will utilise a public outreach and marketing facility to be located at the new HQ development to demonstrate and explain the value of the project and their ongoing commitment to carbon reduction throughout their business.

The Project team plan to deliver the following dissemination activities:

- The development and maintenance of the NGSGP 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 NGSGP. Some of the events will be directed towards a professional audience, others for local politicians and civil servants and 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 participation of industry and commerce in the underlying carbon reduction and energy efficiency goals;
- Support to the proposed Smart Grid Development Centre to be located at Manchester University 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 NGSGP 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 NGSGP 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~~

Electricity North West and the project collaborators have agreed that all project activities will conform to the default arrangements for IPR.

Electricity North West 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;
- Cyber Security applications;
- Super Conducting Fault Limiter; and
- Distribution Network Modelling Application.

It is possible that Electricity North West and the project collaborators will jointly develop foreground IPR in the following areas:

- Development of LV and HV network modelling and planning solutions;
- 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 project 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 NGSGP.
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 NGSGP 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 circa 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 Smart Grid 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	Joule Centre
Relationship to DNO (if any)	None
Type of Organisation	Educational, research and development organisation.
Role in Project	To undertake the role of lead external collaborator for the capture and dissemination of knowledge and learning to all key stakeholders.
Prior experience brought to Project	The Joule Centre for Energy Research & Development is a partnership of North West Universities, commercial organisations and other stakeholders associated with the energy industry. It has emerged out of the complementary strengths of the participating organisations across a range of disciplines and energy areas, with extensive experience in developing, capturing and disseminating knowledge and learning.
Funding	The Joule Centre will commit an agreed number of days effort to the project in support of its goals and objectives.
Contractual relationship	**Will the DNO have a contract in place which ensures the External Collaborator complies with the LCN Fund Governance Document?** ~~Yes~~/No The Joule Centre has signed a Memorandum of Understanding with ENWL which specifies the scope of the service it will
How funding relates to benefits from Project	The Joule Centre will utilise its extensive reach into educational and DNO organisations to further advance its communications and contacts across these sectors.

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 project is located in a key investment priority zone, and represents a UK leading local collaboration at the cutting edge of low carbon innovation. The transition arrangements for the North West Development Agency recognise the strategic importance of this project.

The consortium will deliver actions under:

1. Manchester: A Certain Future which is 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; and
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 around the Northern Gateway is currently meeting its requirements. As the Government's Low Carbon Transition Plan is implemented there will be future increases in demand and in the deployment of distributed renewable generation. These will be driven through schemes developed by commercial organisations to meet their own carbon footprint commitments. Also the introduction of feed-in-tariffs will promote the installation of small-scale and domestic generation which will 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..

The first super conducting fault current limiter (SFCL) installed on a UK distribution network was at Electricity North West's Bamber Bridge primary substation, near Preston. The installation was part of a tri-DNO project collaboration with SP Manweb and CE Electric. The project was funded by the Innovation Funding Incentive available to the participating DNOs. The Bamber Bridge trial aimed to prove the basic operation and overcome any installation issues associated with integrating this new technology into existing networks. In the case of the Gateway we will engage with the HSE to ensure that previous presumptions against the use of this technology are fully overcome with all stakeholders as the technology is put into normal commercial use.

A key goal is for us 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 lower voltage network data. 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 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 the NGSGP, we recognise that technology advancements will be made and new or changing technologies will become available. We consider that the structure of the project, and approach 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 NGSGP 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.

A key element in the NGSGP 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 will use learning from previously funded initiatives, such as IFI projects (both ENWL's and other DNOs'), to integrate the various technologies within a fully operational environment at a reasonable scale.

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

Electricity North West has been working with the Co-operative Group for over 12 months. The consortium has an extensive range of partners bringing a wide variety of knowledge and experience to the project. The development of the consortium and the project to the position where we have agreements under MoUs has ensured that all the partners have a detailed understanding of the project requirements. This commitment and the continuing dialogue with partners regarding project issues (ie timing, costs of provision of services and equipment, involvement and funding of personnel, agreeing the overall levels of investment) provides a high degree of certainty and robustness to the project plan, outlined in Appendix D.

The project plan sets out the staged approach that the consortium has determined will bring the highest success. The stages cover firstly the development of finalised contracts with partners and vendors and finalising the detailed project plan with all resources and responsibilities clearly identified. The next stage 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 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 staged 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 cyber security, some of which should become First Tier LCNF projects before being deployed within the Smart Grid on this Project. The use of prior projects for certain technologies and equipment gives a very high degree of confidence in its later successful deployment.

There will of course be ongoing project management risks throughout out each stage of the NGSGP and the plan has been phased 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 consortium 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 utilised. Given those uncertainties appropriate costings 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 Project. 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	Impact Area	Mitigation	Risk Rating
1	There is a risk that the proposed Bio-Mass Generator project is delayed due to issues with planning consents.	3	4	Project/ Environment	Monitor progress of planning consent process in conjunction with the Co-operative group.	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 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
5	There is a risk that the Co-operative Group are unwilling to participate in the trial which would effectively lead to the stopping of the project.	2	5	All	A long time has already been spent working with the Co-op and Electricity North West will continue to work closely with the key stakeholders within the Co-operative Group	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 and milestones as well as reputationally.	2	5	Project/, Financial/ Regulation	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 financial control of the project is hindered because of the requirement for and management of separate bank accounts. This may lead to impacts on procurement, suppliers, payment control and other financial aspects.	2	5	Financial	Develop effective financial controls in conjunction with Electricity North West finance directorate. Ensure robust and regular audit regime.	10
8	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	Financial	Upfront procurement process for checking financial viability of suppliers. Close liaison with possible affected companies and sourcing of alternates where possible.	10
9	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
10	There is a risk that the overall time scales of the project may change as further and more detailed design and analysis is undertaken.	3	3	Project	Ongoing contract negotiations and analysis with partners as well as the continuing process of risk monitoring and update	9

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

The NGSGP will be managed by an integrated Programme Management Office (PMO), comprising consortium partners and will report to the Executive Steering Group comprising senior management from ENWL and senior members from key partner organisations. The NGSGP 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 NGSGP 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 the NGSGP. 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 NGSGP 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 NGSGP.

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 Electricity North West. 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 template is presented in Appendix 4. The scoring matrix will be used by the Project Board and Executive Programme Board 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 / 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	Introduction to the Co-operative Group
Appendix 2	The Co-operative Group's Memorandum of Understanding
Appendix 3	Northern Gateway Substation Analysis
Appendix 4	Electricity North West's Risk Scoring Template
Appendix 5	
Appendix 6	
Appendix 7	