SPT2001 Demand Side Management of Electric Storage Heating – Addendum

Proforma box number/ Spreadsheet	**Where the latest information can be found**
Box 1	Response to **SP013** and **SP014** clarifies the use of a simulation of demand side response to variable wind generation and the constraints the project will address. **SP015** details the operating conditions of the Demand control units. **SP016** details the use of POS data from the trial. **SP018** clarifies that the trial will only relate to space heating.
Box 1 & 2	Response to **SP012** details the type of electric heaters to be used in the project.
Box 2 (Project description)	Response to **SP009** clarifies the view that the learning from the project and the concept can be applied elsewhere in the UK.
Box 4 (Derogations or Exemptions)	Response to **SP007** clarifies the conditions under which a derogation or exemption would be requested.
Box 9 (Payment to Customers)	Response to **SP011** details the reasoning behind the payment to be made to customers.
Box 13 (Successful delivery reward criteria)	Response to **SP031** includes a revised successful delivery reward criteria.
Box 19 (IPR)	Response to **SP017** details parties interested in IPR.
Appendix E (Benefits Calculation)	Response to **SP010** clarifies the assumptions behind the benefits case included in appendix E.

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

Scottish Power Distribution
Demand Side Management of Electric Storage Heating

The Challenge the Project seeks to Address

In the transition to a low carbon economy it is anticipated that there will be a significant uptake of electric heating and electric vehicles in response to the Government's strategy to reduce emissions from the heat and transport sectors. Significant increases in electric heating and electric vehicles, which are at an early stage of deployment, could have an adverse impact on electricity networks in the UK if this load growth is not carefully managed and controlled.

In addition, it may not be possible to deliver a sustainable solution if this demand is not controlled to suit low carbon generation availability, rather than running generation to suit demand, as has traditionally been the case. Low carbon generation requires flexible demand because it is intermittent (e.g. wind) or inflexible (e.g. nuclear). To date demand management has been passive and predictable however, to cater for future load growth demand management will require to be far more dynamic.

Ofgem's demand side response modelling work, published in July 2010[1], has quantified that demand management and load shifting of 10% could save up to 2,550tCO2 per day and £564m per annum on capital cost of new generation and network investment. This project will help to facilitate the move in delivering these benefits.

In recognition of the significance of this Project and the potential carbon benefits, endorsement has been received from Jim Mather MSP, Energy Minister for Scotland (Appendix 1) and Glasgow City Council (Appendix 2).

The Solution to this Challenge

The solution to this challenge will be to allow new load growth in electric heating and electric vehicle load to be connected on the network in a manner that meets the customers' needs and lifestyle without excess costs or problems being encountered with the day-to-day operation of the UK network.

Electric storage heating is an important part of the solution to this challenge since it has the ability to act as a form of energy storage and flexible demand response, which can be operated at times when energy is available. To take advantage of this however requires that any local distribution network constraints, such as excessive loading, can be managed simultaneously.

The Project solution will address the challenges of balancing loads on the network when demand management is possible in advance of the future challenges of widespread electric heating and electric vehicles plus less predictable generation.

The Method to be Trialled

In the UK large-scale control of electric heating loads is one-way via the National Radio Teleswitching System (NRTS) with control signals being transmitted over Radio 4 airwaves. This arrangement requires a customer to have a radio teleswitch (RTS) as part of their existing metering arrangements in order that off-peak heating loads can be controlled in response to these control signals. This project will trial a demand control unit, capable of two-way communications, as a potential replacement for the RTS which will be used to provide individual switching control of storage heating loads and capture power quality information. This approach lends itself to the smart metering roll out as the technology utilised in the Project will be similar.

The demand control units will form part of a novel dynamic load management system to be trialled where control signals will be scheduled from a centrally located demand management system. In addition to providing control in response to a set period of charging or day ahead weather, as is currently the case with the RTS this project will trial the optimisation of stored energy charging in response to a number of operating conditions and network constraints. The existing and proposed control scheduling is illustrated in Appendix 3.

In addition, a novel communications solution to the UK will be trialled between the demand control units and the centrally located Demand Management System using Long Range Radio. This communications solution has been chosen as it provides a potential scalable solution for future smart metering and demand management response requirements in the UK.

The Project Trial to be Undertaken

This project seeks to undertake a Trial that will involve a group of 1000 households with electric storage heating that is currently controlled by a radio teleswitch, in Low and High Rise accommodation in the Greater Glasgow area.

During the Trial the NRTS will continue to exert 'external control' over the storage heaters while a new demand control unit will be installed in each home to provide real-time 'fine control' of each storage heating system. The demand control unit offers greater granularity and flexibility of control than the teleswitch as well as measuring power quality. This unit will provide real time control of the storage heating in response to a range of network and operational parameters from a new centrally located Demand Management System to be located at ScottishPower's Control centre in Strathkelvin House, Kirkintilloch.

The existing tariff arrangements, metered through the fiscal meter, for the Trial customer group will be maintained and the customers will receive the same number of hours of charge to the storage heaters that they would normally receive, except this may be supplied at an alternative time to make better use of low carbon generation. One of the objectives of the trial will be to 'smooth' the overall demand requirements of approximately 4MW of storage heating while balancing the network supply. As the properties in the Trial are similar, control groups of properties will be used to analyse the quantitative effects and measured benefits that smoothing the demand profile will realise. As a result of the trial the temperature in the properties will be monitored to ensure no change from the current arrangements are experienced.

The new Demand Management System at Kirkintilloch will also be capable of scheduling charge to the heaters to provide an optimum heating solution in response to weighted inputs such as wholesale pricing, type of generation available, emissions etc. In addition, the Trial will provide valuable learning in optimising demand management scheduling for Electric Vehicles and other developing new technologies.

[1] *Ofgem July 2010 – Demand Side Response, A Discussion Paper (Ref 82/10)*

Box 2: Please provide a description of the Project

Geographical Location of the Project

The Greater Glasgow area has significant high-density areas of electric storage heating primarily due to the extensive number of tenement buildings that do not have a gas supply due to safety reasons. The Townhead area of Glasgow, see Appendix B, Figure 1 has been chosen for the trial due to its high concentration of electric storage heating. For administrative efficiency, it is considered desirable to have the group of properties confined to a relatively small geographical area.

The properties chosen are a mix of High Rise (4 blocks) and Low Rise and have recently been refurbished (including electrical supply upgrading). These properties are managed by the Glasgow Housing Association (GHA) who were approached about using this area for the Trial and have subsequently endorsed this project's aims and objectives.

As a fall back, in event of tenants being reluctant to adopt the technology or other issues arising, an area in North Lanarkshire has also been identified for the Trial. North Lanarkshire Council, whose area of control is adjacent to Glasgow City, see Appendix B, Figure 2 was also approached regarding the possibility of being involved in the Trial.

The new centralised Demand Management System will be located within ScottishPower's Control Centre in Strathkelvin House, Kirkintilloch.

Existing Electrical Network and Associated Workscope

The Trial properties are supplied from a total of four secondary substations (Grafton Place 15, Taylor Place 2, St Mungo Place 7 and Dobbies Loan Place 12), which have the same source primary (Rottenrow), see single line diagram in Appendix B, Figure 3

The associated project workscope is as follows:

Workscope in Customer's Premise

In recognition of the customers key role in this project a community engagement campaign will be will be initiated prior as the first part of the trial to ensure that the Trial customers are kept fully informed of the Trial process, and that their views are sought at community meetings, through surveys and at one-to-one meetings and responded to appropriately. This is process is illustrated by 'The Customer Journey' in Appendix 4.

In each home a new demand control unit will be installed before the fiscal meter in each property and will be used in conjunction with a separate contactor to provide switching control of off-peak storage heating, see Appendix 5. The radio teleswitch will remain in circuit but will be re-coded.
Each demand control unit will have a SIM card, modem and internal aerial.

As part of this Trial it is proposed to install temperature monitors in 100 properties (including both High and Low Rise) to monitor the temperature in the properties before and during the Project Trial. This will provide baseline property temperatures for comparison purposes over the course of the Trial.

Workscope at Substations

The secondary substations are located in the basements of each High Rise property being used for the Trial. At each secondary substation metering and associated CTs will be installed on the low voltage busbars to monitoring the low voltage demand. A weather monitoring unit will be installed at Rottenrow primary substation to capture local weather readings.

Workscope at Strathkelvin House

A new Demand Management System will be located in Strathkelvin House to provide the centralised control, on an individual property basis, of the total storage heating demand.

The project will include the new software development for the new Demand Management System to provide the necessary control of each demand control unit. Additional algorithms will be developed for radio teleswitch control and load scheduling in response to a range of generating, operational and network constraints.

Workscope between Strathkelvin House and Customer's Premise

The Demand Management System will communicate with each secondary substation meter and demand control unit over a secure communications network. This bi-directional communications network will facilitate control of the demand control units and the back haul of power quality data at each customer's premise and secondary substation meter. In addition, the network will be used to capture weather data from the local weather monitoring unit at Rottenrow substation.

Customer Numbers

It is proposed to approach approximately 1100 households with the expectation that around 1000 would ultimately be engaged in the trials. It is recognised that within the flats identified for the trials some customers will be of vulnerable classification (e.g. on dialyses, elderly etc.) In such cases these customers will still have the new demand control units fitted but their storage heating charging arrangement will remain unchanged. ScottishPower Energy Networks (SPEN) has written to a number of other energy suppliers to determine if they wish to be involved in the Trial. To date, only ScottishPower Energy Retail (SPERL) has expressed interest in participating in this trial therefore only customers of SPERL will be initially approached about being part of this trial.

1000 customers have been chosen as it is considered to be a manageable number for one-to-one control of individual storage heating loads. The Project is not expected to have any impact on those customers connected close to where the Project is being trialled. In the event that this number decreases due to customers not being willing to participate or other circumstances, this will not impact on the trial.

Contractual Relationships with Customers

While the majority of the tenants are ScottishPower customers, SPEN will be endeavouring to work with all the retailers which supply electricity to the residents of the trial area.

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~~

Project Changes

No fundamental changes have been made to the Project following our Initial Screening Process submission.

Since the submission of the ISP we have developed a collaborative partnership with BT, further details of which is included in Box 22. The BT partnership will provide the communications connectivity solution for the project which, it is considered will provide cost effective scalable communications in the event of a wide area roll out of 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	£3,838k
External Funding	£592k
DNO Extra Contribution	£0
DNO Compulsory Contribution	£325k
Second Tier Funding Request	£2,818k
Project Completion date	12/2013

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

Derogations or Exemptions At this stage it is not anticipated that any derogation, licence consent or exemption, or any change to the regulatory arrangements will be required in order to undertake the Project or cater for contingencies. Should this situation change then we would make Ofgem aware of such requirements as soon as this became apparent.

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 Principle Project Manager:

Name and Title:	**Martin Hill, Low Carbon Networks Manager**
Telephone:	**01698 413000**
Email:	**Martin.hill@scottishpower.com**
Address:	**New Alderston House,** **Dove Wynd,** **Strathclyde Business Park,** **Bellshill,** **North Lanarkshire, ML4 3FF**

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	Initiate customer/community engagement of trial sample (1000 homes) and install temperature monitoring devices.
12/2011	Installation of Demand Control Units within customer's premises and substation metering.
01/2012	Proven network connectivity solution in place between each Demand Control Unit and new Demand Management System at Kirkintilloch.
03/2012	Replication of existing system on new Demand Management System and able to demonstrate that the system works as per the existing arrangements
09/2012	Control of the heating systems with improved scheduling to demonstrate smoothing out the demand curve.
07/2012	Laboratory simulation to demonstrate additional functionality taking cognisance of different factors such as transformer loadings, pricing signals, local weather, generation type etc.
09/2013	Trials using enhanced control to demonstrate additional functionality proven under laboratory simulation over a full year to cover all seasons.
10/2013	1-2-1 Customer feedback at the end of the trial.
12/2013	Project analysis and dissemination of learning outcomes.
12/2013	Project Close-Out reporting. All installed equipment will remain in situ at the end of the trial however, in the unlikely event it will be removed de-commissioning will be completed 12/2013.

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
Project Manager	£168k	400	LCN Fund
Low Carbon Networks Manager	£71k	150	LCN Fund
Senior Engineer (Various Technical Specialists including Telecoms, Real Time Systems, Asset Risk, Design)	£504k	1200	LCN Fund

Staff type	Total Costs	Person days	Funding
Community Liaison Officer	£50k	200	LCN Fund and External Collaborator
Industrial Resource (fitters/jointers)	£6k	20	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
1000 Demand Control Units plus modems	These units will control the storage heating charge provided to each property in response to commands from a centralised Demand Management System. In addition, the meters will capture point of supply data.	£243	£243k	Funding split between LCN Fund and Other Partners (GE)	N/A
Connectivity Solution for 1000 homes	Private network providing the link between each in-house demand control unit and ScottishPower's new Demand Management System at Kirkintilloch	£595	£595k	Funding split between LCN Fund and Other Partners (BT)	N/A
Demand Management System	Hardware and development associated with ENMAC control system. This system will be standalone and not used for any other purpose. *(Counted as equipment due to scale)*	£650k	£650k	LCN Fund	N/A
PowerOn (ENMAC) Licences	Software licences for the Demand Control Units. *(Counted as equipment due to scale)*	£-	£51k	Funding by Other Partners (GE)	N/A

Item description & No. of units	Function in Project	Cost per unit	Total Cost	Funding	Direct Benefit
PI Server and software licences	The PI server and PI software provides a real time repository for values of all measurements recovered from site, e.g. amps, voltage, etc., and delivered to it via the ENMAC system. *(Counted as equipment due to scale)*	£-	£39k	LCN Fund	N/A
IT Hardware	To provide additional server and backup hardware for PI server	£-	£6k	LCN Fund	N/A
1000 Energy Monitors	The energy monitors will provide the customers involved in the Trial with a real time display of their energy consumption. This will assist them to more efficiently manage their energy needs.	£14	£14k	Funding by Other Partners (SP Energy Retail)	N/A
1000 Contactors & associated fittings	100A contactors with associated fittings will be installed in each property in order to switch the electrical supply to the storage heaters	£15	£15k	LCN Fund	N/A

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
DataServe	DataServe will install and commission the new Demand Control Units in each of the 1000 homes identified for the trial. DataServe will install the contactors and associated fittings required to switch the storage heating load in response to commands sent to the demand control units. DataServe will also recode each Radio Teleswitch and undertake any equipment de-commissioning in the unlikely event this is required.	LCN Fund	6 months.	£104k
To be determined	Specialist support with the trial in interfacing with the existing Radio Teleswitch in each home. Support work will include developing new algorithms for the new Demand Management System, modifying the RTS Management System, applying new RTS codes and interface design specifications.	LCN Fund	12 months	£90k
Accenture	Accenture are ScottishPower's IT support/services contractor, and are responsible for the configuration and support of the IT equipment. For this project they will be engage to install, configure, test and commission the infrastructure servers associated with the proposed Demand Management System solution and to provide 24/7 management and support of the infrastructure for the Demand Management System.	LCN Fund	24 months	£73k
University of Strathclyde	At the project outset the University of Strathclyde will assist with developing the detailed dispatch system objectives. Based on these objectives they will develop improved dispatch and load 'smoothing' algorithms for incorporation within the network management system. A laboratory simulation will be developed to trial advanced dispatch algorithms based on a range of operational inputs.	LCN Fund and Contractor	36 month	£268k

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
Domestic customer with storage heating controlled by radio teleswitch to be engaged in the Trial	£20 credit to the electricity bill of each customer upon installation of equipment. Further £20 voucher/credit at project close-out	£40k	LCN Fund
Domestic customer with storage heating controlled by radio teleswitch to be engaged in the Trial	Contingency payment for Customer Care	£10k	LCN 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
Equipment	Temperature monitors for 100 Trial Homes	£10k
Equipment	Substation meters	£3k
IT	All reported against equipment	£0
IPR	No IPR cost implications are anticipated	£0
Abnormal Travel	All travel and expenses	£41
Contingency	Labour	£123k
Contingency	Equipment	£155k
Contingency	Contractors	£35k
Contingency	IT	£0
Contingency	IPR costs	£0
Contingency	Travel and expenses	£6k
Contingency	Payment to Users	£0
Decommissioning	Remove Demand Control Units	£100k
Public Engagement	Detailed in Appendix 6	£150k
Dissemination of Learning	Proposed activities detailed in Box 18	£50k
Other	Assistance from Partners	£100k
Contractors	Legal Assistance for contracts/agreements	£50k

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

5 %

The default cost over-run funding position has been adopted with a maximum amount of 5% being available if requested.

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

DNOs must outline the level of protection against Direct Benefits that they wish to apply for

0%

It is not envisaged that this project will have any significant direct benefits therefore no protection is required for this project.

Successful Delivery Reward Criteria

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

Successful Delivery Reward criterion	Evidence
Replication of existing supply arrangements and storage heating control system associated with the Trial households on new Demand Management System. Prove the functionality of the Demand Control Units (which will also be available in smart meters) and the connectivity solution.	Ability to demonstrate that the system works as per the existing arrangements.
Control of the heating systems with improved scheduling for the Trial group of households. Ability to demonstrate smoothing out the storage heating load demand curve compared to the baseline load demand curve for the properties under normal operations	Quantify percentage reduction in peak heating load across the Trial area.
Laboratory simulation of additional control functionality, to be incorporated into the Demand Management System, taking cognisance of different factors such as network loadings, pricing signals, local weather, generation type etc.	Laboratory demonstration of a working simulation model in response to a range of external operational conditions which can be shared with interested parties.
Implementation of enhanced Demand Management System incorporating additional functionality as developed in the laboratory simulation	Demonstration of enhanced control provided by the Demand Management System due to the incorporation of additional functionality over multiple seasons. Quantify percentage reduction in peak heating load and associated carbon savings.

Successful Delivery Reward criterion	Evidence
Project analysis, knowledge capture and dissemination of learning outcomes including the quantification of carbon benefits and re-evaluate potential benefits across the UK. Carry out evaluation of the project success and consider if it should be expanded.	Project analysis report and presentation of learning outcomes to other DNOs.
-	-
-	-
-	-

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

UK Low Carbon Transition Plan

Over three quarters of the energy used by households for heating, and accounts for 13% of the UK's total green house gas emission. Therefore this is one of the key areas where significant carbon savings can be realised. The policies set out in the UK Low Carbon Transition Plan are aiming to ensure that significant reductions in emissions from heating homes are realised.

The Government's Low Carbon Transition Plan identifies the need for a more flexible energy system to meet the goal of an 80% reduction in carbon emissions by 2050 (DECC, 2009). It is recognised that the electrical system will need to adapt to have a more dynamic relationship between supply and demand. One such measure to enhance this dynamic relationship is the introduction of demand side management measures such as the Solution proposed by this Project. This Project will enhance the understanding of demand side control application and optimisation in response to a range of operational parameters and future market signals through coordinated intervention by the network operator and generators.

The Global Insight Report on DSM (2009) estimates that between 1GW and 6GW of discretionary load is available from residential customers. Time of use tariffs may grow in popularity with the roll-out of smart meters and encourage customers to move discretionary load, however this will be out-with the control of generators and network operators who require to operate within a number of physical and economic constraints. For this reason, direct load control or smart controllers may be required to manage load in an optimal manner.

The increasing prevalence of electric vehicles and heating are expected to increase electricity consumption overall and alter electricity consumption profiles. Ofgem (2010) identify that in order to integrate an increasing proportion of renewable and distributed generation and accommodate increasing demand from heat and transport, the electricity system will need to be able to intelligently integrate the actions of all users connected to it. The solution being demonstrated in this project will demonstrate some of the benefits of such control.

Using the base case in Ofgem's discussion paper on Demand Side Response (2010), a 5% shift in peak load has been assumed if the Project Solution were to be rolled out nationwide. It has been assumed that this would take place from 2020 onwards following the full deployment of smart meters. The annual capital cost saving and network investment savings are also assumed to be the same as the values quoted by Ofgem in the above paper.

The quantitative contribution this Solution could potentially make, if rolled out nationwide, is detailed in Appendix E alongside the reference data used to determine this calculation. The NPV of carbon benefits associated with the Solution has been estimated to be £2.21Bn.

References cited above are detailed in Appendix E.

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.

A trial group of 1000 properties have been selected for the purposes of this trial as it is believed that this number is large enough to demonstrate the functionality and control of the technology. This number will provide a suitable challenge of developing a system to the various criteria without being overwhelming. The approach taken to this project is that of think big, start small and scale fast as identified by the ENSG route map.

The project solution has been designed in such a manner that the technology being deployed can be easily scaled in the future. Much of the functionality of the demand control units may be achievable through smart meters and this platform will trial the customers' experience of this functionality. The proposed communication solution (Appendix 7) is a candidate for the wide area network (WAN) to be developed for smart metering which will also provide learning to industry. Because of the scalable approach, the cost to roll out this solution, if successful, would be at a marginal incremental cost opposed to a proportional cost which other technology may have required.

As a result of this approach, the forecast cost to the UK for a nationwide roll-out would be largely down to the cost of deploying the control system in each DNO network. It has been assumed that in the longer term the smart meters and associated WAN would have the functionality to achieve the demand side management being demonstrated in this project.

Net Benefits

Three sources of net benefits have been assumed: reduction in network reinforcement, savings from capital investment in new generation plant and wholesale cost savings through smoothing of the demand pattern. These assumptions are largely in line with the Demand Side Response discussion paper published by Ofgem on 15th July 2010. It has been assumed that this project could longer term deliver a 5% shift in electricity demand, solely through controlled DSM opposed to incentivised DSM such as Time of Use (TOU) tariffs. On this basis, a NPV saving of £3.8Bn may be achievable between 2010 and 2050.

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

Planning, Development and Operation Benefits

The Project will provide significant learning on the application of demand side management through a controlled system in a residential setting. Demand side management has frequently been cited as a key requirement in the future energy chain.

The solution being deployed in this project will enable demand side management to be exercised in a manner which allows for the optimisation of the network as well as considering the availability of low carbon generation, compared to previous schemes which have focussed largely on off-peak/low cost generation. This solution will have a direct impact on the distribution network as it will allow for the network assets loading to be optimised which would have the long term implications of reducing the requirement for reinforcement. Optimal loading of assets may also increase the life of assets reducing the requirement for some asset replacement.

The scale of the solution being undertaken in this project is unlikely to provide any significant direct benefits over the course of the project. The aim of the project is to demonstrate the functionality from this novel configuration of equipment such that it can be easily scaled up to a larger area using the learning developed. The approach taken is one that allows the technology to be adopted across GB to achieve significant benefits.

The project will also contribute an improved understanding on the application of DSM and the interaction with customers which will be readily transferable to the smart meter programme. Much of the functionality and communication system being deployed could be utilised by smart meters and over the course of the trial, this learning will be openly shared with interested parties. An improved understanding of customer's behaviour in relation to demand side management and electric heating will be achieved through the monitoring of load in the customers premise. This may be used to influence the design of future schemes, particularly where demand side management is being considered as part of a zero carbon home as will be required post 2016 for all new builds.

This solution will enable the improved design of future networks which need to be capable of dealing with increased electricity demand, electric vehicle penetration, distributed energy storage as well as electric heating.

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

Level of Incremental Learning

The knowledge generated from this project will improve the understanding of managing stored energy and the implications of demand management at a local network level. To date, demand management has been passive and predictable, but making it more dynamic will require a closer relationship with the customer to ensure it meets their requirements as well as the wider electrical system. The level of incremental control being trialled in the project and the impact on the customer will generate new knowledge which may influence the role of smart meters if they have the capability for demand management. Working with academia, SPEN will utilise the information gathered to help optimise future demand management and share this learning across the wider community.

Applicability of the new learning to other DNOs

Optimisation of load scheduling will be analysed in response to a range of existing and future inputs in combination with associated weighting factors. This will provide new learning that will inform other DNOs as they consider how best to accommodate new technology load demands with respect to existing and future operational drivers.

Trialling demand management will also provide a good platform to examine the challenges that a step change in electric vehicle deployment may create. In this scenario, it is anticipated that future customers will require electric vehicles to be charged overnight, however the network operator will require a system which allows for this load to be managed; minimising the level of reinforcement which could be required. This should make the transition to electric vehicles simpler for customers as network operators will have a better understanding of the potential implications to the network and be able to manage costs more effectively. By understanding in advance of need, the benefits that storage and demand side management will play, will help to minimise the time faced by customers to connect additional load.

The Trial will test the potential for a large scale enhanced replacement to the existing radio teleswitch system which is used by across the industry in Great Britain.

How the learning will be captured

Learning will be captured during both field and laboratory trials for a range of operating scenarios. Findings will be documented and presented in published papers and presentations as well as interim project reports and the final project close-out report.

The success of the customer/community communication campaign and impact of the trials from a stakeholder perspective will also be captured through customer questionnaires; one-to-one interviews etc., and reported, so that DNOs and others can benefit from the findings and lessons learnt in subsequent demand side management projects.

Extrapolation of Results

There will be some extrapolation of results to quantify potential benefits to the UK.
The laboratory simulation of the control system will be capable of being scaled to consider the potential impact for larger network load demands.

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

Dissemination of Project Learning

A range of different media will be used to disseminate the learning realised during the project to a range of stakeholder groups and is anticipated to include the following:

- Regular Team meetings
- Team briefings within ScottishPower
- Company magazine
- Presentations
- Interactive Laboratory simulation of the Project
- Published papers
- SPEN Web portal
- Site visits (DNOs, other Housing Associations and interested parties)
- Institute Lectures such as the Institute of Engineering and Technology (IET)
- Undergraduate and Graduate presentations
- Interim Project Reports
- Project Close-out Report

As part of the project development the University of Strathclyde will build a laboratory simulation of the Trial in order that they can develop new control algorithms prior to deployment in the new Demand Management System at Kirkintilloch. This simulation will be used to demonstrate to interested parties how demand management can be optimised in response to a range on existing, and future, key operational parameters and network constraints. The University, with input, as appropriate, from other project partners will publish papers on the analysis work undertaking and learning outcomes and thus disseminate learning into the public domain.

SPEN propose to set up a web portal to raise public awareness of the project by providing information on the project, its aims and objectives and updating details of the project as it moves through deployment and close-out stages. In addition, SPEN propose to host site visits to see the installation in a sample property and the Demand Management System at Kirkintilloch. Such visits will allow other DNOs to see firsthand the physical installation requirements, learn about project logistics and see the system in operation. During these visits there will also be opportunities for the DNOs to learn about ScottishPower's customer engagement programme from our Community Liaison Officer and the experiences of the customers engaged in the Trial.

As the project moves through the project lifecycle, learning will be shared between collaboration partners at regular project team meetings. This will provide an opportunity to share project findings, discuss and record what went well, what didn't, how things might be done differently and opportunities to enhance the project or future project ideas arising.

Opportunities to make project presentations, in conjunction with other project partners, at institute lectures such as the Institute of Engineering and Technology (IET) will be sought along with opportunities to present to both undergraduates and graduates both in Universities and on industrial placement.

Learning will be captured from customer surveys and during one-to-one interviews and community meetings and will be included in interim project reports and the final project close-out report. The customer surveys will be developed in conjunction with the Glasgow Housing Association to ensure that the learning arising from these surveys meets the needs of housing associations, the tenants themselves as well as the DNOs.

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

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

The Foreground IP generated by the University of Strathclyde in developing control algorithms for the Demand Management System will be the subject of a published paper and will therefore be in the public domain and available to any interested party. In the event that the software development could generate significant IPR, a partner has indicated that they may undertake this at their own cost therefore owning any IPR which is generated.

When a full contract is entered with project partners/contractors, SPD will endeavour for these to comply with the default IPR arrangements as set out in the Governance Document. In the event that these do not comply, SPD will notify Ofgem in advance of entering the agreement. A proportion of funding has been identified for legal assistance in entering into formal agreements with third parties to complete this project at which time the IRP arrangements will be finalised.

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

A number of collaborators are providing external funding to this project in recognition of the significance of the trial and the potential benefits which it could create in the future. The nature of their contributions and associated monetary value is summarised below:

GE Energy

GE Energy will be contributing the project by discounting the cost of meters and supplying software licences free for the duration of the project. This equates to a total value contribution of £105k which represents 11% of their total costs.

BT

BT will supply labour resources (design, delivery and service) and physical system components (base stations and radio infrastructure). This equates to a total value contribution of £245k which represents 41% of their total costs.

University of Strathclyde

The University of Strathclyde will undertake complementary project work set around technical and market issues and scheduling of domestic electricity loads for demand side management. This equates to a total value contribution of £101k which represents 38% of their total costs.

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	Not applicable
Type of organisation	
Amount of funding	
Funding arrangements	Funding is being provided by external collaborators only. SPD will continue to look for other funding sources in the event that the project can be developed further at a later date.
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	**GE Energy, trading as IGE Energy Services (UK) Ltd**
Relationship to DNO (if any)	GE Energy is independent of ScottishPower Distribution.
Type of Organisation	GE Energy has been a leader in bringing innovative solutions to the electricity energy industry for more than 100 years and is uniquely positioned to deploy integrated smart grid solutions using our technology building blocks. GE Energy is actively involved in smart grid projects throughout the world and is looking to extend and share the acquired knowledge to benefit smart grid projects worldwide.
Role in Project	GE Energy will supply an integrated solution of end-point meters (consumer and LV substation) and a central control system to support the monitoring, reporting and control of the end-point meters, over an IP communications medium supplied by another external collaborator. GE Energy will deliver additional software functionality for the central control system to provide improved load scheduling and subsequently implement an enhanced meter control algorithm, as designed by another external collaborator. GE Energy will provide project services to assist in the deployment, configuration and commissioning of the system plus maintenance of the system.
Prior experience brought to Project	In the UK, GE Energy provides the Distribution Management System used by 13 of the 14 UK DNOs to control and report on their distribution networks. The first DMS was commissioned live in 1995 and there has been a close and successful working relationship between GE Energy and the UK DNOs in the subsequent 15 years. No other vendor has this amount of detailed knowledge of the ever-evolving operational and regulatory challenges that DNOs face in the UK. Outside the UK, GE Energy is a major participant in smart grid projects, especially in the US and Australia.
Funding	GE Energy is contributing to the project by (a) discounting meter list price and (b) supplying PowerOn licences free for the duration of the project. The value of this contribution is £105k.
Contractual relationship	**Will the DNO have a contract in place which ensures the External Collaborator complies with the LCN Fund Governance Document? Yes/~~No~~** A signed Memorandum of Understanding is in place between SPEN and GE Energy which covers this Pre-award stage, see Appendix 2.
External Collaborator benefits from the Project	GE Energy will benefit from the Project by gaining a better understanding of how active demand management can be met by optimising the usage of electric storage heating. This will be gained from experience of real trails rather than a theoretical study and has the potential to extend our product portfolio to support active demand management via optimising of all electric energy storage, including electric vehicle charging.

Organisation Name	British Telecommunications plc (& partners)
Relationship to DNO (if any)	British Telecommunications plc is independent of ScottishPower.
Type of Organisation	BT is a global communications services company who will be sub-contracting with two companies (Arqiva and Detica). Arqiva is a telecommunications company which provides infrastructure and broadcast transmission facilities in the United Kingdom and Republic of Ireland. Detica is an international business and technology consulting firm. Its areas of expertise are information exploitation, security and resilience, fraud containment, threat intelligence and customer insight.
Role in Project	BT and its partners will provide the connectivity services based on Long Range Radio to underpin the bi-directional connectivity for the 1000 devices (Demand Control Units) that will be utilised to remotely manage domestic electrical storage heating units. It will provide coverage to the in-home meters as well as monitoring nominated sub stations for demand information. They will provide access and data transfer over a private network with secure backhaul connectivity to ScottishPower's Control Centre at Kirkintilloch.
Prior experience brought to Project	BT brings its knowledge of successfully delivering high-profile and complex national IT transformation projects to the project. BT have unique experience in establishing and successfully running a regulated entity which supports a competitive market. BT's partner Arqiva is the largest third-party maintainer of radio systems in the UK and currently maintain many of the UK Emergency Service Systems. The Sensus technology to be utilised has already been successfully implemented in the US and provides a high quality data solution that we expect will be superior in building penetration for other technologies.
Funding	The collaboration parties will supply labour resources (design, delivery and service) and physical system components (base stations and radio infrastructure) with a total value of £245k.
Contractual relationship	**Will the DNO have a contract in place which ensures the External Collaborator complies with the LCN Fund Governance Document? Yes/~~No~~** A signed Letter of Intent is in place between BT and SPEN which covers this Pre-award stage, see Appendix 2.
How funding relates to benefits from Project	Current Smart Metering trials are based around GPRS as the communications technology. This trial would allow the External Collaborator to demonstrate the advantages of its Long Range Radio solution in terms of coverage, reliability and security and therefore present the industry with an alternative solution to GPRS.

Organisation Name	University of Strathclyde
Relationship to DNO (if any)	The University of Strathclyde is independent of ScottishPower Distribution.
Type of Organisation	The University of Strathclyde is a research-led educational institution. Both the Department of Electronic and Electrical Engineering which is leading the collaborating team and the Department of Management Science at the University have a wide and well-established portfolio of research with clients and collaborators from industry and government.
Role in Project	The collaborating academic team at Strathclyde will investigate advanced methods for optimal scheduling of electric storage heating load subject to local network constraints and constraints articulated for relationships with consumers taking part in the scheme and taking account of available real-time measurements. The team will develop a prototype facility for the purpose. This will be tested and demonstrated in a lab-based simulation and made available for trialling in the full-scale demonstration setting identified by SPEN. Finally, the team will contribute to monitoring and appraisal of the scheme's performance and to the reporting and dissemination of results and learning outcomes.
Prior experience brought to Project	The Advanced Electrical Systems Group at Strathclyde has worked with electricity network operators on a wide variety of applications for more than 20 years. This includes power system operation, active network management and condition monitoring. It is both the principal investigator and management hub for the largest publicly funded research initiative linked to highly distributed energy futures and low carbon distribution networks – "HiDEF" – contributing in respect of demand side management and distribution network operation. It is also a leading participant in "FlexNet" and a number of other active network management projects.
Contractual relationship	Complementary project work will be set around technical and market issues and scheduling of domestic electricity loads for demand side management. Value of contribution is £101k.
Funding	**Will the DNO have a contract in place which ensures the External Collaborator complies with the LCN Fund Governance Document? Yes/~~No~~** A signed Letter of Intent has been received from the University of Strathclyde, see Appendix 2.
How funding relates to benefits from Project	The collaborator will benefit from a continuation of a longstanding fruitful relationship with ScottishPower, the maintenance of industrial relevance in both teaching and research and the opportunity to develop new approaches that promise to benefit the migration to lower carbon networks. By having a 'real world' test case and access to trial results, the collaborating team will have a genuine proving ground for ideas. Using existing publication expertise, the team will be able to disseminate outcomes and contribute to learning not only in the UK but internationally.

Organisation Name	SP Energy Retail
Relationship to DNO (if any)	SP Energy Retail is a Business Divisions of ScottishPower, operating business function in the UK as part of the Iberdrola international energy group.
Type of Organisation	Scottish Power Energy Retail is a multi-utility supply company managing customer service and billing for energy supply to business and domestic customers and dealing with consumer enquiries arising in the course of this remit. The majority of consumers having their premise heated electrically in the trial patch have SP Energy Retail as their energy supplier of choice.
Role in Project	SP Energy Retail will schedule and deliver the implementation of the trial equipment in the consumer's homes. They will assist in engaging and incentivising the consumer to enter the trial at the outset and maintain a close community liaison throughout the active trial period. SP Energy Retail will provide the consumer with appropriate and regular tips and advice on improving end use energy efficiency within the home, with space heating being of particular focus.
Prior experience brought to Project	SP Energy Retail are one of the 'big six' energy suppliers in the UK, and as such bring a wealth of experience and know how in managing customers on a diversity of energy related matters. With their collaboration they also bring considerable proven practical expertise in the design and delivery of successful trial schemas involving the end-use consumer. The continuity of applying Business as Usual processes in handling queries and complaints from consumers will be engaged wherever possible therefore reducing specialist set up and handling costs.
Contractual relationship	The collaboration party will provide project management assistance, a contribution to the provision of a community liaison officer and 1000 real-time Energy Monitoring Devices with a total value of £139k.
Funding	**Will the DNO have a contract in place which ensures the External Collaborator complies with the LCN Fund Governance Document? Yes/~~No~~** A signed Memorandum of Understanding is in place between SPEN and SP Energy Retail, see Appendix 2.
How funding relates to benefits from Project	Through collaboration SP Energy Retail will gain a greater understanding of the supplier's role in promoting and delivering product and service arrangements in a Smart Grid arena. The funding will deliver the trial foundation helping to deploy and commission the trial equipment, keep an on-going monitor on the consumer reaction and help to promote the benefits to the consumer and the environment of achieving greater energy efficiency through more effective control of the heating load.

Organisation Name	Not Applicable
Relationship to DNO (if any)	
Type of Organisation	
Role in Project	
Prior experience brought to Project	
Contractual relationship	
Funding	
How funding relates to benefits from Project	

Organisation Name	Not Applicable
Relationship to DNO (if any)	
Type of Organisation	
Role in Project	
Prior experience brought to Project	
Contractual relationship	
Funding	
How funding relates to benefits from Project	

Box 23: Other partners

Energy Suppliers
SPEN has written to a number of other energy suppliers to determine if they wish to be involved in the Trial, see Appendix 2. To date one energy retailer has declined but the invite, to all, still stands. However, once the project commences, it may be difficult for the trial to accommodate customers provided by other suppliers.

The Glasgow Housing Association
The Glasgow Housing Association is a key partner in this project as it will be their tenants that will make up the 1000 customers selected for the project Trial. The Glasgow Housing Association will assist with SPEN's customer engagement programme and will help facilitate community liaison and local acceptance of the trials.

The Glasgow Housing Association (GHA) is one of the largest social landlords in Europe. GHA provide housing services for around 56,000 households across the city (around a third of Glasgow's residents). They are also the city's largest factor, delivering property management services to a further 27,000 homes.

Their customer profile is rich and diverse with a challenging range of needs. This combined with the fact that the GHA has a significant number of tenants who have electric storage heating in both High and Low rise accommodation in concentrated geographical areas make them an idea choice for customer trials. GHA has provided a letter of support for this project, see Appendix 2 and agreed to the Trial being conducted with their tenants in the Townhead area of Glasgow.

Glasgow City Council
Glasgow City Council is a leader in tackling energy and CO2 challenges and has established Sustainable Glasgow, a partnership between the public and private sector to make a tangible contribution to tackling climate change through reducing Glasgow's carbon emissions by 30% within 10 years, maximise use of sustainable energy resources, and minimise Glasgow's adverse impacts on the environment.

Sustainable Glasgow will go significantly beyond achieving carbon emission reductions. Sustainable Glasgow will deliver major investment; create long-term jobs; help tackle fuel poverty; support the development of new clean energy sector in the city; create new revenue streams for the public sector and communities; improve air quality; and help regenerate communities and will help transform Glasgow's image – making it a better place to live, work, and invest.

Consequently, Glasgow City Council has provided a letter of support (Appendix 2) for this Project which could ultimately make a contribution to their Sustainable Glasgow energy management ambitions

ScottishPower Energy Management
Energy Management is responsible for the management of all commercial aspects across the UK energy value chain for the SP Group. This includes the wholesale trading activity in electricity, gas, coal and CO2 allowances in order to balance generation and retail demand energy requirements. As part of this responsibility Energy Management undertakes short to long term forecasting of all retail demand requirements including the forecasting and management of the controllable demand element within the domestic retail portfolio. In this capacity Energy Management forms an intrinsic part of the LCNF project in order to work with SP Energy Networks to accurately forecast and then analyse and assess the commercial impact of dynamic controllable demand on the both the electricity network and on customers.

Relevance & Timing of Project

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

Relevance of the Trial

It is recognised that demand side management has an important role to play in the transition to a low carbon economy. This developing economy will see a far more dynamic relationship between supply and demand with the ambition that demand can be varied to best match increasing levels of renewable penetration. In the move to a low carbon economy it is anticipated that there will be far greater electric vehicle and electric heating demand which has to be properly controlled in order to avoid any adverse network implications. This Project will provide valuable learning in demand side management application and control. In addition the Trial will develop a real scalable solution which can be expanded. Albeit a trial for 1000 customers, it has been designed in a manner which will allow it to be scaled up.

Why the Project is Timely

This project is timely as it fits alongside industry developments in smart meters, and the Governments plans to continue with the programme to roll-out smart meters to all customers, and will provide valuable learning in optimisation techniques for controlling demand in response to a range of generating and operational conditions in conjunction with network constraints. While it is targeted at domestic customers with off-peak storage heating the approach and techniques could equally be applied to future electric vehicle charging requirements and other emerging technologies.

Given the increasing penetration of renewable generation both at a large scale and local community level, coupled with small scale generation schemes being developed in response to Feed-in Tariffs incentives it is timely to consider opportunities to match load demand profiles with such low carbon generation availability.

The Trial will also test the potential for this solution to become a large scale UK replacement for the existing radio teleswitch system which is due to be made redundant in the next decade due to the transition from analogue to digital radio broadcasting.

While the Trial focuses on storage heating load the project is timely due to the future increase in in-home smart appliances.

Impact on Future Business Planning

If the method proves successful it will be used to aid network investment decision making in response to greater levels of electric heating and electric vehicle plus other developing technologies by helping to:

- Improve asset utilisation;
- Identifying opportunities to defer investment;
- Reduce levels of future network reinforcement;
- Reduce cyclic loading and consequent asset life extension; and
- Reducing network losses through better balancing of network loading.

Having a better understanding of the network implications of such technologies will enable the network operator to manage costs more effectively. All of which will impact upon business plan submissions in future price controls, including DPCR6.

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

Project Start

The project is ready to start in a timely manner in line with the project plan presented as a Gantt chart within this submission document, see Appendix D. The plan has been discussed with the various parties involved to ensure that all parties are aware of the key project milestones that have to be achieved and associated activity dependencies.

The project team structure consisting of both internal business units and all external parties has been identified (see Appendix C), and a number of meetings have already taken place to ensure that all concerned are kept abreast of developments and are fully aware of their commitment expectations in order to realise the successful delivery of the project.

A communications strategy for the Project identifying key activities with associated communication focus (internal or external) and timelines has been developed and is being implemented, see Appendix 6.

The customer catchment area for the Trial has been identified as the Townhead area of Glasgow and the customer profile has been analysed with a view to identify any vulnerable customer groups. The Glasgow Housing Association manages the proposed Trial properties within the Townhead area and they have been approached to ensure that they are comfortable with the scope of the Trail and able to help facilitate community engagement at the start of the project. A letter of support from the Glasgow Housing Association has been received to this effect. A fallback position with North Lanarkshire Council has been identified.

All key project partners have formally acknowledged their project support. Memorandums of Understanding have been signed with GE, BT and SP Energy Retail. Letters of Intent have been signed with SP Energy Wholesale, the University of Strathclyde, GHA and Glasgow City Council.

Key project risks have been identified with associated mitigation measures.

Discussions have taken place with the University of Strathclyde regarding external monitoring of the Project Trial in order to gain an independent perspective. Arrangements are in hand for the project programme to be monitored in-house by a separate business unit remote from the day-to-day project activities.

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

Key Risks and Associated Contingency

The table below identifies some of the key risks and associated contingency plans:

Key Project Risks Identified	**Mitigation Measures**
Adverse reaction from customers due to lack of information or understanding of the Trial and its objectives.	A Community Liaison Officer will be appointed to liaise with the housing association, local housing officers, tenants etc. Communications campaign to ensure that all concerned are fully informed of project trials. Customer Helpline to be established.
GHA tenants fail to engage in the trials.	North Lanarkshire Council has also been approached and another customer group identified as a potential fallback position.
Risk of not getting enough Trial properties or access to 1000 properties. Customers wanting to remove themselves from the trial.	Trial continues. Minimum number of 700 required, below which the learning may be difficult to justify.
Lose of integrity of connectivity between Demand Management System and in-house control units	Should there be a problem with the proposed connectivity solution GPRS communications will be used (GPRS is being used by numerous retailers in smart meter trials).
Signal strength is weak at customer meter points	A site survey has been undertaken at sample locations and signal strength is found to be acceptable. Should weak signal strength be encountered these customers will not be selected for the trial. Robust communication solution selected to reduce this risk.
Demand Control Units fail	The unit will 'fail safe' in the closed position such that the original supply arrangements will prevail (radio teleswitches provide the necessary heating control)
Catastrophic failure of Demand Management System	The Demand Management System will be stand-alone with respect to any live business critical systems. Businesses as usual arrangements are easy to re-establish.
Demand scheduling issues	Develop laboratory simulation facilities to de-risk algorithm deployment and trouble shoot.
Equipment failure and subsequent hazard to health	Ensure that all equipment is fit for purpose and has the necessary approvals following appropriate testing and certification for the particular application.

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

Project Monitoring Procedures and Processes

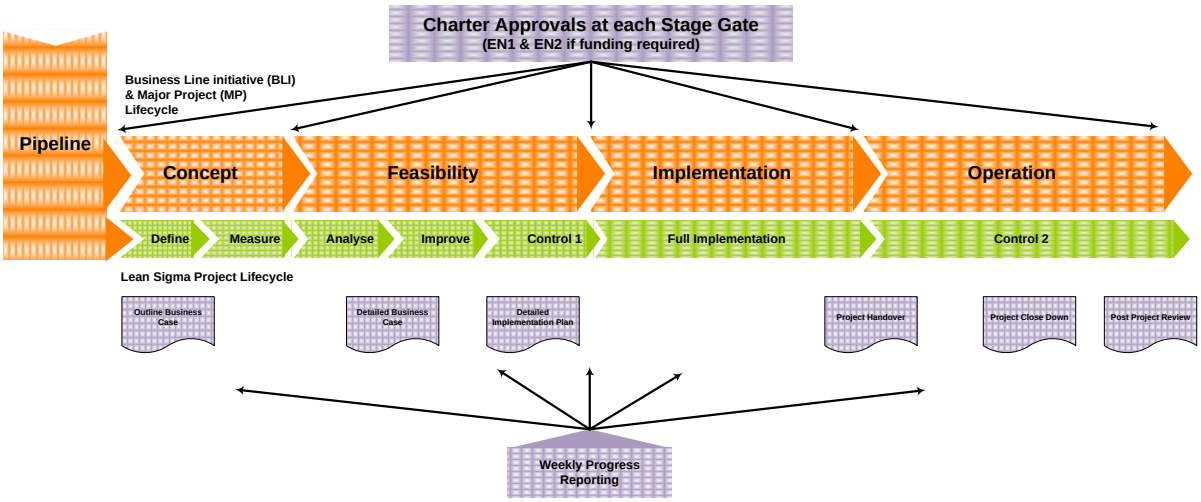
The project will be monitored through the Energy Networks Business Change Programme processes and governance model. The Change Programme is a permanent and independent function within the Energy Networks business established to monitor and deliver key strategic projects. The function is lead by the Business Change Director (who reports to the Director, Energy Networks) and is staffed by experienced project and programme managers, including a dedicated programme office service. All projects within the Change Programme are subjected to the same rigorous monitoring process which include:

- Weekly reviews of key project milestone progress (baseline against actual);
- Monitoring of key risks and issues, including mitigating actions and the effectiveness of their application;
- Monthly Steering Group meetings, attended by the Energy Networks Executive Team, were actions are logged and tracked to conclusion;
- Weekly project status reporting, including risks to scope, milestone delivery, costs and project deliverables;
- Financial reporting, including value of work against forecast and budget;
- The effectiveness of communications and stakeholder management plans; and
- Monitoring of resource utilisation, including both internal and external parties.

These robust programme management and governance arrangements are designed to ensure a high level of project success and give early warning of risks allowing both the Programme and Project Managers to identify appropriate risk mitigation measures to either reduce the risk to an acceptable level or provide Ofgem with an early warning of an unmitigated risk to the project (i.e. cost over-run etc).

Business Change Programme - Project Lifecycle

SP ENERGY NETWORKS



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 15**
Summary	Summary of supporting project information which has been included in the Appendices.
Appendix 1	Letter of Support from the Energy Minister for Scotland
Appendix 2	Memorandums of Understanding, Letters of Intent and Engagement
Appendix 3	Existing and Proposed Control Scheduling
Appendix 4	The Customer Journey
Appendix 5	New Point of Supply Configuration
Appendix 6	Communications Strategy
Appendix 7	FlexNet Summary