

Review of Low Carbon Network Fund proposals

Report to Expert Panel

Central Networks

CNT2001: MKSmart2020

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Report prepared by TNEI and Arthur D. Little
for project commissioned by Ofgem

Report Context

This report has been prepared for the Expert Panel with the aim of supporting them in their funding allocation decisions for the Low Carbon Network Fund.

Having reviewed the submission pro-forma and all of the supporting material, as well as answers to clarification questions we have put to the DNO, this report is intended to serve two purposes:

- it sets out any factual clarifications that we believe would be helpful to the expert panel when considering the submissions; based on information or data that is not immediately apparent or available in the pro-forma or Appendices A-E, and
- it highlights any concerns we have in any particular areas from, for example, either a technical, commercial or deliverability perspective, that the Expert Panel may wish to explore further with the DNO.

Consequently, the Expert Panel can assume that the factual content of the submission pro-forma to be sound unless noted otherwise in this report.

In writing the report we have avoided merely reproducing large parts of the submission, which stands on its own merits for the Expert Panels' consideration.

This report does not seek to assess the quality of this submission or rank it against any others. In particular, it does not provide any opinion as to whether the proposal should be funded. This is the role of the Expert Panel.

This report is not intended to be read in isolation and should be reviewed alongside the pro-forma and compulsory appendices.

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Project: MKSmart2020

Description of Project (summarised from pro-forma Box 1)

Smart Cities

Central Networks is piloting a smart city in Milton Keynes linking with the Low Carbon living Programme which includes electric heating, transport, renewable Distributed Generation (DG), low carbon homes etc. It is principally about increased system monitoring, better control including new IT architecture and better commercial approaches.

Problem

Meeting climate change targets will lead to a significant uptake of electric vehicles, heat pumps and distributed generation. These lead to local constraints on the network. Overcoming these constraints using conventional techniques would require extensive network reinforcement.

Solution

The solution is to use smart grids to facilitate the uptake of low carbon technologies and help reduce the cost of network reinforcement required. This, in addition to demand response measures, reduces the cost of the low carbon economy for the customer. The project will enable the citizens of Milton Keynes to adopt a low-carbon lifestyle and provide us with relevant insights to use across the UK.

Method

MKSmart2020 has four themes supported by comprehensive programmes of research and knowledge dissemination and customer engagement and empowerment.

- (1) New challenges: early 2020 representation of Electric Vehicles, heat pumps and DG with Milton Keynes Low Carbon Living Programme.
- (2) Increased visibility: real-time and granular network data from a subset of the 20,000 smart meters installed by 2012 and sensors at selected primary and secondary substations.
- (3) Increased control: trial and evaluate new technical and commercial mechanisms to optimise network utilisation and asset health and maintain power quality. This will include: demand response, dynamic voltage control, dynamic rating and condition based monitoring - enabled by the new IT architecture.
- (4) Market integration: provide time and location based network charges for customers participating in a 50-60 low carbon Homes Demonstrator. A variety of tariffs and commercial propositions will be offered to the 20,000 customers with smart meters and Industrial and Commercial - integration with energy retailers.

Project

MKSmart2020 will support the Low Carbon Living Programme and deliver increased sensing, visibility and control to measure and manage the network effects of the associated low carbon adoption. We will also trial new arrangements and technologies which could help reduce the cost of the low carbon economy to the customer. There are a series of individual sub-projects:

- (1) Retrofitting and replacement of approximately 200 secondary substations, and retrofitting 5 and new build of 2 primary substations.
- (2) E.ON will deploy 20,000 meters and involvement with other retailers is being discussed. Some of these meters will enable data from the meter to be used to help run the network more efficiently. The metering deployment will be combined with focused customer engagement efforts.
- (3) The project will include a Low Carbon Intelligent Network Architecture, enhancements to Central Networks Distribution Management System and a series of new applications to actively manage the network.
- (4) Industrial and commercial demand response via engagement with several local businesses and public sector organisations receiving significant interest. Commercial arrangements through the customer's electricity supplier will enable us to manage these loads, including National Grid demand response.
- (5) Time and location network tariffs will be trialled based on time and location with the 50-60 customers participating in the Homes Demonstrator trial to see whether customers will change their consumption behaviour and electricity demand in response to simulated tariffs.

Key Project Figures

Project

Funding requested: £20.3M

Total Project value: £33.3M

Direct Benefit: £0.35M

Roll-out

Total Carbon Benefit (discounted):

Total Other Benefits (discounted):

Total Costs :

Net Benefit :

Carbon Saved (undiscounted):

Proposal

£0B

£15.5B

£6,800M

£8.6B

0 million tonnes

TOTAL WITHOUT CONTINGENCY	32,064,690
Percentages of total cost	
Contingency	3.7%
IT	39.2%
Equipment	8.8%
Staff	45%
<i>Internal</i>	23%
<i>Contractors</i>	21%
Payments to consumers	1%
Decommissioning	0.0%
Other	4%

EXPLICIT PROJECT MANAGEMENT LABOUR	
Project Working Days	880
Labour Days	17155
Full Time Equivalents	19.5
Project Management	£5,263,487
Relative to Project Cost	16%

Key Items	Total Cost	FUNDING PROPORTION OF TOTAL ITEM COSTS			
		External	LCNF	DNO	
				Compulsory	Extra
Labour	7,463,489	29%	63%	7%	0%
Equipment	2,822,015	7%	84%	9%	0%
Contractors	6,853,221	70%	27%	3%	0%
IT	12,574,089	20%	72%	8%	0%
IPR Costs	60,000	0%	90%	10%	0%
Travel & Expenses	813,240	0%	90%	10%	0%
Payments to users	200,000	0%	90%	10%	0%
Contingency	1,175,000	0%	90%	10%	0%
Decommissioning	-	-	-	-	-
Other	1,278,636	2%	89%	10%	0%
Total	33,239,690	29%	64%	7%	0%

Summary of independent analysis

General View:

The project endeavours to develop a wide-area smart grid, incorporating up to 20,000 smart meters and including significant penetrations of low carbon technologies, including electric vehicles.

The proposal pro-forma relied heavily on the supplementary appendices to provide detail on the project which made it complex to review and interpret what the project was aiming to achieve and what it was going to actually deliver. In some cases the detail and clarity could still not be established.

Significant Issues:

- Without detailed person-day assumptions or assumptions to assess the value of equipment/services provided, it is difficult to explore the nature of funds provided. (e.g. contributions of E.ON Energy: £3million; Accenture: £1.87m; GE: £2.669m, Cisco: £2.2m)
- Considerable focus of the project appears to be around an IT project based on replacement/upgrading of existing central control and communication systems?
- A significant and disproportionate amount of the project is associated with communications infrastructure and software development which in addition has been highlighted as a significant risk to the success of the trial.

Specific Issues:

- There are limited details on the impact of delays/overruns on associated projects in Milton Keynes such as Low carbon Living Programme, ELVIS – Plugged in places (and other initiatives)
- The project is also engaging with a number of organisations to “receive their support for their commercial propositions”; the outcome of these discussions is still ongoing. It is also not clear how critical their involvement is to the success of the project.
- We note that no carbon benefits have been claimed.
- We note that the benefits claimed for the savings to network reinforcements to cope with higher penetrations of electric heating and electric vehicles are based on assumptions of 50% uptake of each by 2030 and 75% by 2050.
- Delivery criteria do not align very well against major project cost items.
- No cost control measures evident to ensure contractor and collaborator contributions and costs in check.
- No tie in to Smart Metering roll-out which is a key project risk.
- The case for the value of the “Accenture Smart Grid Leadership Network” has not been made relative to its emphasis in the proposal. The source of funding for this is not clear and no reference to the transfer of learnings have been explicitly mentioned.
- The knowledge portal go-live is very late in the programme given this appears to be an existing system put forward by the project partners.

1. Accelerates the development of a low carbon energy sector

Summary:

The proposal looks to develop a wide-area smart grid, incorporating up to 20,000 smart meters and including significant penetrations of low carbon technologies, including electric vehicles. It also encompasses customer engagement at both domestic and industrial & commercial levels, as well as network measurement and management solutions.

As a result it should allow learnings to be disseminated to other DNOs to inform network planning and operation.

No carbon benefits are claimed as the result of implementing a smart grid.

1.1. The proposal is closely aligned to priorities outlined in the current Low Carbon Transition Plan	The proposal brings together network solutions, smart metering, consumer engagement in demand side management (DSM) – including different tariff structures - as well as engaging with embedded low carbon technologies. The development of a smart grid will help connect more renewable generation and connect it faster than it might have otherwise been able to.
1.2. The calculations for carbon savings are robust (audit of calculations only)	There are no carbon saving benefits calculated – see below.
1.3. The carbon benefits of the project are credible	No carbon benefits are claimed. <i>(Clarification on this point stated: “Smart grids will not deliver material direct carbon savings. Electrification of heat and transport as well as decarbonisation of the power sector will reduce the carbon content of the industry. Low carbon networks will facilitate and accelerate this transition to a low carbon economy. Hence, it is the cost savings of the low carbon networks such as the avoided cost of network reinforcement due to heating and transport and not the carbon benefits which are the focus of our benefits case”)</i>
1.4. Extrapolation for roll-out is both statistically and technically sound, reliable and/or verifiable.	The extrapolation of the rollout appears reasonable. The project is assumed to be rolled out across the UK, taking 10 years to complete and then equipment having to be replaced at the end of an assumed 20 year life.
1.5. Total energy system consideration as well as for DNO	There are no assumed interactions with other energy system players beyond those in the trial.
1.6. Assessment of Method's credibility	The Method is credible. It seeks to address the issues of connecting large numbers of distributed generation, electric vehicles and heat pumps (required for the decarbonisation of the energy system) in the face of network constraints through customer engagement for DSM and network control solutions.

1.7. Significance of the Deliverable	The project should deliver findings across a range of solutions – from consumer engagement (both domestic and industrial & commercial) to network technologies. It aims to concentrate the rollout of 20,000 smart meters within one geographic location to test the required large-scale required IT solutions. The 50-60 demonstrator homes are new and so may not be directly applicable across the rest of the UK given the predominantly aged housing stock
<i>Re-estimation of carbon benefits on the basis of “correcting for erroneous assumptions” or re-baselining</i>	

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

Summary:

The project has the potential to deliver net benefits to customers in the form of avoided network reinforcements and the reduced need for centrally despatched back-up generation.

The benefits are calculated on the basis of 50% uptake of electric vehicles and heat pumps by 2030 and 75% uptake by 2050.

Savings from centrally despatched back-up generation are based on avoiding the equivalent of 800MW of Open-Cycle Gas Turbines (OCGT) and 200MW of Combined-Cycle Gas Turbines (CCGT) operating at 10% load factor by 2030 and 1,100 MW of OCGT and 400MW of CCGT at 10% load factor in 2050.

2.1. The calculations for net benefits are robust	The calculations of net benefits appear to be robust.
2.2. The benefits claimed are credible	The benefits appear to be credible. Benefits for savings to network reinforcement to accommodate increased heating and transport are claimed assuming a 50% uptake of electric vehicles and heat pumps by 2030, and 75% uptake by 2050. Benefits for avoided reinforcement costs to accommodate distributed generation costs are based on the results from an additional 90MW installed in the Skegness IFI. Benefits from avoided generation is based on avoiding 10% of the output from 8GW of OCGT and 2GW of CCGT operating at 10% load factor (to accommodate intermittent generation) in 2030. In 2050 it is avoiding 10% of output from 11GW of OCGT and 4GW of CCGT operating at 10% load factor. Benefits are claimed for persistent voltage reduction on the basis of £81 million per annum when fully rolled out.
2.3. The costs are credible	The costs of rolling the solution out across the UK appear credible. They are based on detailed bottom up costings on a similar basis to the overall project. Costs and Benefits have been inflated at 2.5% per annum.
Re-estimation of net benefits on the basis of “correcting for erroneous assumptions” or re-baselining	

3. Has a Direct Impact on the operation of the distribution system

Summary:

The project is predominantly based on the monitoring and control of demand side consumption and enhanced voltage control, although there are also activities on network planning, dynamic rating, network intelligence and condition based O&M. There will be a limited trial of time and location based network charges. Reference is made to an ENA report for evidence of value of demand side control, relative to scaling and business as usual developments.

The proposal clearly states that the outputs from this project will be used to inform DCPR6 plans. The proposal states that outputs will result in developments on internal planning & design standards, modelling/simulation tools, training and business processes.

Other DNOs will be engaged during the scoping of the research plan which feeds into the project design. The proposal states that the approach can be applied to other DNOs consistently if it is proved to work in the project area.

The project claims that 75% of the benefits are attributable to the distribution network.

3.1. Directly contributes to the planning, development and operation of an efficient distribution system.	Project appears more around development of an IT system for integration of smart metering data volumes rather than directly addressing the planning, development and operation of the distribution system.
3.2. The size of benefits that can be attributed to the Distribution System, taking into account the level of funding requested.	Claims 75% of benefits are attributable to the distribution network but from the proposal it is not clear how the other benefits to balancing and generation avoidance are assigned within the project group. <i>(DNO comment: the determination of the appropriate split of benefits is an objective of this project)</i> We note that the net benefits are £13B rather than the £27.4B reported in the pro-forma (Response to question CN022). We also note that these benefits are undiscounted. Dynamic voltage control based on increased LV measurement is likely to have limited benefit given there are many LV feeds (400V) off a single Primary (33/11), and so wide variance of generation/demand on a single controlled parameter. More clarity on what exactly is being proposed in terms of voltage control optimization would be beneficial. Control of demand for reinforcement avoidance is good, but does not appear to have been a quantified benefit for the DNO

4. Generates new knowledge that can be shared amongst all DNOs

Summary:

The project dissemination captures full range of technical and customer issues, if anything it appears too ambitious in terms of looking at everything. The learnings from this project should be readily applicable to other DNOs. The project is looking at issues that are common and within a "typical" environment. The only possible issue is that MK is a relatively new city and so the infrastructure is young compared to some of the other cities.

Partners and collaborators appear to have good experience with knowledge capture and dissemination. Potential weakness in that none of them are heavily engaged with the traditional power utility sector in the UK and as such may not be seen as routine points of contact for power engineers.

The plan for dissemination looks good with early information and throughout the project, the research plan still to be developed. An open access database has been mentioned and that the research plan will be linked intrinsically to the project plan.

There is a well structured approach to the investigation and assessment and so it is likely that the knowledge developed will be robust and applicable.

The project appears to be testing quite a number of good aspects ranging from issues with load control and impact of low carbon technologies etc. These are detailed in the supplementary Appendix 3.

Learning Chain Summary:

This project will definitely develop data and the conversion of this into information. The research program suggests this will be converted into useful Knowledge with some learning from the practical implementation of methods. Box 24 highlights planned rotation of DCPR6 staff to ensure exposure to MKsmart2020. This is a strong opportunity for the learning to be captured by the DNO itself.

4.1. Robust methodology to capture the results from the Project	The project dissemination captures full range of technical and customer issues, if anything it appears too ambitious in terms of looking at everything. Potential risk that broad reaching and generalist which misses or too high level on specifics, i.e. Details get lost in the volume.
4.2. Applicability of the new learning to the other DNOs.	Only possible issue is that Milton Keynes is a relatively new city and so the infrastructure is young compared to some of the other cities.
4.3. Effective plans to disseminate learning from the Project	The case for the value of the "Accenture Smart Grid Leadership Network" has not been made relative to its emphasis in the proposal. The source of funding for this is not clear. No reference to the transfer of learnings have been explicitly mentioned. (DNO clarification: the Smart Grid Leadership Network is fully funded by Accenture.) Knowledge portal go-live is very late in the programme (Q2 2012). Given the existing systems outlined by the partners, this seems a long time (18 months) to develop and deploy and capture the initial learnings and disseminations.

	<i>(DNO clarification: knowledge portal is to provide access to the large volumes of network data and as such is aligned to the start of this data generation. Research papers and seminars relating to deployment experience will be disseminated prior to go-live – no further detail on this provided)</i>
4.4. Knowledge generated is novel including innovative plans, tools and techniques which will be shared openly and easily with DNOs.	Potential weakness in that none of the research and dissemination partners are heavily engaged with the traditional power utility sector in the UK, and as such may not be seen as routine points of contact for industry power engineers. <i>(DNO comment: non-traditional parties with expertise in these new areas should become routine points of contact. Open University brings extensive expertise in customer and public engagement)</i> The novelty of the proposed project is not clear relative to the weight of IT system compared to the distribution network elements. Box18 of the pro-forma submission indicates that the Research plan still to be developed particularly around the hypotheses generation. It is accepted that there are realistic limits to the level of detailed design of the dissemination programme at this stage of project development.
4.5. Effective treatment of IPR. (Where a DNO wishes to deviate from the default requirement for IPR)	States default IPR conditions, but there appear to be some areas that bid partners want to clarify on foreground & background. Therefore this is not resolved.

5. Involvement of other partners and external funding

Summary:

Key parties involved in the project are summarised below. Organisations with an asterisk represent organisations which could have been categorised as collaborators

	Equipment providers	Comms. providers	Energy retailers	Academic organisations	Project managers/ consultant s/advisors	Public sector players
Collaborators	General Electric	Cisco	E.ON Energy		Accenture	
Partners				Cranfield University The Open University		
Others mentioned	SilverSpring	BT Arqiva	EDF Energy British Gas Scottish Power National Grid Flexitricity ElectraLink			Milton Keynes Council Milton Keynes Partnership*

Collaborators

Central Networks and E.ON Energy are both part of E.ON UK. E.ON Energy is the main supplier involved in the project. It is noted that measures are place to engage with other suppliers. It is not clear whether the other suppliers will be brought on board on an equal footing if they join later (or provide a link to a smaller number of customers with smart meters)

Technical/development Collaborators are large multinationals with previous experience of similar projects (e.g. Accenture, GE, CISCO) and no gaps have been identified.

Partners

Academic partners and partners to assist in customer engagement are important players in the proposal. They are included as "other partners" in the proforma rather than the top six key collaborators. However following clarification questions, it is stated: *"All these organisations are critical to project delivery and will be bringing unique and essential skills and capabilities but they are not contributing equity directly to the project... if we have misinterpreted the [Ofgem] definition, we are happy to define them as External Collaborators."*

It is noted that Cranfield's track record is primarily condition based monitoring and predictive maintenance in aerospace and other vehicles. While this provides an opportunity to bring approaches into the electricity sector, any past experience in projects related to LCN is not clearly articulated;

While none of the dissemination partners are heavily engaged with the traditional power utility sector; it is noted that the team made an active decision to bring in new perspectives and capabilities to compliment the traditional power sector skills and experience of Central Networks, GE and Accenture.

The project has made good progress in secure arrangements 10-15 I&C customers and ensuring their participation seems likely.

The project is also engaging with a number of organisations to “receive their support for their commercial propositions”; the outcome of these discussions is still ongoing. It is also not clear how critical their involvement is to the success of the project.

External Funding

In some cases the levels of funding provided are higher than the benefits in terms of showcasing a project internationally. Without detailed person-day assumptions or assumptions assessing the value of equipment/services provided this is difficult to explore further. (e.g. contributions of E.ON Energy: £3million;; Accenture: £1.87m; GE: £2.669m, Cisco: £2.2m)

In some cases it is not clear if the funding provided is additional. For instance, in the response to questions it is stated that E.ON funding is contingent on LCNF funding as “*E.ON will still be continuing with pre-mandate smart metering trials but they will not necessarily be concentrated in one area as per MKSmart2020.*”

Limited additional funds sought or listed; however the project is connected with other initiatives in MK which are closely linked to this project. If elements of these were included, the element for external funding would increase.

6. Relevance and timing

Summary:

The project is targeting Year LCNF 1 funding so that project outputs can feed into DCPR6 submissions. The project is in parallel to smart meter roll-out, the Plugged-in places project and the potential for large scale manufacturer trial (highly likely in Milton Keynes by 2012).

There is a clear target for this project to feed this into DCPR6 and the intention is to capture this learning by having the DCPR6 team engaged with this project.

The results are phased with initial results in 2011 and the 2nd phase results in 2012.

6.1. The timing of the project is appropriate	The timing of the project appears appropriate.
6.2. Use of solution as part of their future business planning and how it would impact on its business plan submissions in future price control reviews, including DCPR6.	Aiming to feed this into DCPR6 and capture this learning by having the DCPR6 team engaged with this project.
6.3. Focus on developments associated with a move to a low carbon economy that are more likely to happen.	Clearly there are a number of interesting things that are going to be tested but on what scale. A deployment of 20,000 smart meters is mentioned but detailed trials allude to only being applied to the 50-60 demonstrator homes. <i>(DNO comment: in addition 1,200 low carbon homes to evaluate network impact, targeting 10-15 industrial & commercial customers for demand response contracts, 2-3 electric vehicle fleet projects, 5,000 of the 20,000 smart meters will have enhanced functionality as well as enhanced visibility of substations (200 secondary, 7 primary)).</i>
6.4. Time to tangible results	Results appear to be early but these will be dependent on other parallel projects and roll-outs being achieved within the same timescales.

7. Demonstration of a robust methodology and that the Project is ready to implement

Summary:

A detailed plan is provided including key interdependencies; allocation of responsibility is clearly articulated; High level plan provides overview of project. Responsibilities and testing methodologies for individual research hypotheses are clearly described.

All collaborators are of sufficient size and track record. The contractual arrangements between collaborators are still being carried out: The proposal includes a provision for external collaborator frameworks signed in Q4 2010.

The project is testing a number of commercial arrangements between collaborators.

Risk procedures and processes in place, risk register in place and mitigation and contingency applied.

The project fundamentally uses existing technology applied to a new application in the UK.

The trial does not involve direct control of domestic customer equipment but intends to influence demand response through a range of tariffs.

7.1. Detailed Project plan, with responsibilities clearly established and inter-dependencies identified.	The plan appears credible provides breakdown of individual tasks. The project links closely to other initiatives such as Plugged-in places, installation of smart meters etc; The interdependencies between these projects is not always outlined in the Gantt chart.
7.2. Resources to deliver the Project are of a sufficient size and quality to be reasonably expected to ensure its delivery.	The underlying organisations are of sufficient size but specific numbers of staff allocated are not clearly presented.
7.3. Demonstration that the Project can be started in a timely manner.	While a number of feasibility/defining commercial propositions are required before start-up, there is no reason to suggest that the project would not be ready to go within the timeline indicated. The research and analysis action does not start earlier than H2 2021; it is not clear if all arrangements are in place for this part of the project.. In response to this query, it is stated: <i>"Accenture's smart grid leadership network as well the Open University virtual engagement programme will start as early as the first half and the second half of 2011 respectively. Scale research and analysis activities will begin once the underlying solution is in place after an 18 month design, test and build cycle....Prior to this we will be capturing lessons learnt from deployment activities. We do not believe it is appropriate to commence at scale research and dissemination activities until such time as there is a suitable amount of data to analyse."</i>
7.4. Risks to costs and benefits of the Project have been reasonably estimated.	The costs for mitigating measures or assessment of uncertainties are not clearly documented There are limited details on the impact of delays/overruns on associated projects in Milton Keynes such as Low carbon Living Programme, ELVIS –

	Plugged in places (and other initiatives). No cost control measures evident to ensure contractor and collaborator contributions and costs in check.
7.5. Assessment of proposed cost overrun percentage (if non-default?)	Default position adopted. Specific circumstances for using this protection mechanism are not discussed.
7.6. Assessment of Direct Benefit protection (if non-default?)	No protection required as direct benefits are not greater than the 10% contribution.
7.7. Identification of appropriate risk mitigation processes	A key concern following review of the proforma was the mitigation measures to ensure adequate engagement of consumers. The clarification questions highlighted a number of mitigation measures including: <i>“lease agreements for the 60 demonstrator homes, integration into Milton Keynes’ Low Carbon Living Programme, provision of strong incentives for people to buy electric vehicles by MK, ongoing engagement by OU, considering levels of customer adoption are considered twice in the Decision Point project planning”</i> Risk procedures and processes in place, risk register in place and mitigation and contingency applied. Though at a high level, IT & Communications have been highlighted as a significant risk.
7.8. Direct Impact on Distribution Networks on roll-out has been correctly identified	Nothing explicit but successful roll-out will result in the installation of increased monitoring allowing active network management and dynamic rating of equipment. Demand side management through new commercial arrangements and tariffs and direct control of customer equipment will become an option. All will have an impact on planning, design, operation and maintenance of the network
7.9. Immediate Project impacts on the proposer's network have been correctly identified	The project is a full scale smart system trialling active network management through voltage control and dynamic rating using a significantly increased monitoring capability both on the network and at customer premises
7.10. Customer Impact and change required have been correctly identified	Does not involve direct control domestic customer equipment but intends to influence demand response through a range of tariffs. New commercial arrangement will be entered in to with industrial & commercial customers to allow both direct demand side management and provide demand side response.

7.11. Technology Viability	The project fundamentally uses existing technology applied to a new application in the UK. The documentation makes specific reference to a similar project in Boulder USA. This appears to be a very large scale ambitious project. However a significant part of the project is associated with communications infrastructure and software development. The level of IT is disproportionate to the amount of distribution network equipment being installed. Monitoring of the network is proposed on a subset of 20,000 smart meters and selected substations and Active network management and demand side management through direct control and new commercial arrangements and tariffs are proposed on another smaller subset. It is not clear how many customers make up each trial and hence the risk of take-up impact on viability of results, but the trials are not explicitly linked making significant delays or total failure of the project unlikely The complete success of the scheme relies on the successful operation of a large scale communications/software project which appear to be over specified relative to the needs of the trial and thus carries unnecessary risk
7.12.Successful Delivery Criteria	Revised successful delivery criteria provide improved alignment with project milestones and timescales provided. Still concern that delivery criteria do not align very well against major project cost items.
7.13. Contractual proposals	The project includes testing a number of different (and in some cases likely to be complex) arrangements. As the arrangements are not discussed in detail in the proposal, we are not able to test their credibility
7.14 Derogations and exemptions	The project plans to use a pricing signal that would be proportionate to the avoided capex in relation to the uptake of EV and heat pumps anticipated in the region in 2020. Customers would therefore be charged differently to other customers and derogation from SLC13 charging methodology license condition would be required. Overall impact on the customer is neutral through payment at outturn,. Beyond these requirements described above, further details of derogations are not provided.