SSET206

Low Carbon Networks Fund
Full Submission Pro-forma
Section 1: Project Summary

1.1 Project Title:
Solent Achieving Value from Efficiency (SAVE)

NON-CONFIDENTIAL VERSION

1.2 Funding DNO:
Southern Electric Power Distribution (SEPD)

1.3 Project Summary:

The SAVE project will robustly trial and establish to what extent energy efficiency measures can be considered as a cost effective, predictable and sustainable tool for managing peak demand as an alternative to network reinforcement. The project will target domestic customers only, and the measures to be trialled will include deploying a technology, offering a commercial incentive and taking an innovative approach to engagement.

The project will be based in the Solent and surrounding area in the South of England, which is representative of much of the UK and where the Local Authorities are already creating challenges for the network as a result of implementing a strategy of supporting and encouraging local communities and businesses to develop opportunities and growth.

On completion of the project GB DNOs will have a suite of tools to assess a particular network's suitability for demand reduction through energy efficiency measures and allow informed investment choices to be made between using customer engagement and energy efficiency measures as opposed to traditional measures and "smart" solutions.

The project will also quantify the broader benefits of an energy efficiency measure to allow the complete value of the solution to be evaluated alongside the more network centric solutions.

1.4 Funding

1.4.2 LCN Funding Request (£k): 8,293

1.4.3 DNO Contribution (£k): 0

1.4.4 External Funding - excluding from NICs (£k): 694

1.4.5 Total Project cost (£k): 10,338

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1.5 Cross industry ventures: If your Project is one part of a wider cross industry venture please complete the following section. A cross industry venture consists of two or more Projects which are interlinked with one Project requesting funding from the L ow Carbon Networks (LCN) Fund and the other Project(s) applying for funding from the Electricity Network Innovation Competition (NIC) and/or Gas NIC.

1.5.1 Funding requested from the Electricity NIC or Gas NIC (£k, please state which other competition):

1.5.2 Please confirm if the LCN Fund Project could proceed in absence of funding being awarded for the Electricity NIC or Gas NIC Project:

☐ **YES – the Project would proceed in the absence of funding for the interlinked Project**

☐ **NO – the Project would not proceed in the absence of funding for the interlinked Project**

1.6 List of Project Partners, External Funders and Project Supporters:

Project Partners:
Future Solent – provider of local contacts and data; University of Southampton – data analysis and model preparation;
DNV KEMA – International learning, project methodology, trials managers and learning;
Wireless Maingate – International learning and technology providers

Project Suppliers:
University of Winchester – Engagement media; Neighbourhood Economics – Community Coaching.

Project Supporters:
Partnership for Urban South Hampshire (PUSH), Hampshire Chamber of Commerce, SmartGridGB

1.7 Timescale

1.7.1 Project Start Date:	1.7.2 Project End Date:
1st January 2014	29th June 2018

1.8 Project Manager Contact Details

1.8.1 Contact Name & Job Title:	1.8.3 Contact Address:
Brian Shewan, Development Manager	Scottish and Southern Energy Power Distribution 55 Vastern Road Reading Berkshire RG1 8BU
1.8.2 Email & Telephone Number: brian.shewan@sse.com +44 (0) 1189 534681	

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Section 2: Project Description

This section should be between 8 and 10 pages.

2.1 Aims and objectives

Aim

Through this project we aim to produce a network investment decision tool that will allow DNOs to assess and select the most cost efficient methodology for managing a network constraint.

Objectives

The aim will be achieved through the following objectives:

1. Create hypotheses of anticipated effect of energy efficiency measures (via commercial, technical and engagement methods)
2. Monitor effect of energy efficiency measures on consumption across range of customers
3. Analyse effect and attempt to improve in second iteration
4. Evaluate cost efficiency of each measure
5. Produce customer model revealing customer receptiveness to measures
6. Produce network model revealing modelled network impact from measures
7. Produce a network investment tool for DNOs
8. Produce recommendations for regulatory and incentives model that DNOs may adopt via RIIO

Problem

The report from Work Stream 3 of the DECC/Ofgem Smart Grid Forum "Assessing the impact of low carbon technologies on Great Britain's power distribution networks" presented cost figures for conventional reinforcement of the network if innovation levels were increased. It revealed that a typical low voltage reinforcement project involving cabling only can cost approximately £80,000 whilst a larger low voltage reinforcement involving a transformer replacement can cost approximately £250,000. Targeted investment to deal with demand growth means that this level of investment is seen as sound and sustainable, and providing the capacity for growth. The uncertainty in today's climate will see in many cases energy efficiency reduce demand and low carbon technologies change demand profiles. In many cases where this occurs the long term need for reinforcement may be negated. However the uptake of energy efficiency does not link perfectly with network constraints so in many places reinforcements will still be required but ultimately may become stranded assets as energy efficiency grows. This project seeks to synchronise energy efficiency with the network problem hence avoiding or deferring the need to invest in traditional solutions.

The Solent region is diverse in its population, infrastructure and socioeconomic types, and as such is representative of many of the areas found in the rest of GB. It is recognised as a major growth area and so its electrical demand is forecast to increase and the electrical demand profile is anticipated to change to reflect a high uptake of low carbon technologies. A major part of the DECC Carbon Plan focuses on making UK homes greener and less energy intensive. The SAVE project will help to evaluate the role DNOs can play in this process.

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Project Description continued

In addition, the Local Authorities and the Future Solent initiative (a public sector support body responsible for the development and delivery of the low carbon plans for the Solent area) are actively promoting a Low Carbon Economy to develop business opportunities and growth. The distribution substations may not be able to accommodate further significant increases in demand without being upgraded. Furthermore, unless effectively managed the anticipated changes in demand levels and load profiles will trigger network problems prompting costly and disruptive reinforcement. This story is repeated across the UK.

Methods
The project will evaluate the potential for DNOs to instigate different types of "energy efficiency measures" which will incentivise customer behaviour change resulting in reduction of peak and overall demand on the electricity distribution network. We will compare the impacts of four energy efficiency measures (Methods – described in more detail in section 2.3) which use combinations of technology, commercial rewards and engagement campaigns informed by energy consumption and demographic data. The project will identify the energy efficiency measures which are most cost effective in terms of achieving demand reduction.

The project will develop a "market matrix" of relevant programmes, incentive mechanisms and opportunities operating in other regions to look for learning that can be applied in GB.

Trials (see Appendix F for trial summary diagram)
The trials will consist of evaluating 4 energy efficiency measures on participants in the Solent region. The methods have been chosen to allow an assessment of multiple factors, such as cost and effort required to install/implement, etc. Note: LEDs have been chosen as they have been considered to be the best option in the current market to test customer reception to a technological intervention.

The trials involving Methods 1-3 will be managed by DNV KEMA, whilst the trial of Method 4 will be managed by Neighbourhood Economics. Analysis will be carried out by the University of Southampton (customer modelling) and another party selected by tender (network modelling). Methods 1-3 will each have a sample group of up to 1,000, with up to a further 1,000 making up a control group for comparison. Method 4 will involve community coaching and will be targeting 2 neighbourhoods typically comprising up to 1,000 properties. Like the other methods these will also have control groups, made up of similar neighbourhoods of up to 1,000 properties.

It is important to note that the recruitment rate is part of the trial itself- understanding uptake rates is an important stage in measuring impacts. The sample sizes are the ideal, yet if the numbers do not reach the desired levels it will simply mean that it may be harder to determine small changes in behaviour. If the changes are so small then the model will still be valid as it will still reveal the method(s) that yield only small changes in consumption.

The 4 methods are:

1. LED installation
2. Data-informed engagement campaign
3. DNO price signals direct to customers plus data-informed engagement
4. Community coaching

These methods are described in detail in section 2.3.

Solutions

As a result of identifying the effectiveness of each energy efficiency measure we will produce an investment decision tool that will allow DNOs to assess and select the most cost efficient methodology for managing a particular network constraint and most effective for its connected customer types. See Appendix G for the SAVE model and Appendix H for the network modelling and investment tool diagrams.

Current practices do not support the deployment of energy efficiency measures as a cost effective tool in comparison with traditional network investment, and are currently not considered when designing networks. The results of the trials will enable this to be considered as a solution and implemented as an alternative to traditional network reinforcement/planning, with the DNO costs also established.

2.2 Technical description of Project

As stated the project intends to use technical and commercial measures as well as proactive customer engagement to promote energy efficiency (a change in consumption levels and patterns).

The technical means of facilitating energy efficiency will involve utilising LED lighting in one trial, and the provision of meter sensors and smart plugs in another. The trial utilising sensors and smart plugs will provide graphical views of total property and individual appliance demand, and this data will be used to inform the campaigns as part of the proactive customer engagement approach (effectively meaning the trial utilises both technical means and proactive engagement).

Commercial means of promoting energy efficiency will encourage customers through a target-related reward that is provided directly by the DNO. This will test the sensitivity of customers to incentives and the scale required. As a result the project will design a blueprint for an energy efficiency incentive measure that Ofgem may consider implementing as a future phase of RIIO, by making recommendations on the type and level of incentive that would be necessary.

The third method employed will involve proactive customer engagement to create behaviour change. This will involve two trials, with one trial drawing upon a range of targeted methods that will include apps to monitor energy efficiency and media material in the form of targeted short film clips and printed flyers. Under the guidance of DNV KEMA the University of Winchester will create a campaign strategy and produce the bulk of the media material, drawing upon the experience and expertise of their Media Department. The other trial will

realise further proactive engagement thanks to Neighbourhood Economics and their work on SEPD's IFI project 'Community Energy Coaching Programme', by targeting neighbourhoods and embedding a Community Coach to engage with customers and change behaviour via a range of means, including community actions.

The innovation in this project's methodology stems from the fact that it is aiming to quantify the network benefits of various energy efficiency measures, focussing on both electrical peak demand and daily demand profiles, resulting in the creation of a tool for a DNO's network planning teams to utilise in the future. Also, to ensure the results are statistically valid and therefore strengthen the reliability of the tool the trial size and selection of trial participants have been influenced by the University of Southampton and their expertise in designing trials.

2.3 Description of design of trials

A. Introduction

The trials will define the relative value to distribution networks of using different energy efficiency measures to reduce network demand. To do this two key metrics will be developed to describe the performance of each trial method. These are:

- £ spent per kW reduction (peak)
- £ spent per kWh reduction (overall- in the 6 month trial iteration periods)

These two metrics will allow the energy efficiency methods to be compared and ranked objectively against each other to show which are most effective to be used to meet different network needs. Furthermore, by analysing which types of customers responded in different ways to energy efficiency methods, it should also be possible to conclude which methods are most effective, reliable and sustainable. From a network perspective the value of changing consumption levels changes with time (greater value in addressing winter peaks) and so the network model will be developed to address this to allow the quantification of both network and economic benefits.

During each trial a formalized process of recording the cost of the trial methodology will take place. Timesheets will be designed for all project staff (both SEPD and other project participants). These timesheets will be collated and reviewed on a monthly basis to ensure costs are not omitted. Each resource will be allocated a realistic market rate including overheads. All external costs such as engagement material will be recorded for each trial. At the end of each trial period, total trial costs will be calculated. Since the robustness of the network investment model is driven by the accuracy of the cost of approach, an internal review process will take place for each total costing to ensure no costs have been missed. The frequency of engagement will also be taken into account in this process ensuring the costs are valid for the length of demand reduction required.

The SAVE project team will use the existing SEPD Future Networks Financial Management procedure WI-PS-FNP-010 to manage and reconcile costs from the individual trials costs.

Each trial participant will be monitored for energy consumption. The monitoring process enables the project to judge whether a trial has had an impact on energy consumption. A

control group will be established for comparison. The demographic characteristics of each participant will be recorded. Within each trial group a representative number of demographic groups will be present. This enables the constructing of representative substation demographics, leading to a calculation of energy consumption reduction for each method for different substations.

The calculation of relative cost effectiveness of each trial methodology is a simple division of the cost of the trial recorded in the manner described above and the total kWs and kWhs consumption reduction observed from the methodology. This will feed in to the network model and enable control engineers to select the most cost-effective methodology for a given network area. Please see Appendix R for more details on the structured methodology.

Customer engagement sits at the core of the project and forms part of every trial in order to understand the most effective way of engaging with different types of customers in order to maximise their response. Therefore, much of the most useful learning in the trials should come in this area.

The structure of the trial approaches also has two innovative characteristics that should maximise the opportunity to learn during the project. These are:

- an iterative development approach – there are planned to be two trial periods which allows learning from the first period to be assessed and used to inform the approach for the second trial period. This will include learning from both aspects that worked, and those that didn't work
- the project has a competitive element as different methods will be evaluated against objective metrics (as explained above). This should enable ranking of energy efficiency methods against each other and an understanding of their relative effectiveness in different situations and with different customers

The trials will take a statistically robust approach so that conclusions have a consistent, solid and credible basis. This is reflected in the sample sizes and approach to recruitment and has been informed by University of Southampton (UoS), who have stated that the project should commit to carrying out trials of the highest quality in order to achieve the following objectives:

- ability to distinguish between effects caused by selection and by actual measures
- ability to distinguish between novelty effects and longer term change
- to be able to detect statistically significant effects
- to allow the results to be extrapolated to the general customer population

Sample size and region

Other LCNF projects that have looked at time of use tariffs have suggested 7% overall reduction with a 14% reduction during the peak tariff period (source: LCNF Customer-Led Network Revolution project). The University of Southampton have advised that the ability to observe a particular sized reduction (and determine it as attributable to the project) dictates the required sample size. If we assume we will see a similar reduction of 7.5% then the effective sample size required for a statistically-robust trial method becomes 1000 properties. Therefore we will aim to recruit up to 1000 properties for each intervention group (including the control), with the recruitment rate being part of the trial itself-understanding uptake rates is an important stage in measuring impacts. The sample sizes

are the ideal, yet if the numbers do not reach the desired levels it will simply mean that it may be harder to determine small changes in behaviour.

If the number of recruited properties is significantly lower than this, we will move away from using the approach where each intervention sample is kept strictly separate, and instead look to use a factorial design which combines interventions for some groups to allow us to determine effects whilst using a smaller sample size (see Appendix I).

The overall Solent region has been selected as the target area for the study within the project. This will facilitate rigor and significantly improve potential impacts in both analysis and outcomes. The need for a larger region of study (as opposed to simply a Council district or town) is based on the following premise:

- the eventual 'network effects' model needs to be able to estimate the local 'impacts' of the intervention measures across all population groups and therefore across all areas, meaning we must have control and test samples which are representative of all entities in the Solent area; and
- by assuming that there are no specific 'living in the Solent region' effects then the dataset and the results can also be used to model effects across all DNOs

In order to obtain a cross-section of customers the project will recruit from a range of areas: urban; suburban and rural. This will avoid any bias that could arise from sampling in only one area by reflecting the full diversity of socio-economic and demographic characteristics across the region.

Sampling process

The approach will apply standard best practice academic and Market Research Society (MRS) techniques to the recruitment of the customers and to the entire data collection processes, using an experienced professional market research agency with MRS accreditation for recruitment and surveys to ensure an expert and cost-effective approach. Having taken the learning from other LCNF projects we have taken the decision to employ a tried and tested MRS-accredited agency to support the University of Southampton and mitigate the risks associated with trial recruitment. It is important to note the use of such an agency is not currently considered in a Business As Usual solution- although it could form part of the solution in the future.
Best practice within the academic and market research survey sectors dictated our use of a randomised stratified approach by indicating that it is the only effective way to generate a representative random sample sufficient for our analytic needs (see Appendix I).

It is important to note that the SAVE project's approach has been taken to avoid issues which have been seen in other LCNF projects (recently documented in the 'Project Lessons Learned from Trial Recruitment paper' for the CLNR project). The approach will ensure that the results, and subsequent ability to extrapolation to other networks, are statistically sound and reliable (see Appendix I for further information).

B. **High-level concept** (see Appendix J for high level project concept diagram)

As seen in the high-level project concept diagram at the core of the project sits a model of customer response which will be set up and maintained by the University of Southampton (UoS). This model will be informed in the first instance by an initial research phase which will review findings from energy efficiency programmes from around the world and how they

have engaged with customers. In parallel, the demographic and energy use characteristics of Solent customers will be investigated by the UoS based on work they have already undertaken (and reinforced by information from the project partners).

Findings will be combined with Solent customer segments and analysed to understand which customer demographic characteristics are most important to consider for grouping into trial groups. This should enable the profiling and segmentation of customers within the model of customer response. This model will allow the development of initial hypotheses to act as the basis for the first trial period. Once the first trial period is complete these will be assessed and evaluated based on both quantitative results (electricity reduction and the associated cost to achieve it) and qualitative feedback (surveys and questionnaires filled in by participants), with the results fed back in to update the customer model and the associated customer profiles. The academics analysing the results are aware that customers are likely to change their behaviour subconsciously and so they will look to draw out these observations from the results. This should refine understanding of methods and customers and allow for updated hypotheses to be developed and trialled in a second trial period. Results will also be fed into a network impacts model which will take data on energy reductions and apply it to a virtual network to understand what the potential network impacts would have been. The final output will be a combination of the customer model and network model, which will be an investment decision tool for DNOs.

C. Project phases (see Appendix K for project phasing diagram)

The project splits into five operational phases:

Phase 1 – Preparation and recruitment, is planned to last for the first 18 months of the project (January 2014-June 2015) and focuses on setting the foundations of the trials. To begin with, a Customer Engagement Plan and Data Protection Strategy will be developed and reviewed with Ofgem before any customer-related activity takes place. In parallel, the desktop research will be undertaken to look at learning from other energy efficiency and LCNF programmes, and to investigate Solent customer characteristics (see Appendix S Incorporating prior customer engagement learning).

Once the customer engagement plan is agreed, recruitment for the trials will commence. Customers will be required to participate for the full period of their trial and for methods 1-3 this requires the installation of monitoring equipment supplied by Wireless Maingate ("Maingate") to record electricity consumption. Please see Appendix L for Maingate's proposal. This monitoring equipment will later allow participants to understand when they are using electricity (via access to an online portal or letter) so that they are better able to respond to stimuli, as well as smart plugs in the engagement campaign and network rebate groups to collect data on the usage of specific appliances which can be used to enable more sophisticated campaign messages. Participants for method 4 (Community Coaching) will be selected at a neighbourhood-level and substation monitoring installed to monitor consumption.

In the latter part of the first year, and once the desktop research has been completed, the

customer model will be developed and an initial view of trial groupings will be developed based on the recruitment outcomes. The aim will be for groupings to be consistent in terms of their demographic make-up.

Phase 2 – Initial monitoring, is a six month period (July 2015-December 2015) when a base set of data can be collected from trial participants. It is planned that this will run from July-December to ensure coverage of both summer and winter periods and the associated seasonal changes in consumption levels. The ability to view and assess impacts on winter peaks is of significant value to a DNO. Six months has been chosen as it will allow 2 trial iterations to take place and also ensure that there is a directly comparable six month period from July-December where monitoring of responses to the methods can be compared to the initial baseline monitoring period. Note: there will still be visibility of consumption in January-June and comparisons can be made against the control group's consumption in that same period. As real data is collected from this monitoring period, it will be used to update the customer model. This should enable the refinement of the customer groupings and formulation of initial hypotheses for the first trial iteration.

Phase 3 – First trial iteration, will last for one year (January 2016-December 2016). Both trial iteration phases are split into two six-month periods. The first period will give time to install technology, start tariffs and begin engagement campaigns; whilst the second period will allow a full six-month period of monitoring participant responses to the different methods deployed against the original July-December monitoring period. During this time, data will be collected, the customer response model will be updated and hypotheses will be refined.

Phase 4 – Second trial iteration, has a very similar format to Phase 3 (this time running from January 2017-December 2017). However, in this case, the first six-month period will be used to review the outcomes and learning from the first trial iteration in order to update the approach for each method. This will either be to improve delivery (e.g. how to target participants that did not engage in the first iteration), or to simply do things differently or more cheaply (e.g. to offer a lower rebate, or engage with participants on a more sophisticated basis through analysis of their appliance usage).

Phase 5 – Conclusions and wrap up, is the final assessment of outcomes and conclusions from the project, and the collection of final feedback. This includes the production of key reports to present important findings and to interpret them into regulatory and network implications. This period (January 2018-June 2018) will also see the closing of the project from a practical perspective including the removal of some project equipment, etc.

D. Description of trial methods

The trials plan to utilise four different energy efficiency methods to allow comparisons between their relative effectiveness. All the methods have the same underlying objective and starting point, namely reviewing consumption data gathered at the start of the trials to identify what demand reductions/shifts need to be achieved to benefit the network, which

will inform the engagement approach as to what behaviours/specific consumption patterns need to be encouraged/discouraged to achieve this. The methods will diverge as each one goes to trial a different means of achieving the target, then converge again as they all give a common measure of demand to enable comparison.

Method 1 – LED installation: One sample group will be targeted for LED installation. This trial will test this method from two perspectives; both the ability to engage customers to agree to having a package of LEDs installed, and then the impact of the LEDs on electricity consumption once installed. LEDs will be offered free to customers, reflecting a real-world situation where the network may pay for LEDs to be installed. For the second iteration, a different engagement approach may be considered to target those participants who did not agree to an installation in the first iteration. This would be based on participant feedback from the first iteration.

Method 2 – Data-informed engagement campaign: A second sample group will be targeted by a focused customer engagement campaign. The campaign will use data from monitoring (both of overall household and of appliance-specific consumption) to make messages more sophisticated and tailored to different customer groups in a bid to achieve a sustained behaviour change and subsequent reduction in peak and overall demand, e.g. targeting customers using their washing machine over peak time. Customers will be able to view their consumption habits via an online portal or a letter to assist with the awareness and behaviour change. A variety of engagement techniques will be employed, which are set out further in Section 8. Again, campaigns will be set up and executed in the first half of the trial phases. For the second trial iteration campaigns there is scope to further tailor messages or use different techniques.

Method 3 – DNO price signals direct to customers plus data informed engagement: The third sample group will be subject to the same engagement campaign approach as in Method 2, but in this case participants will be able to earn a rebate from the DNO in return for achieving a targeted change in consumption. This rebate will be structured (in the form of a consumption-related target) to reflect the network's needs, such as reducing peak demand, and will be supported by engagement campaign messages. To inform the setting of this rebate, a network pricing model will be developed in the first part of Phase 3 to estimate the value for the network of reducing demand at different times in terms of potential avoided reinforcement..

Method 4 – Community coaching: This method represents an alternative approach to engagement and will be led by Neighbourhood Economics Ltd (NEL) an organisation specialising in local community engagement and behaviour change. As for Methods 1-3, Neighbourhood Economics will use consumption data to target their approach to achieving network benefits. This method seeks to:

- **'embed'** a Community Energy Coach within an agreed target community providing a dedicated and consistent local presence
- work with all local stakeholders and partners to **'build'** the capacity to embrace change in energy consumption; and

- draw on the support of all stakeholders and partners in mobilising and integrating grassroots effort to cultivate enterprise opportunities which will generate income to **'sustain'** and further develop the positive behaviour change which the programme has served to trigger

In this case there will be no recruitment or data linked to specific customers. Instead monitoring will take place at the substation level and results in terms of overall reductions in usage will be assessed and compared through the network modelling. Control substation areas will also be monitored for comparison. Based on advance profiling, NEL will identify and select 2 differentiated communities of up to 1000 properties in each:

- one relatively affluent and aspirational, being seen as an attractive place to live with a relatively high quality of life allowing greater local engagement in choices regarding sustainability; and
- one relatively disadvantaged and increasingly susceptible to adverse effects in the local economy, many within the community being disaffected and potentially harder-to-engage on sustainability issues. Although hard-to-engage they have the potential to have a significant impact for customers as small energy changes have a bigger impact if the customers have less disposable income and are in fuel poverty

2.4 – Changes since Initial Screening Process (ISP)

The following changes have been made since the ISP:

- properties targeted by ECO and/or Green Deal are at the initial stages of such initiatives and are likely to be centred on local authority properties and would give biased results. Hence they are not targeted during the period of the SAVE project. Nevertheless, the results within our project will inform such schemes through sharing of learning, approaches and appropriate data in energy efficiency measures and interventions
- given the time and budget constraints it is impractical to achieve a statistically valid sample of SMEs, therefore we have decided to drop this element and look to do this work outside of this project. As a result of these changes the following partners and external collaborators are no longer involved: PassivSystems, Honeywell Control Systems, 22nd CE, Opower, Campaign Agenda
- we initially planned for the project to run from January 2014 to March 2017, however after evaluation of other LCNF projects (notably the recruitment challenges in CLNR) it has been decided to extend the duration until June 2018 to allow sufficient engagement time
- in the ISP £5.5m of LCN Funding was required, however as the bid has developed (namely the size of samples to achieve statistical validity) the cost of the project has increased, and as a result £8,293k of LCN Funding is now requested
- during the workshops, and following Ofgem's Expert Panel meetings, we decided to tender for the following roles within the project to enhance value for money: Supply and roll out of LED lighting; The University of Southampton Customer Engagement work; substation monitoring for the Community Coaching trial; developing the network model
- following Ofgem's Expert Panel meetings the decision was made to remove ELEXON as a partner and the method of reviewing DNO price signals via Suppliers

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Section 3: Project Business Case

This section should be between 3 and 6 pages.

3.1 SEPD Context

The SAVE project is proposed by SEPD, the licence holder for the network of which Scottish and Southern Energy Power Distribution (SSEPD) are the holding company. SSEPD is part of the Scottish and Southern Energy (SSE) Group.
In its 2012 Annual Report, SSE states that priority for energy networks is: "Delivering upgraded electricity transmission networks and operational efficiency and innovation in electricity and gas distribution networks as they respond to the decarbonisation and decentralisation of energy." The learning from the Low Carbon Network Fund projects such as the SAVE project continue to inform our strategy to deliver on priorities with an aim to support our core purpose which is to provide the energy people need in a reliable and sustainable way.

3.2 Integration into SSEPD's Business Plan

SSEPD does not believe in carrying Research and Development for the sake of it. SSEPD's pragmatic approach to R&D and innovation ensures that the outputs of all projects are practical and effective. All R&D and innovation projects are regularly benchmarked and evaluated against the Business Innovation Matrix (Red, Amber and Green system) and each solution given a timeline to be taken up, or not, by the Business as Usual team.

Until now DNOs have not trialled energy efficiency at scale within the customers' premises. Traditionally DNOs have regarded this as outside their area of influence but in August 2012 the Smart Grid Forum Workstream 6 report highlighted that electricity demand reduction could serve to reduce the need for network reinforcement. Following the consultation from Ofgem dated 7th December 2012 entitled 'Low Carbon Networks Fund – Electricity Demand', SEPD became interested in potentially trialling such demand reduction. At present this is untested and therefore cannot be used at Business As Usual (BAU). Through these trials, SEPD hopes to quantify the most cost effective approach to having a measurable change in the operation of the distribution system and develop means of controlling the demand reduction in order to be able to rely on the demand reduction and defer or avoid network reinforcement.

The SAVE project has been designed to act as a template for replication across SSEPD's distribution networks and those of other GB DNOs. To this end we will utilise the dedicated Power Distribution Future Networks team. Within the Future Networks team is a dedicated Delivery Team supported by a dedicated Knowledge Manager whose role is to ensure that learning from each of our projects is incorporated into overall knowledge and business as usual as quickly as possible.

3.3 SEPD's Challenges

SEPD is facing 3 distinct challenges which have prompted this project:

1) **Localised Network Capacity:**
SEPD recognises that local electricity substations will face new challenges. Given the scale and nature of the investment required to address these load issues, SEPD is keen to seek alternative and potentially less costly methods to negate or defer the need for this investment

2) **Stakeholder Engagement:**
The requirement for SEPD to engage more fully with its customers and stakeholders in the design and delivery of its business plans

3) **Social Obligation:**
SEPD are keen to continue building on our ability to identify synergies between the needs of our customers and the needs of the network, which aligns with the recommendations made in Ofgem's 'Strategy Decision for the RIIO- ED1 electricity distribution price control - Outputs, incentives and innovation' (Supplementary Annex to the RIIO-ED1 overview paper, March 2013). Ofgem's recommendations include DNOs identifying and delivering solutions that might reduce demand on the network, such as energy efficiency measures

SEPD's challenge is how to respond to this 'major cultural and behavioural shift' to ensure that creative stakeholder engagement forms part of a strategic response to the opportunities presented and is embedded at all levels within the organisation. Confronting this challenge successfully could set SEPD apart as a market leader.

3.4 The SAVE Project Business Case

3.4.1 Consistency with SSEPD's Future Business Plan

To support the SAVE project business case we refer to the recently completed SEPD's feasibility study project ref no IFI 2013_01 Community Energy Coaching (Appendix M): "changes in localised consumption behaviours generally - and in terms of energy demand reduction in particular - are more likely to be achieved with key local and national stakeholders working intensively together to resource and empower defined geographical communities in actively embracing a compelling, locally relevant, collaborative sustainability-related theme. Furthermore, resultant positive behaviour change is more likely to be reinforced and sustained in the long-term by the momentum of pooled stakeholder effort."

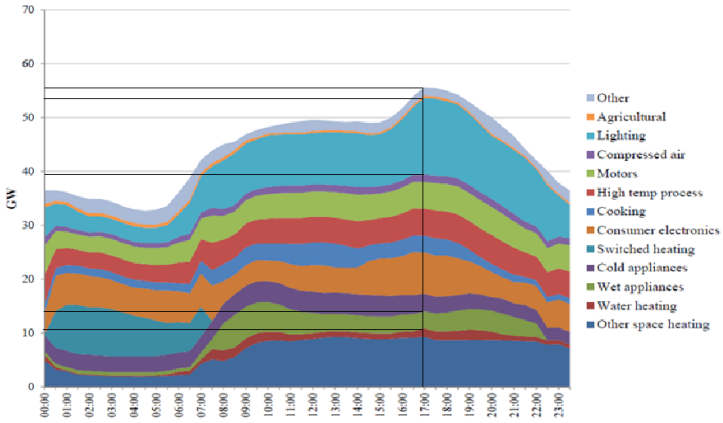
The SAVE project will test the above statement and also develop the hypothesis further. Moreover, SSEPD's future Business Plan references the Community Energy Coaching approach ('Making Innovation Happen' paper) and also underpins the core proposition of this project and SEPD's aspiration that:

- from a purely technical perspective - such an approach could deliver sustainable reduction in demand for electricity, particularly in communities where loads are at or close to the limit of network capacity, negating or deferring reinforcement
- from the wider operational perspective - that SEPD, its stakeholders and partners could anticipate other significant benefits arising from such intensive local

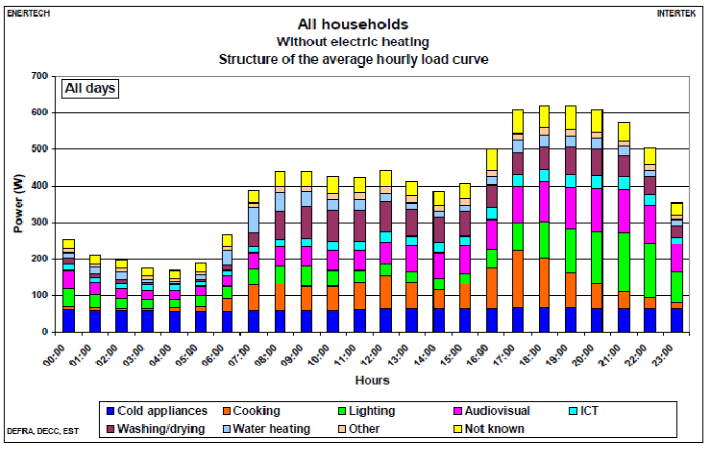
collaboration notably in terms of improved strategic effectiveness and operational efficiencies in respect of carbon reduction and the broader sustainability agenda

3.4.2 Benefits case for Network Operator

We have developed a business case for the measures, drawing upon both the Ofgem report 'Assessing the Impacts of Low Carbon Technologies on Great Britain Distribution Networks' and the Sustainability First report detailing GB demand broken down by appliances at peak demand periods (GB Electricity Demand – 2010 and 2025. Initial Brattle Electricity Demand-Side Model). The graph below indicates the breakdown of GB demand on January weekdays in 2010:



From the graph the two demand groups that are most likely to be of use to DNOs are lighting and white goods/consumer electronics, therefore the SAVE project will concentrate on evaluating these two demand groups. This is also confirmed by the Intertek Report R66141 'Household Electricity Survey: A study of domestic electrical product usage', which revealed the structure of the average hourly load curve, as seen below:



A number of scenarios have been created to evaluate the expected impacts and benefits from all the measures being deployed in the trials. A few examples are included below, however please refer to Appendix N for full workings, split into 5 sections:

Low Carbon Networks Fund
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Project Business Case continued

1. **Base Case**
2. **Headroom Scenarios,**
3. **Part Two - Urban reinforcement scenarios**
4. **Part Three - Rural reinforcement scenarios**
5. **Part Four - Estimated Costs of EE Measures**
6. **Part Five - Scenarios using real networks**

Average annual household consumption (kWhs per year)	4,226	4,226	4,226	4,226
Measure	**LEDs**	**Data informed engagement**	**DNO rebates**	**Community Coaching**
Average annual household lighting consumption (kWhs per year)	634			
Expected total reduction (%)	10.5	11	15	15
Expected annual reduction (kWhs per year)	444	465	634	634
Expected hourly reduction (kWhs)	0.05	0.05	0.07	0.07
Expected hourly reduction (Watts per hour)	5	5	7	7
Expected daily reduction (Watts per day)	122	127	174	174

Small LV Urban	**LEDs**	**Data informed engagement**	**DNO rebates**	**Community Coaching**
Daily reduction on LV cable with 150 customers (kW)	18	19	26	26
Rating of circuit (kW)	200	200	200	200
Headroom made available (%)	9.12	9.55	13.03	13.03
Equivalent to connection a number of 3kW heat pumps or EVs now able to connect (without diversity)	6	6	9	9

	LV Major	**LEDs**	**Data informed engagement**	**DNO rebates**	**Community Coaching**
LV MAJOR LOW COST	Cost of LV major works with transformer (£)	190,000	190,000	190,000	190,000
	Maximum funds available to supply measures to 400 customers (£)	475	475	475	475
	Cost for measure per customer (£)	150	120	220	293
	Cost for measure for 400 customers (£)	60,000	48,000	88,000	117,333
	Saved budget due to deferred reinforcement (£)	130,000	142,000	102,000	72,667
	GB LV major works expected to be undertaken	4,213	4,213	4,213	4,213
	GB cost of LV major works (£)	800,470,000	800,470,000	800,470,000	800,470,000
	Potential number of GB LV major works deferred by use of measure	421	421	421	421
	Cost to reinforce suitable networks in GB (£)	80,047,000	80,047,000	80,047,000	80,047,000
	Cost to implement measure on suitable networks in GB (£)	25,278,000	20,222,400	37,074,400	49,432,533
	GB saved budget due to deferred reinforcement (£)	54,769,000	59,824,600	42,972,600	30,614,467

LEDs

Lighting is responsible for 11.5% domestic consumption (19% at evening peak). For a typical household, this demand is driven by 14 light bulbs, each with the power of 60 Watts. Our base case is assuming incandescent lighting and this is due to the slow transition to efficient fittings. There are still approximately 651million filament bulbs still in use in the UK (source: EST) and in any event LEDs are still a further 50% more efficient that CFLs. We therefore feel that this assumption is an honest estimate for our base case.

From our calculations the deployment of LEDs is a viable alternative for all scenarios bar HV minor works, where the number of customers and budget available do not make it financially viable.

Data-informed engagement

As discussed with the Expert Panel various projects, including the EON project in Sweden that utilised data to change customer behaviour, were reviewed. Taking an average result of a 11% overall reduction in demand and a 20% peak reduction we have used the conservative figure of 11% as the base for our calculations.

From our calculations the use of data-informed engagement is a viable alternative for all scenarios bar HV minor works and low cost HV major works, where the number of customers and budget available do not make it financially viable.

DNO price signals direct to customers plus data-informed engagement

Results of previous trials, such as the Customer Led Network Revolution, confirm that customers do react to price signals with reduction in the order of 8% on overall consumption and 14% on peak. The EON 100k project indicates larger reductions of 11% overall and 20% peak. A report by Sarah Darby, 2006, on the effectiveness of feedback on energy consumption suggested that even higher reductions could be achieved if we were to introduce dual interventions, therefore our baseline figure of 15% is seen as a very achievable figure for our assumptions and target.

Our calculations show that this measure is suitable for a localised deployment, as HV minor and HV major works.

Community Coaching

As part of SEPD's feasibility study, previous research has been reviewed and a number of discussions have been held with national interest bodies and research agencies regarding expected reductions, and as a result we expect 5-10% as a minimum reduction output for the SAVE project arising from typical interventions with up to 15% as a potential expectation.

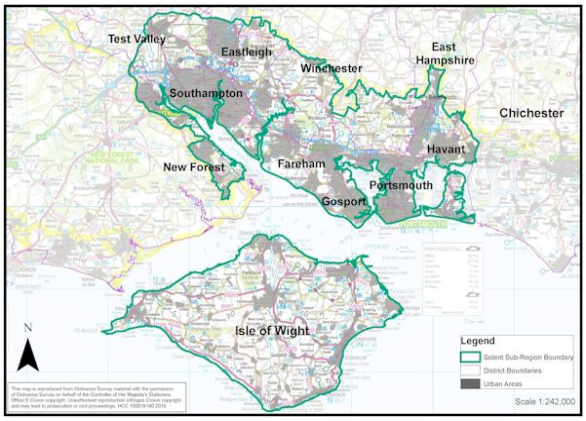
Calculations have shown that due to the costs being spread across communities, this measure is not suitable for LV works or low cost HV minor works, with the greatest benefits coming where there are higher costs and customer numbers involved.

Note

It is important to note that the scenarios do not take into account the disruption costs when conducting traditional reinforcement works (calculated to be between 20-40% of the capital cost) so the methods would likely achieve greater benefits and also work in more scenarios.

3.5 Why the Solent?

The Solent has become a key economic hub anchored around Portsmouth, Southampton and the Isle of Wight, with a population of more than 1.3million and over 50,000 businesses. The Solent region is diverse in its population, infrastructure and socioeconomic types, and as such is representative of many of the areas found in the rest of GB, making it an ideal area to source trial participants.



3.6 In Summary:

The business case for the SAVE project can be summarised in five parts:

- Firstly, this project has the potential to reduce capital investment requirements for network operators consistent with the objectives of RIIO ED1 that will be beneficial to customers
- Secondly it will inform how stakeholder and customer engagement can support SSEPD's future business plans, notably in creating win-win, collaborative bottom-line solutions and allowing for more effective planned investment to develop local capacity
- Thirdly, facilitate the connection of more low carbon technologies, such as EVs and heat pumps, and subsequently develop a cost effective network model for use by SSEPD and the other GB DNOs
- Fourthly, working closer with stakeholders and communities will serve to explore and develop potential commercial and development solutions to sustain bottom line benefits to DNOs and other stakeholders
- Fifthly, the most challenging part of replacing distribution assets is at the low voltage level. The replacement value for the renewal of these assets, in SEPD and SHEPD's (Scottish Hydro Electric Power Distribution) license areas would be in the region of £3 billion. Therefore we urgently need to consider such measures as the SAVE project proposes and failure to take action now would result in major disruption and costs to the DNO's, stakeholders and customers

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Section 4: Evaluation Criteria

This section should be between 8 and 10 pages.

(a) Accelerates the development of a low carbon energy sector & has the potential to deliver net financial benefits to future and/or existing Customers

The Carbon Plan states that in order to meet government targets by 2050 all buildings will need to have an emissions footprint of close to zero and will need to become better insulated, use more energy-efficient products and obtain their heating from low carbon sources. In addition to being better insulated, the Carbon Plan states that buildings will need to make use of Smart Meters and heating controls, more efficient lighting and appliances and reduce their demand for energy. In this project SEPD will very actively facilitate these aspects of the Carbon Plan in a manner that produces direct network benefits and financial benefits to customers. The project has the potential to deliver net financial benefits to customers as local customers who adopt energy efficiency measures will save through reduced bills, whilst customers across the relevant network licence area would save through reduced DUoS charges if reinforcement costs are successfully reduced.

This project will work with the local stakeholders and will demonstrate the role a DNO can take in systematically and focussed encouraging uptake of energy efficient products and influencing behaviour. It will also show how residential buildings can be both the cause and the solution for DNOs. By evaluating and quantifying the benefits of energy efficiency measures to DNOs, the project will deliver a framework for the industry to contribute to the implementation of the Carbon Plan.

DECC believes there is significant potential for greater electrical efficiency in the UK – up to 32 terawatt hours or around 9% of total demand in 2030. In Government Response to the Consultation on options to reduce electricity demand, DECC calculated that a 9% reduction in overall demand could deliver, in 2030:

- Savings of around £2.3 billion
- Emissions' cuts in the traded sector by 3.2 mega tonnes (equivalent to the amount produced from electricity use of around 1.8 million households in a year)
- Electricity savings equivalent to that generated by around four power stations in a year

The SAVE project will provide SEPD with an opportunity to examine the role a DNO can play in facilitating theses savings as a by-product of managing peak loads on the network.

Project participants such as Future Solent and the University of Southampton are already deeply engaged in facilitating the development of a low carbon energy sector through their own work. By participating in this project they will further demonstrate how collaborative working with electricity networks can enhance this development. Examples of these include the University of Southampton's £6.2 million project on "Liveable Cities" which aim to quantify the UK's legally required emissions in cities by 2050, by assessing resources flows for cities (encompassing buildings, transport, etc.) economics, acceptability and the impact on the current energy supply. These studies currently target Southampton, Portsmouth and Solent LEP with direct involvement by Local Authorities through the investigation and monitoring of their building stock and opportunities for energy efficiency and local CHP generation. Partner Local Authorities have plans for ECO/Green Deal schemes of around £100 Million investments in the sub-region over the next 3 - 5 years, targeting energy efficiency measures and their impacts on supply and emissions in the region.

Low Carbon Networks Fund
Full Submission Pro-forma
Evaluation Criteria continued

The green economy is emerging out of the need to meet international and domestic carbon targets. In order to meet the ambitious government target of an 80% reduction in CO2 emissions by 2050, many areas of the UK economy will experience growth opportunities in the green economy. Energy efficiency can create jobs in the Solent and by creating visibility of the impact of energy efficiency measures on DNOs, the SAVE project will assist in this growth. The South Hampshire region has a workforce of 434,500 and already 11,000 of these workers are employed in the green economy in businesses trading in both environmental technology and services. The Community Energy Coach trial offers a jobs creation model for the smart energy sector. The SAVE project will provide valuable learning on the cost of such an approach and the impact on the distribution network which could lead to a cost/benefit analysis of a national Community Energy Coach programme.

The trials will focus on how buildings can be the solution enabling both base load and peak load reduction, focusing on the approach a DNO could utilise to reduce both in the required time to avoid a defined level of investment. This approach will lead to benefits for both the DNO and its customers. Ofgem has been calculated that a 5% reduction in energy use at peak will result in energy market cost reductions of £219m per annum, some of which would benefit to customers in the form of lower energy bills. At the same time the same 5% reduction at peak will result in infrastructure cost savings of between £143m and £275m. This directly correlates to savings for the customer. These benefits could also be passed on to customers through lower socialisation costs of network reinforcement. However, we anticipate that through the projects highlighted above, enhanced reduction can be achieved that will allow the DNO to validate further its business and infrastructure investment models.

The Energy Saving Trust estimates that lighting makes up roughly 8% of a household energy cost. The SAVE project will examine how effectively DNOs can encourage the uptake of LED lighting to reduce this percentage. The findings from the SAVE project can feed in to DECC to examine if there could be a role for DNOs in future schemes that drives the uptake of both energy efficiency measures and behaviours.
Extensive reviews of Smart Meter and Smart Grid projects globally has found clear evidence that technology alone does not produce the most consistent, sustainable route to permanent energy efficiency but that a combination of technology and customer engagement has proven successful. SEPD is very keen to understand what approach will lead to be most significant load reduction at the lowest cost and it is with this in mind that the trials have been designed.

(b) Provides value for money to distribution Customers

This project will demonstrate how DNOs can use energy efficiency measures to address future network planning challenges and the technical and commercial arrangements available to select the optimum means to meet new demands. Real experience of Energy Efficiency will be gained through the trials resulting in the production of a Network Investment Tool that will enable DNOs to accurately select the most cost efficient methodology for managing a particular network constraint which is most effective for its connected customer types.

The project will generate directly related measurable changes in the operation of the Distribution System including:

- deployable list of energy efficiency measures
- cost modelling and business cases for deployment of these different measures
- customer profiling - will leverage existing LCNF project learning
- support from the Energy Suppliers

This project will highlight potential barriers and also propose changes to existing operational documents, e.g. the Distribution Code of Practice and Planning Manual. This would change the way all GB distribution networks are planned and operated.

The Network Investment Tool will reduce utilisation of the low voltage network, allowing for an increased headroom which could allow further load to be added. This would improve utilisation by facilitating new connections or uptake of low carbon technologies such as EVs and heat pumps.

To enhance value for money we plan to undertake an open and competitive procurement process for the supply and roll out of LED lighting to the properties that will form the LED installation group, as well as the trial survey and recruitment work as advised by UoS.
A competitive procurement process has not been undertaken for the other partners as it is felt that their offerings (such as Maingate), in-kind contributions and UK and international experience negate the need to tender for the services or items they will provide.

A great deal of thought has been given to how to construct this project in the most cost effective manner. The focus of the project is determining the most cost effective manner to achieve DNO-led energy efficiency and therefore the project approach has to be cost effective. SEPD approached the University of Winchester School of Media and Film instead of a media agency to develop cost effective engagement material for the customer engagement campaigns to deliver value for money for distribution customers. The DNO also recognised that the act of involving hundreds of student in making the engagement material is in itself a form of DNO engagement deepening the value for money. The university is already focused on energy efficiency and has recently added to its building stock with award winning energy efficient buildings. SEPD anticipates that their involvement in the project will lead to establishment of relationships on an on going basis in the BAU business.

(c) Generates knowledge that can be shared amongst all DNOs

The University of Southampton has provided insight into the ideal size of trial group sizes to be recruited to ensure that the project will generate results that are statistically significant to ensure that the learning from this project can be shared amongst all DNOs. The rate of receptiveness and uptake forms a useful part of the project learning. In designing this project SEPD has learnt from previous LCNF projects and the challenges faced by those projects in recruiting customers to trials. Sufficient time will be allocated and a professional MRS-accredited agency will be utilised for the customer recruitment approach with trials only commencing in the second year. This approach has been designed to ensure that the learning from the project will be valid to all DNOs.

The project will provide new knowledge on the effectiveness and relative value of energy efficiency measures for DNOs. We have identified a range of knowledge gaps which need to be addressed in order for DNOs to understand and exploit the potential benefits of the methods which will be trialled:

- What engagement approaches are available to DNOs to facilitate uptake of energy efficiency measures by domestic customers?
- What do a DNO led energy efficiency campaigns look like and how can they be run successfully?
- What are the most cost effective energy efficiency measures for DNOs?
- How enduring are the impacts of each measure and what costs if any are associated with sustaining the impacts?
- What is the value of local stakeholder engagement to DNOs in developing/using energy efficiency measures and how can it be used in the network investment tool?
- Can energy efficiency make an effective and economic contribution to network management?
- What is the potential for peak demand reduction and overall demand reduction achieved through energy efficiency measures to off-set the need for traditional network reinforcement?
- What changes are required to industry governance and documentation to facilitate an energy efficiency modelling-based approach to network management?

Learning objectives will be refined during the early stages of the project to take account of the most recent knowledge available and insights from stakeholder consultation to understand groups' specific knowledge needs. This will ensure the project generates learning that is robust, relevant and timely. We will engage with existing LCNF projects and projects from outside the UK to ensure all learning is collected and extracted from the project. The knowledge will be shared via a professionally planned and managed learning and communication strategy which includes dissemination via a range of media (online resources, publications, conferences, seminars and mentoring). Whilst aimed at DNOs, the dissemination of knowledge will be helpful to customers, energy suppliers and policy makers/regulators. It will also have cross-sector relevance – for example, gas distribution network licensees are also likely to be interested in learning about how a network operator can engage with its customers and promote energy efficient behaviour change. .

(d) Involvement of other partners and external funding

Project Partners

Our partners were chosen for a number of reasons including their knowledge and expertise in energy efficiency measures, Customer Engagement, Sustainability Credentials and their passion for thinking for new and innovative solutions.

During the time period between the 2013 ISP result and making our full submission we have held a series of workshops and reviews with our potential partners and product suppliers. As a result of these workshops we have re-focused some of the project and our partners' roles and responsibilities.

As per our previous LCNF projects we are encouraging a different approach with partners and product suppliers, each have chosen because of their experience in particular areas such as the energy efficiency not only in the UK but across the world where energy efficiency is already being used by Network Operators. The SAVE project partners have worked with us all through the Initial Screening Process and now through to the main bid submission. The experience they bring to the project will be critical, we believe, to the

success of the SAVE project and successfully tackling future low carbon challenges.
The main project collaborators and their roles are detailed below, more information can be found in the Partner Information section in Appendix O. 'Gross costs' refers to the total costs expected to be incurred by each partner during the project, 'Contribution' is the portion of these costs the partner will cover from their own resources:

DNV KEMA (Gross costs £X; Contribution £X) - will be responsible for management and evaluation of the trials (Methods 1-3) and campaigns, along with providing project assurance.

University of Southampton (Gross costs £X; Contribution £X) - will be responsible for designing and setting up the statistical valid samples groups in the Solent, statistical modelling, analysis and profiling of customer behaviours to produce the Customer Engagement model.

Maingate (Gross costs £X; Contribution £X) - will be responsible for providing a local centre for data, a system to aggregate data from across the project (customer, grid, buildings, renewables, etc); customer engagement and supply of smart home devices for households in Methods 1-3. Produce reports and extractions for both statistical analysis and operations.

Future Solent and the local Councils – will provide support and input into the development of the trials, access to stakeholders and assistance with learning dissemination.

Project Suppliers

- Neighbourhood Economics – will be responsible for supporting and developing the Community Coaching trial in the project (Method 5). Utilising their experience in the previous IFI project
- University of Winchester – will be responsible for supporting the project with energy efficiency campaign materials and techniques, UoW now being considered as a support to the business as usual stakeholder engagement in SEPD

Project supporters:

- SmartGridGB – support the project in a number of areas including customer engagement
- Partnership for Urban South Hampshire (PUSH)
- Hampshire Chamber of Commerce

During the project workshop discussions and following the Ofgem Expert Panel meetings we have decided to tender for the following activities within the project to enhance value for money:

- Supply and roll out of LED lighting to domestic customers
- The University of Southampton Customer Engagement work
- Substation monitoring for Community Coaching trial
- Developing the network model, working closely with the team at UoS and the

customer engagement model work

We also decided that to achieve a statistically valid sample of SMEs would not be practical in the timeframe and budget constraints of the SAVE project therefore we decided to drop this activity and look to do this work outside this project.

(e) Relevance and timing

We feel the time is now right to carry out a project to validate the effectiveness and value of energy efficiency measures as another tool available for DNOs to manage their networks in the future.

While it is expected that predicted fuel cost increases will mean that energy efficiency will start to drive itself, rate of uptake and the level of impact on electricity networks are still significant unknowns. It is therefore difficult to justify any avoided capital expenditure on the basis of expected energy efficiency savings during the RIIO-ED1 period. Understanding the results of real action on the ground to reduce consumption is required to enable GB to avoid the risk of in millions being spent reinforcing networks that could ultimately be made redundant. This project is needed to show the extent to which DNO actions to encourage adoption of energy efficiency measures in targeted areas can both accelerate energy efficiency and avoid significant network investment to the benefit of all stakeholders.

The timing of the project means that it will be possible during RIIO-ED1 for DNOs and Ofgem to gain an understanding of the potential for DNO-led energy efficiency measures to avoid the need for reinforcement, and the variation in impacts which could be expected in different areas according to customer types. It will also provide policy makers and regulators with understanding of what changes to the current regulatory and policy landscape may be required for wider roll out of these measures. This learning will be available by mid 2018, giving time for assimilation by relevant parties and further investigation of outstanding issues if required to inform incorporation into the early stages of planning for development of RIIO-ED2. For example, relevant working groups could use lessons from SAVE to consider introduction of an energy efficiency related incentive through RIIO-ED2 and inform an effective design.

The project will be able to draw upon and complement the existing initiatives and successes of the local stakeholders' activities to boost the uptake of energy efficiency measures. This approach will maximise the opportunities for SMEs to participate in the growing renewable and low carbon sector by opening up supply chain opportunities.

The project is conducting research at the right time when there is much anticipated change to how the network will operate, such as heat networks and heat pumps, CHP, electrification of rail, increase in rail freight, EVs, storage technologies, offshore wind and marine renewables. By understanding what role energy efficiency can play in supporting a reliable and flexible network, and delivering the actions that will realise that efficiency, then the DNO can in its own way support innovation by others to benefit customers.

Low Carbon Networks Fund
Full Submission Pro-forma
Section 5: Knowledge dissemination

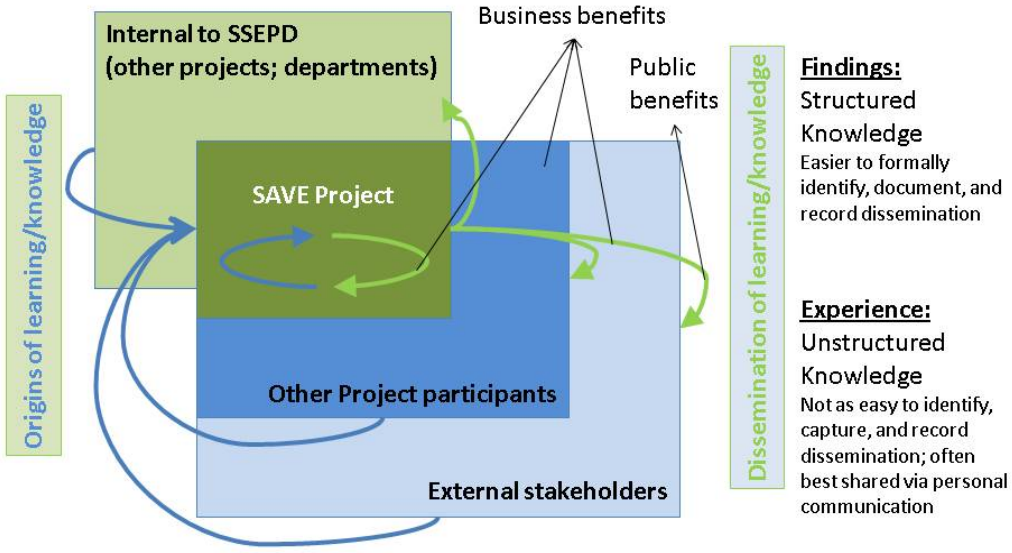
This section should be between 3 and 5 pages.

☐ Please cross the box if the Network Licensee does not intend to conform to the default IPR requirements.

5.1 Introduction

Effectively capturing and disseminating learning, both internally and externally, is a critical aspect of innovation projects undertaken by SEPD. In order to achieve this in innovation projects, we adopt clear learning objectives supported by established knowledge management principles and procedures, common to SSEPD.
Our approach builds on the approach used for previous LCNF projects and SEPD's own experience from past projects, including SSET203 New Thames Valley Vision (NTVV) and SSET205 I^2EV (My Electric Avenue), which has improved our understanding of how learning and/or knowledge is generated from DNO R&D projects and can be most effectively disseminated.

The diagram below provides an overview of the types and sources of knowledge which will be generated, used and shared through the project.



The project will recruit a dedicated Communications & Outputs Manager who will work with all partners to ensure structured and unstructured learning is identified, and appropriately documented. This is essential for effective dissemination and integration activities tailored to specific audiences, through channels appropriate for each audience. The Communications and Outputs Manager will facilitate:

- Learning dissemination: sharing the knowledge generated by the SAVE project as an ongoing project activity
- Integration activities: these activities are aimed at enabling the practical application of knowledge generated by the SAVE project by stakeholders, including customers, industry participants, academia, and DECC/Ofgem

Low Carbon Networks Fund
Full Submission Pro-forma
Knowledge dissemination continued

The following subsections describe our knowledge management and dissemination process in detail and identifies the detailed dissemination and integration activities we propose to undertake.

5.2 Formalising Learning Objectives for the SAVE project

The starting point is to formalise the project's anticipated key learning objectives to understand the structured knowledge the trials will generate and what is required to effectively capture, manage, and share the outputs.
The trials in the SAVE project are designed to provide insight into the cost effectiveness of a variety of measures that can be introduced by DNOs to encourage more energy efficient behaviour by customers. The trials will also generate learning on how different types of measures can be designed and implemented. Taken together, the outcome of the trials will be used to increase DNOs' – and energy supply chain stakeholders' - understanding of how energy efficiency measures can be used as an alternative to network reinforcements, as well as the costs and requirements associated with investing in different energy efficiency measures.

The learning objectives for the trials conducted in the project are:

- to gain insight into the drivers of energy efficient behavior for specific types of customers
- to identify the most effective channels to engage with different types of customers
- to gauge the effectiveness of different measures in eliciting energy efficient behaviour with customers
- to determine the merits of DNOs interacting with customers on energy efficiency measures as opposed to suppliers or other parties

5.3 Reapplication of experience

The project will build on previous research, incorporating learning from LCNF and global projects related to customer engagement, customer categorisation/demand profiling and price signals. Other projects have identified effective methods for engaging with customers, difficulties in customer recruitment, means of overcoming these difficulties, and the methods that are less effective at persuading customers to participate. This learning will form the basis for the project to avoid replicating the learning about methods of consumer engagement. Literature reviews plus stakeholder consultation are part of the early phase of the project.

The overall approach to incorporating learning will be:

- Conduct a literature review of relevant consumer engagement projects
- Identify consumer engagement aspects of LCNF projects
- Identify consumer engagement aspects of global projects
- Identify key people responsible for consumer engagement on these projects
- Set up meetings and conference calls with project personnel
- Design a project questionnaire to utilise in meetings to capture appropriate learning in a usable form

- Hold meetings and conference calls to capture learning
- Run a workshop with wide participation on consumer engagement trial design
- Produce draft trial designs based on collected learning
- Circulate draft trial designs to project personnel and marketing/consumer engagement professionals for comments
- Incorporate feedback in to project design
- Issue trial design document

This principle will ensure the SAVE project generates new learning; where necessary, learning objectives may be refined to ensure the project builds on current knowledge and does not replicate any emerging work. Please see Appendix S (Incorporating prior customer engagement learning) for further details.

5.4 Continual learning capture

Structured learning – tangible data or findings relating to the learning objectives above - will be generated by the trials. Project participants will dedicate resources to trial design, data monitoring, interpretation, refinement of trial design and reporting of findings. Unstructured learning including lessons learned and 'how to' knowledge will be captured through reflection on the process of project delivery. The project team will schedule and carry out lessons learned reviews at the end of defined activities and phases. Findings from lessons learned reviews will be validated by the Project Review Board and disseminated to relevant groups as set out below.
In addition regular SAVE project meetings will include a 'Learning Moment' dedicating time to identify recent learning, from the project and/or observation of external developments. A learning log will be maintained to capture lessons learned on an ad-hoc basis, including new insights from learning moments.

5.5 Targeted Dissemination & Integration Activities

We recognise that different groups will have different interests in the learning generated by SAVE and that dissemination is most effective when the messages and methods are tailored to the audiences' needs. For instance, while social media might be an effective way of reaching out to customers and the academic community, this would work less well for industry participants (DNOs, suppliers, Ofgem, DECC). Similarly, the type of publications and coverage provided will differ between customers, the academic community, and industry participants.
Our dissemination will focus on the following groups, using the methods outlined in the table below. Where appropriate, we will integrate our dissemination with established channels for sharing LCNF project learning to maximise efficiency and enable cross-project insight, such as the use of the ENA portal.

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Knowledge dissemination continued

Audience	Dissemination Activities			Integration Activities
Customers	SAVE website	General publications/magazines/ brochures/social media	Community events	
Industry participants	SAVE website/ periodic project reports/ENA portal	Industry publications/magazines	Conferences/ industry stakeholder events	Training materials/ workshops/ new commercial models
Academics	SAVE website/ periodic project reports	Academic publications/magazines/ social media	Conferences/ academic events	Course materials/ guest lectures/ Trial data for research
Ofgem	SAVE website/ periodic project reports/ENA portal	Industry publications/magazines	Conferences/ industry stakeholder events	Training materials/ workshops/ incentive mechanisms
DECC	SAVE website/ periodic project reports/ENA portal	Industry publications/magazines	Conferences/ industry stakeholder events	Training materials/ workshops/ policy advice

Customers
Knowledge dissemination will enable trial participants and other GB customers to learn about their own energy consumption patterns, their impacts on distribution networks and how they can benefit from energy efficiency measures (at individual and collective levels). Dissemination activities targeted towards the 'community energy' sector will also be undertaken – engaging with these groups will promote wider spread of learning via grassroots networks.

Industry participants - DNOs
DNOs' primary interest will be in the impacts of energy efficiency measures and the methods by which they can implement the most cost effective measures. The network and customer models, and the processes for their development will be shared via publication of knowledge outputs and activities to enable DNO staff to integrate learning into their business practices (see below for further details).

Industry participants – other stakeholders
This group includes energy suppliers and other groups involved in the energy supply chain and its management. In particular, findings on the feasibility and impacts of delivering new commercial models within existing regulatory frameworks will be of value to the industry. Requirements defined for wider roll out of the trial methods will be highly relevant to technology suppliers and service providers. It also includes groups representing customer interests.

Academics
Customer engagement with their energy usage, and willingness/ability to shift and reduce energy demand is an area of research currently attracting significant interest. Findings on response to different methods of engagement will be shared with academic audiences via conferences, workshop series, peer-reviewed outputs and training.

Knowledge dissemination continued

Ofgem and DECC
Findings from the project will provide valuable new knowledge to inform development and implementation of policy in relation to the role of energy efficiency and potential for demand reduction. Dissemination to these groups will focus on the impacts of the tools trialled and barriers/opportunities encountered in project delivery.

Events
In addition to dissemination via the annual LCNF conference, we will disseminate findings through relevant academic and industry conferences. Small, focussed workshop series targeted to academics and industry specialists have proved a useful means of knowledge exchange which builds networks across stakeholder groups and promotes ongoing dialogue. Participation in industry forums will also be used.

SAVE project website
An appropriate format for online dissemination will be selected based on review of available tools. The website will be used to publish interim knowledge outputs including training materials as they are developed and build up a library of resources.

Integration activities – training
We consider the practical training of industry participants a core part of the dissemination and integration plan. Effective training ensures that the audience will simultaneously gain an understanding of the learning achieved and how to apply it in practice – key to successful business as usual roll out of measures proved cost effective through the project. We will use outputs from our NTVV project's training development package of work to inform selection of training methods to embed SAVE project outputs.
For energy industry participants integration activities will focus on the preparation of manuals, training materials, workshops and advice related to the development of new commercial models. We plan similar activities for Ofgem and DECC, to explore the possibility of developing energy policy changes and a formalised incentive framework under RIIO-ED2 aimed at energy efficiency, DSR or DR activities for DNOs.
For the academic community, integration would focus on the development of course materials and on making trial data available for further research – this is a further way in which the project will provide value for money.

5.6 Intellectual Property Rights (IPR)

It should be noted that we do not anticipate that any formal intellectual property rights will be created as a result of the SAVE project and so no specific provisions have been made in that regard.

The knowledge and learning generated will be in the form of 'know-how' and results from trials. These types of outputs are not anticipated to be appropriate for protection via registration or licensing and we plan to share all outputs required for other stakeholders, particularly DNOs, to use the learning gained effectively, in line with the aims of the default IPR arrangements.

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Section 6: Project Readiness

This section should be between 5 and 8 pages.

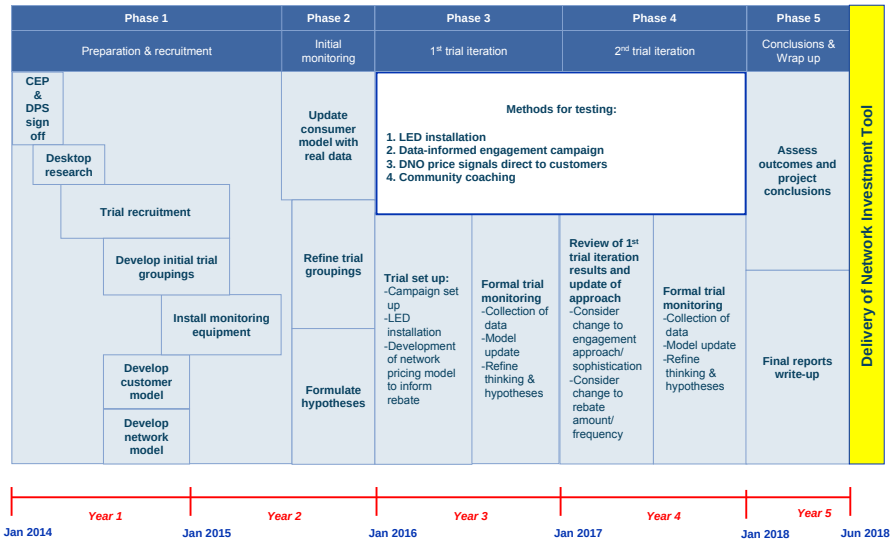
Requested level of protection require against cost over-runs (%):

Requested level of protection against Direct Benefits that they wish to apply for (%):

6.1 Readiness introduction

The SAVE project has come about as a result of discussions with numerous organisations over several years. More recently this has crystallised into the SAVE project as it is now defined. The project consists of a number of discrete elements carried out over the life of the project. These are illustrated in the diagram below and are shown in more detail in Appendix B. As can be seen from this overview of the project the key elements to undertaken at the start of the project are the development of the customer and network models and the recruitment of participants.

Appendix K Project phasing diagram



For the model development the initial work is a review of existing research to provide a sound basis for the design of the model and ensure this is a learning continuum by drawing on the vast international and UK experience of our project partners from previous trials. There are no barriers to this work starting immediately. The second element is the recruitment of participants for the trials. Given that this requires customer interaction the first part of this is the production of customer engagement plan and data security strategy to be provided to Ofgem for approval. At a high level the customer interactions are understood and so the plan can be produced without delay based on our understanding of this project and our knowledge of previous customer engagement plans provided for other LCNF projects.

Given the technology and installation process of the monitoring equipment being used in the project is already tried and tested, the start of the trials is seen as low risk allowing the start of activities to be planned with certainty.

6.2 Project Resources are Ready to Start

The development of the project to date has been led by an experienced, disciplined team experienced in LCNF projects working with the project partners in the preparation of the bid. The core expertise within this team will continue into the SAVE project execution bringing continuity and focus on the objectives of the SAVE project. Therefore the work will start immediately upon project award with little need for an initial set up period.
Following project approval, further appointments will be made to allow the team to move to delivery mode and all frameworks will be agreed and formalised with our partners. We will then proceed to deliver the project in line with the outline plan shown above and the detailed plan in Appendix B.

6.3 Project Partners are Ready to be Engaged

For the project partners Memoranda of Understandings (MoUs) and purchasing frameworks covering the activities within the SAVE project will be established before the start of the project. The procurement engagement is important to SEPD's bid as it facilitates work commencing without delay upon contract award.

SEPD will enter into Memoranda of Understanding with its key project partners (by 31st December 2013):

- University of Southampton
- Maingate
- Future Solent
- DNV KEMA

The Memoranda of Understanding and agreed framework agreement will provide information for the supply of products or services over a given time period. They are not in themselves contractual agreements to supply, but are enabling agreements providing agreed specifications, delivery terms, prices, and terms and conditions of contract. Framework agreements will be in place with all project partners upon contract award, allowing individual purchase orders to be placed against it under the agreed terms and conditions.

Although the framework agreements will not specify definite quantities of goods or services that will be ordered against it, indicative quantities will be provided before funding allocation. Framework agreements are normally used to set up general supply arrangements with a supplier (e.g. use of a supplier's catalogue), or to set up central supply arrangements for use by local operational areas.

The project suppliers will work with a combination of a framework contract and a call off contract, as appropriate. Each agreement that will be put in place will be backed by

individual work orders which formally outline the individual work packages, a process that supports the SAVE project.

6.4 The SAVE Project will be Controlled Using Existing Methodology

Management of the SAVE project will be conducted in accordance with SSEPD's Future Networks Programme Management Procedure (FNPMP) and its associated documentation, processes and templates. The manual has been based on the SSE Major Project Governance Framework Manual (MPGFM) which is in place to ensure the delivery of projects '…safely, on time and with the level of returns committed to...' and to assist in the delivery of £6.4bn of investment across the SSE Group over the period 2000-2013. The use of a tried and trusted methodology allows for an immediate start with confidence in the project management process.

A key element of the project governance is the development of a detailed project plan. The SAVE project is made up of a number of discrete elements brought together to provide the desired project outcomes. Each of these elements has been developed and planned with the people responsible for that part of the project, both from within SEPD and the project partners and the whole brought together by the core project team. This allows independence and some degree of flexibility of each element operating within the overall project framework. This supports both a prompt start and reduces the risk as the project progresses.

In developing the plan we have taken cognisance of learning from our and our partners' involvement in other LCNF Tier 2 projects, to provide a plan that is realistic and will ensure that a prompt start can be made once approval of the SAVE project by Ofgem has been confirmed.

6.5 How costs and benefits have been estimated

6.5.1 Project costs

Gross - £10,338k; less External funding - £694k; less DNO funding - £1,015k; leaves a net funding requirement- £8,293k

The project costs have been provided by our project partners following the agreement of the project approach, deliverables and work packages. We have made reference to available public source information, international comparisons, and academic input to ensure these are robust.

Below is a breakdown of the key components of the SAVE project (gross costs are pre-bid submission but are inclusive of benefit in-kind contributions from our project partners):

Work Package	Description	Cost
WP1	Project Management	£726,990
WP2	Customer Model Development, Data Analysis and Reporting	£1,163,540
WP3	Network Model Development	£452,290
WP4	Participant Recruitment, Trial Surveys, Field Trials and Trial Management	£1,336,470
WP5	Meter Data Gathering and Collation	£2,837,070
WP6	Knowledge Dissemination	£1,447,420
WP7	LED Trial	£378,070 (estimated tender value)
WP8	Smart Plug Trial	£22,350
WP9	DNO Rebate Trials	£662,920
WP10	Data-informed Engagement Trial	£554,760
WP11	Community Coaching Trial	£768,070

Total Cost of the Project is £10,338,430 (inc. Inflation)

6.5.2 How the Costs and estimates have been estimated

The costs per work package are shown below in more detail. The cost of each task has been budgeted by estimating the days for SEPD and the project partners' time and materials, travel and accommodation required. The costs are correct at the time of the bid submission however will continue to develop as the project develops. All costs are shown in more detail on the main costing sheet which can be seen on Appendix A.
All costs are in gross real terms.

A further breakdown of the main elements of costs per work package are shown below:

Project Management - (Lead - SEPD)
The costs for this work package includes all associated SEPD staff, including a full time Project Manager who will be supported by the South Delivery Manager.
The labour rate associated with these tasks is SEPD standard labour rate of £X per day.

Customer Model Development Data Analysis and Reporting - (Lead - University of Southampton)
The costs for this work package are all involved with building an interactive tool using appropriate statistical and analytical GIS tools. The main output of the UoS work will be to build a model which will allow interrogations of scenarios and undertake simulations.

Network Model Development - (Lead - party to be awarded by tender)
The costs for this work package are involved with building the network modelling tool for the project. It is anticipated that the tool will be similar to the UoS tool that it will be a interactive tool to allow various network scenarios and simulations to be run. This work will also be supported by existing network analysis by SEPD staff.
Participant Recruitment, Trial Surveys and Field Trials - (Lead – University of Southampton/ DNV KEMA – to be tendered)

The costs for this work package are involved with the recruitment of customers. This recruitment element of this work package will be tendered and will be coordinated by UoS. The bulk of costs in this work package are in the use of an independent experienced MRS Market Research company who will lead our customer recruitment and on-engagement programme. This work package also includes the management of the trial model by DNV KEMA.

Meter & Data Gathering, Collation, Central Data Repository - (Maingate, SEPD)
The costs for this work package include provision for the installation of equipment and support services to allow gathering of customer data. The equipment includesthe Data Hub and Optic Sensors, supplied and supported by Maingate. The costs include for the main data hub, optic sensors, installation of the smart plugs, delivery of equipment to the customer, on-going help desk and on the ground support for the installation and trial periods. This work will be supported by SEPD ICT and data staff.

Knowledge Dissemination - (SEPD)
The costs for this work package include provision for the various learning activities planned for the project. A major part of these costs are the funding of a SEPD member of staff to handle the outputs of the project and communication to all stakeholders. The workload associated with these tasks is ever increasing and as it so important to the development of the LCNF arena we will install a person to document and manage production of materials and activities required to disseminate the learning.

LED Trial - (SEPD – to be tendered)
This work package supports the main trials. Therefore the costs include provision for the specification of LED requirements, tendering for best solution and installing in trial zones.

Smart (monitoring) Plug Trial - (Maingate/ SEPD)
As above this work package supports the main trials. The costs includes provision for buying the equipment for the trials as the smart plugs will be installed with the main optic sensors to reduce the cost to the project.

Campaigns - Engagement and Interventions - (DNV KEMA)
The costs associated with this work package are involved with preparation, design, build and implement campaign materials to support the customer engagement and intervention trials. This work package will be managed by DNV KEMA who will be responsible for ensuring the campaigns are productive and add value to the other trials.

Community Coaching - (Neighbourhood Economics/ SEPD)
The costs for this work package include provision for evaluating the effect of a installing a community coach in the Solent area. The work includes for the initial evaluation of the Solent area for suitable study areas for the trial. The costs also include for installation of substation monitoring at appropriate locations within the Solent area. These tasks will be supported by Network Design support from SEPD.

In Kind Contributions
The costs to Maingate, University of Southampton and DNV KEMA were estimated by the respective companies. All partners have supplied a breakdown of costs and their in-kind contribution.

6.5.2 Direct project benefits
There are no Direct Benefits being claimed from the SAVE project.

6.5.3 Measures to reduce cost over-runs or direct benefit shortfalls

As stated above the SAVE project will be managed in accordance with SSEPD's Future Networks Programme Management Procedure, which has been based on the SSE Major Project Governance Framework Manual. The SSE MPGFM is a whole-lifecycle tool designed to ensure projects are governed, developed, approved and executed in a consistent and effective manner, with consideration of best practice in project delivery. As this project is utilising the procedure based on the SSE MGPFM it will ensure a rigour is employed to confirm the project is well controlled leading to a successful conclusion. Additionally the same successful management formulae used for the NTVV project will be extended to this project.

The governance framework is phased with three gates at appropriate decision points, with clear, consistent deliverables for each gate. Project governance rules are established and defined for each phase, with standard project organisational structures and key roles. As the SAVE project develops through the inception and opportunity assessment it is subjected to stage gate reviews. The initial reviews consider project readiness and the underlying needs case in order to allow the project to proceed, or if further re-working is required. Similarly, as the project enters the research and development and operate and evaluate stages the project will continue to be reviewed to assess the cost and completion of deliverables.

The governance framework requires increasing cost accuracy as projects pass stage gate reviews. The costing information used in this proposal represents the best available information from SEPD and our SAVE project partners at the time of the preparation of the bid. However uncertainties in the costs and benefits may prevail due to certain assumptions made:

- the number of iterations of each trial needed to provide robust results
- other external factors affecting the validity of customer engagement

Each of the detailed work packages has identified associated risks and developed mitigating actions to form the basis of the contingency plans. Risk management will be conducted under the auspices of the SSEPD FNPMP 'Project Risk Management Plan'.

Our project has been constructed as an integrated whole, and any scope changes (if required) by Ofgem prior to project award will require a period of re-planning and possible re-negotiation with collaborators/suppliers which would delay commencement, and hence completion.

6.6 Contingency Plan (see Appendix D – Project contingency plan)

The project risk register and supporting process is used to identify inherent risks, specific controls/mitigation and the resulting residual risk. Specific contingency plans will be developed to enhance and support the specific risk controls where the specific risks are expected to or have materialised.

The detailed work produced to support the bid preparation provides a significant degree of comfort on our cost and funding estimates as described below. However, there are still elements of the solution that are still to be tendered or subject to contract finalisation, and may be subject to variation from our assumptions (both up and down). We are comfortable to accept the 0% level of protection against cost overruns.

6.7 Verification of all information included in this proposal

Information in this proposal has been developed in conjunction with all project partners and has been subject to checks and analysis to ensure its validity.

Structure of bid: The approach to the SAVE project has been developed in conjunction with the project partners. The project consists of a number of individual elements each of which is the responsibility of an individual organisation which in turn is responsible for its design and will be responsible for its delivery. Together the project team and the partners have considered these and ensured that they are realistic in terms of delivery, they are appropriate to the project overall and that the project as a whole will deliver the desired outcomes.

Project costs: Cost and technology information has been developed directly by Project Partners. Project Partners are experts in their field and independent of each other and SEPD. The costs for each element have been compared with the knowledge and experience of similar activities to allow verification of costs as the project has been built up.

Project management and governance: Overall project rigour and review is in accordance with the SSEPD FNPMP which provides a whole-life cycle stage-gate review process and assess the project viability, delivery and safety with an independent steering group and review bodies. The FNPMP review process has been applied to verify this bid submission. The project plan has been developed following input from our project partners, to ensure the timescales are both achievable and robust.

Regulatory matters: The requirements for derogations in the SAVE project have been developed by SEPD and its consultants and have been discussed with Ofgem (see Section 7 for more detail).

Customer impacts: Developed by the project team with linkage to our project partners.

Successful Delivery Reward Criteria: This has been developed in conjunction with our

project plan to ensure the criteria put forward is SMART (see Section 9 for more detail).
Partner Support: To support our project readiness and provide an indication of the importance of the SAVE project we have attached a sample of the letters of support from our project partners (see Appendix P) and the full letters of support can be provided if required.

6.8 Delivery of Learning

A central part of the SAVE project is the delivery of a model that allows comparisons between different options for energy efficiency and energy savings. To this end the level of take up of a particular measure resulting from an intervention carried out as part of the project is a key finding that will be built into the model. From this perspective low take up itself provides valuable information that can be applied in the future to proposed DNO activities providing guidance on the likely impact of any particular intervention.

6.9 Process to identify when project should be suspended

Risk monitoring will be in accordance with the Future Networks Programme Management Procedure. Our risk monitoring procedures will be supported by the establishment of a Project Partner Review Board (PPRB) as supervised by the SSEPD Innovation Steering Board (ISB) for quality management purposes. An initial Project Risk Register (Appendix C) has been prepared and this will be maintained following the Bid Submission. Risk and issue identification will be the responsibility of all participants in the project. Changes and additional risks/issues will be managed by the Project Manager who is also responsible for identifying and agreeing mitigating actions and contingency plans with the next level of seniority. The register will be reviewed at the PPRB and risks categorised as 'high' (impact x likelihood) will be tabled at the ISB - unless a risk/issue warrant an exceptional meeting of the ISB - such as a significant cost over-run. In addition, the Future Networks Programme Management stage gate reviews give final assurance that the project purposes are being achieved, if corrective action is required and/or (in conjunction with Ofgem) the project should be terminated). The SEPD Project Manager will be responsible for preparing and holding the PPRB with project partners and key suppliers whilst the Project Management Office (PMO) will be responsible for preparing materials for the Innovation Steering Board, both normally held monthly.

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Section 7: Regulatory issues

This section should be between 1 and 3 pages.

☐ Please cross the box if the Project may require any derogations, consents or changes to the regulatory arrangements.

SEPD (under Method 3) will offer commercial incentives to encourage trial participants in the Solent region to shift / reduce their energy demand, based on distribution network requirements. The project will develop a network model to estimate the financial value of demand shift/reductions to the DNO, which will inform development of appropriate price signals to be passed to consumers.

The project will utilise direct ex-gratia payments or alternative rewards (e.g. retail vouchers, credit to a local community fund) for participation and specific electricity consumption behaviours whilst also theoretically investigating the feasibility of modifying Distribution Use of System (DUoS) charging to reward participants for energy efficient consumption i.e. more accurately reflect the costs incurred by the Distribution Business by the use of a beskpoke Time of Day (TOD) / Seasonal Time of Day (STOD) charge.

The trials will provide understanding of what sort of commercial mechanisms suit different customer types and customer behaviour in response to the mechanisms, and the necessary changes to the contractual framework or charging methodologies to implement the measures within existing frameworks and processes.

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Section 8: Customer impacts

This section should be between 2 and 4 pages.

8.1 Customer Engagement

The SAVE project will trial multiple methods of engaging with distribution network customers.

In the early months of the project a Customer Engagement Plan and Data Protection Strategy will be finalised after a review of best practice in customer engagement for smart meters and smart grids, drawing on global experiences. The approach for all trials will be written up in to a comprehensive document which will be provided to Ofgem for review before any customers are contacted.

At this stage we anticipate that the approach will commence with methods for recruiting customers on to trials. Southampton University will identify characteristics for trial participants and a trial recruitment professional will use this information to recruit the appropriate sample groups in order to ensure the project is statistically rigorous. By agreeing to participate these customers will agree to have their electricity consumption monitored by the project.

Once the appropriate sample has been recruited and monitoring equipment installed there will be a period of no engagement to collect baseline data. This data will help to feed in to detailed engagement approaches since an understanding of current consumption behaviour is a vital starting point for engagement.

Of the 4000 sample set, 1000 will remain as a control group and will not receive any further engagement. The remaining 3000 participants will be recruited on to the three trials:

1. LED installation
2. Data-informed engagement campaign
3. DNO price signals direct to customers plus data-informed engagement

Each group will receive initial engagement to enable the specific trial recruitment. This will be in the form of postcards inviting participants to join the trials, followed up with emails, phone calls and face-to-face meetings. Targeted film clips explaining the trials and what is expected of participants will be shared with participants. These clips will also be available on the project website and the Facebook project page. Once they commence the Data-informed trial and DNO price signals direct to customers trial will receive continuous engagement from multiple channels such as email, text messages, Facebook and postcards and flyers.

At the end of the first trial phase, a survey will be undertaken to gain greater understanding of what engagement techniques were perceived as effective. This will be compared to results from the trials to verify if electricity usage patterns did indeed change following the different engagement methods. This data will be fed in to the second trial iteration to tweak the engagement campaign.

The creation of sustainable behaviour change as a result of proactive customer engagement is the principle of the third method being tested in the project via the Community Coach trial. Whilst this will draw upon a range of communications mediums, further proactive

engagement will be realised thanks to Neighbourhood Economics and the outcomes of their feasibility study on behalf SEPD.

The solution recommended by Neighbourhood Economics as a result of the Feasibility Study is the Community Energy Coaching Programme- an initiative which will embed a Community Energy Coach in a community to work with a range of key stakeholders on a broad agenda to test and assess the potential to achieve energy reductions through sustainable behaviour change and complementary demand reduction initiatives.

The Community Energy Coach will be embedded within the area, working from within a local host organisation to facilitate change and empower each community to deliver and sustain its own demand reduction.

An examination of prior engagement campaigns will be carried out to ensure lessons learned elsewhere are taken on and used as building blocks to design the engagement process. This will take in to account work on previous LCNF projects such as CLNR and Low Carbon London and contact will be made with Northern Powergrid and UK Power Networks to gain insights in to their approach and findings. Projects that have been carried out globally such as the Solar City project in Perth, Australia and the Smart Hours project currently being carried out by Oklahoma Gas & Electric in the US will be reviewed extensively so the SAVE project can learn from their successes and challenges before commencing engagement.

In order to best engage customers the project will draw upon existing initiatives, projects and learning. These include:

- existing Future Solent and University of Southampton low carbon initiatives;
- learning, funding, skills and experience from the Universities of Southampton and Winchester's existing projects
- price signal expertise of SEPD
- working closely with local Councils, local generation and low carbon initiative groups
- customers - we will be engaging with a wide range of customers in the study zones where we propose to install and trial a variety of technologies and equipment

8.2 The Solent Area

The electricity network in the Solent area is typical of many urban and suburban areas in the UK: it serves a diverse mix of industrial, commercial, small business, residential and economic development along with a range of housing types including pockets of severe deprivation (see Appendix I).

A key part of the project is the engagement of domestic customers. As a result the project will organise a programme of campaigns and customer engagement events in the early stages where we (as a DNO) will speak directly to customers in the Solent.

Our vision in the Solent is to leave a legacy of a closer relationship between the DNO and customers, building on Ofgem's philosophy that DNOs should once again be speaking with customers.

8.3 Working with Communities

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Full Submission Pro-forma
Customer impacts continued

The engagement with customers and communities is vital to the success of our project and achieving effective demand reduction as a result of active participation. The SAVE project will address the challenge of raising the DNOs profile with customers and within communities. The project will also help to communicate with and educate customers on the low-carbon solutions and smart grid initiatives in a bid to achieve mutual benefits, such as reducing network peaks whilst saving customers money on their energy bill.

8.4 The SAVE Project Implementation

The project has been designed to maximise our positive interaction with customers whilst minimising any potential negative impacts from the trials.

8.5 Interruptions / Quality of Supply

A key part of the trials is the installation of sensors either in the houses, buildings or in the distribution substations. The monitoring will be via non-invasive optic counting sensors (which handle digital and mechanical signals) and non-invasive substation monitoring equipment now being utilised in numerous LCNF projects. Therefore we do not anticipate any supply interruption for the customers.

Any unplanned interruptions will be managed in accordance with SSEPD's standard procedures.

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Section 9: Successful Delivery Reward Criteria

This section should be between 2 and 5 pages.

No.	SDRC	Sub-SDRC	Evidence	Date
1	Review learning from other projects	Produce report on UK and international efficiency project findings and the impact on the SAVE project, including recommendations and key suggestions to improve the project design and implementation	Present findings in the form of a written report to Ofgem	Jun-2014
2	Create customer model	2.1 Create initial customer model	Produce report and present to Ofgem	Dec-2014
		2.2 Revise customer model	Produce updated report and present to Ofgem	Dec-2016
		2.3 Finalise customer model	Host a demonstration of finalised customer model and produce final report	Jun-2018
3	Improve customer engagement	3.1 Create Customer Engagement Plan	Submit Customer Engagement Plan to Ofgem	Feb-2014
		3.2 Hold open days supported by online/paper information to share progress, experiences and next steps with customers involved in trials on a six monthly basis	Produce report summarising objectives and outcomes of open days	Jan-2017
4	Create commercial energy efficiency measures	Establish the pricing model and processes for passing DNO price signals direct to customers	Prepare and present report on findings of exercise	Jun-2016

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Successful Delivery Reward Criteria continued

5	Identify control and trial sample groups	Select the customers required for each group in the project, ensuring that they represent a cross-section of the population to allow extrapolation of results	Present findings and method of selection in report	Jun-2015
6	Install 80% of optic sensors and smart meters	Successfully install 80% of the optic sensors and smart meters within the properties of customers successfully recruited to trials, ensuring ability to retrieve data from both	Produce report detailing installation figures and indication of communications capability	Jun-2015
7	Create Network Investment Tool	7.1 Create initial network model and parameters for tool	Produce report and present to Ofgem	Dec-2014
		7.2 Revise model and tool	Produce updated report and present to Ofgem	Dec-2016
		7.3 Finalise tool	Host a workshop demonstrating tool and produce final report	Jun-2018
8	Close down reports	8.1 Project close-down report	Produce report and present to Ofgem	Jun-2018
		8.2 Network investment tool key outcomes report (including comparison of trial method impacts)	Produce report and present to Ofgem	Jun-2018
		8.3 LED trial report	Produce report and present to Ofgem	Jun-2018
		8.4 DNO price signals direct to customers trial report	Produce report and present to Ofgem	Jun-2018
		8.5 Network pricing model report	Produce report and present to Ofgem	Jun-2018
		8.6 Customer and network modelling report	Produce report and present to Ofgem	Jun-2018
		8.7 Data-informed engagement trial report	Produce report and present to Ofgem	Jun-2018
		8.8 Community coaching trial report	Produce report and present to Ofgem	Jun-2018
		8.9 Project progress reports	Produce reports on a six monthly basis and present to Ofgem	From Jun-2014

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Section 10: List of Appendices

Appendix A Financial spreadsheet

Appendix B Project Plan

Appendix C Project Risk Register

Appendix D Project Contingency Plan

Appendix E Organogram & Roles and Responsibilities

Appendix F Diagram of trial summary

Appendix G SAVE model

Appendix H Network Modelling and Investment Tool

Appendix I University of Southampton paper

Appendix J High-level project concept diagram

Appendix K Project phasing diagram

Appendix L Maingate proposal

Appendix M Community Coaching manual

Appendix N Benefits Case

Appendix O Partner information

Appendix P Sample of letters of support from partners

Appendix Q UoS track record and role in the project

Appendix R Structured Methodology

Appendix S Incorporating prior customer engagement learning

LCN Fund Second Tier Full Submission Spreadsheet

(version 2.0)

Appendix A

DNO Name: **Southern Electric Power Distribution**

Submission Date: **14/10/2013**

Input cells
Totals cells (of formula within worksheet)
Referencing to other worksheets
Check cells
No Input
Descriptions and pack data
Ofgem Input cells

Second Tier Funding Request

		2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	Total
Total Project Cost	From Project Cost Summary sheet							
	Labour	176.42	425.18	496.98	554.77	559.76	232.77	2,445.88
	Equipment	-	526.83	132.45	-	1.12	-	660.40
	Contractors	119.14	1,242.20	1,291.24	965.81	1,164.16	401.10	5,183.64
	IT	-	446.12	256.35	163.13	28.05	-	893.65
	IPR Costs	-	-	-	-	-	-	-
	Travel & Expenses	5.60	5.89	3.74	4.38	4.49	2.30	26.40
	Payments to users & Contigency	-	206.60	-	109.48	112.22	-	428.30
	Decommissioning	-	-	5.87	6.02	73.50	172.54	257.94
	Other	20.92	43.23	112.21	94.48	171.38	-	442.22
	Total	322.08	2,896.05	2,298.84	1,898.07	2,114.69	808.70	10,338.43
External funding	Any funding that will be received from Project Partners and/or External Funders - from Project Cost Summary sheet							
	Labour	-	-	-	-	-	-	-
	Equipment	-	84.29	22.22	-	-	-	106.51
	Contractors	6.08	119.96	74.70	96.97	118.68	31.52	447.91
	IT	-	67.25	45.93	27.15	-	-	140.33
	IPR Costs	-	-	-	-	-	-	-
	Travel & Expenses	-	-	-	-	-	-	-
	Payments to users & Contigency	-	-	-	-	-	-	-
	Decommissioning	-	-	-	-	-	-	-
	Other	-	-	-	-	-	-	-
	Total	6.08	271.50	142.85	124.13	118.68	31.52	694.75
DNO extra contribution	Any funding from the DNO which is in excess of the DNO Compulsory Contribution - from Project Cost Summary sheet							
	Labour	-	-	-	-	-	-	-
	Equipment	-	-	-	-	-	-	-
	Contractors	-	-	-	-	-	-	-
	IT	-	-	-	-	-	-	-
	IPR Costs	-	-	-	-	-	-	-
	Travel & Expenses	-	-	-	-	-	-	-
	Payments to users & Contigency	-	-	-	-	-	-	-
	Decommissioning	-	-	-	-	-	-	-
	Other	-	-	-	-	-	-	-
	Total	-	-	-	-	-		-
Initial Net Funding Required	calculated from the tables above							
	Labour	176.42	425.18	496.98	554.77	559.76	232.77	2,445.88
	Equipment	-	442.54	110.23	-	1.12	-	553.89
	Contractors	113.07	1,122.24	1,216.54	868.84	1,045.48	369.57	4,735.73
	IT	-	378.87	210.42	135.98	28.05	-	753.32
	IPR Costs	-	-	-	-	-	-	-
	Travel & Expenses	5.60	5.89	3.74	4.38	4.49	2.30	26.40
	Payments to users & Contigency	-	206.60	-	109.48	112.22	-	428.30
	Decommissioning	-	-	5.87	6.02	73.50	172.54	257.94
	Other	20.92	43.23	112.21	94.48	171.38	-	442.22
	Total	316.01	2,624.55	2,156.00	1,773.95	1,996.00	777.18	9,643.68
Direct Benefit	from Direct Benefits sheet							
	Total	-	-	-	-	-	-	-
DNO Compulsory Contribution / Direct Benefits	from Project Cost Summary sheet							
	Labour	17.64	42.52	49.70	55.48	55.98	23.28	244.59
	Equipment	-	52.68	13.24	-	0.11	-	66.04
	Contractors	11.91	119.72	124.32	92.08	111.92	40.11	500.06
	IT	-	44.61	25.63	16.31	2.81	-	89.36
	IPR Costs	-	-	-	-	-	-	-
	Travel & Expenses	0.56	0.59	0.37	0.44	0.45	0.23	2.64
	Payments to users & Contigency	-	20.66	-	10.95	11.22	-	42.83
	Decommissioning	-	-	0.59	0.60	7.35	17.25	25.79
	Other	2.09	4.32	11.22	9.45	17.14	-	44.22
	Total	32.21	285.10	225.08	185.31	206.97	80.87	1,015.54
Outstanding Funding required	calculated from the tables above							
	Labour	158.78	382.67	447.28	499.29	503.78	209.49	2,201.29
	Equipment	-	389.85	96.99	-	1.01	-	487.85
	Contractors	101.15	1,002.52	1,092.22	776.75	933.56	329.46	4,235.67
	IT	-	334.26	184.79	119.66	25.25	-	663.96
	IPR Costs	-	-	-	-	-	-	-
	Travel & Expenses	5.04	5.30	3.36	3.94	4.04	2.07	23.76
	Payments to users & Contigency	-	185.94	-	98.53	101.00	-	385.47
	Decommissioning	-	-	5.29	5.42	66.15	155.28	232.14
	Other	18.83	38.91	100.99	85.03	154.24	-	398.00
	Total	283.80	2,339.45	1,930.92	1,588.64	1,789.03	696.31	8,628.15
balance	8,293.40		5,670.15	3,878.87	2,385.72	659.33	(6.53)	8,293.40
interest		0.00	139.64	95.49	62.65	30.45	6.53	334.75
								8,628.15

Check Total = to Initial Net Funding request in Project Cost Summary — **OK**

of Total Initial Net Funding Required — **OK**

Check that **Total** is = or > than Total Direct Benefits — **OK**

Check that Total is =to Total Outstanding Funding required — **OK**

click this button to calculate the Second Tier Funding Request

Bank of England interest rate: 0.5%

interest rate used in calculation: 2.0%

SECOND TIER FUNDING REQUEST £ **8,293.40**

RPI adjustment	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/2021	2022/2023
Index	252.02	260.33	269.12	275.85	282.74	289.81	297.06	304.48	312.09
Annual inflation	3.00%	3.30%	3.40%	2.50%	2.50%	2.50%	2.50%	2.50%	2.50%

n.b the Second Tier Funding Request calculation should use the Bank of England Base rate plus 1.5% on 31 June of the year in which the Full Submission is made.

1.033	1.034	1.025	1.025	1.025	1.025	1.025	1.025	
1.033	1.068122	1.09482505	1.122195676	1.150250568	1.179006832	1.208482003	1.238694	

Direct Benefits

Direct Benefit: Any benefits of the Project accruing to the DNO during the Project Implementation and include the following

- Revenue included in the DNO's Full Business Plan Questionnaire (FBPQ) for DPCR5 which will be saved through undertaking the project
- Incentive payments generated as a result of the Project for the duration of the Project

Description of Direct Benefit	2013/14	2014/15	Total
N/A			-
			-
Total Direct Benefits	**-**	**-**	**-**

n.b. These are Direct Benefits associated with the Project itself, not the wider deployment of the Solution and therefore should not exceed beyond the project or the DPCR5 period

Cost Category	Cost	
Labour		
	2201.29	
Equipment		
	487.85	
Contractors		
	4235.67	
IT		
	663.96	
IPR Costs		
	0.00	
Travel & Expenses		
	23.76	
Payments to users		
	385.47	
Contigency		
	0.00	
Decommissioning		
	232.14	
Other		
	398.00	Check that = to Total Outstanding Funding Required
Total	**8,628.15**	**OK**

Net Benefits

DNOs can provide notes alongside costing in order to aid understanding of why these costs are required. This should be supplemented by a fuller qualitative account of the Base Case method and Method in the appendices.

Method 1 - LEDs

Benefits from introducing LED lighting, DNO Rebates, Data Informed Campaigns and Community Coaching interventions

(a)

Base Case costs	
Description of cost	**Cost (£)**
Cost of LV major works with transformer (£)	£250,000
Total	£250,000

This example includes for one scenario - a "typical Major Low Voltage with Average Cost" (cost includes for new Transformer and associated HV and LV cabling)

The Costs of the associated works are taken from Ofgem's Workstream 3 model

(b)

Method costs	
Description of cost	**Cost (£'m)**
Installation of the LEDs	£60,000
Total	£60,000

For the full range of scenarios please refer to Appendix N
Appendix N includes for a number of scenarios including:
Part One. Headroom Scenarios
Part Two - Urban reinforcement scenarios LV Minor, LV Maior and HV Minor scenarios includina a ranae of costs Low. Averaae and Hiah
Part Three - Rural reinforcement scenarios LV Minor, LV Average and HV Minor scenarios including a range of costs Low, Average and High
Part Four - Estimated Costs of EE Measures - including breakdown of costs of each measure and our assumptions
Part Five - Scenarios using real networks - four real projects and the effect of each EE interventions

Net financial benefit	**£190,000**

(c)

Capacity released (kW)	73	kW

The capacity released is equivalent to connect 24 EVs or Heat Pumps.

(d)

Base Case time (months)	24

The total number of sites has been obtained from the OFGEM report "Assessing the effects of Low Carbon Technologies on the Networks
For this scenario we have taken the "GB LV major works expected to be undertaken" figure of 4217 and split it across 20years.

(e)

Method time (months)	6

As above for the ful range of scenarios - see Appendix N

(f)

Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Total sites where method replicated	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	0	0	0	0	0	0	0

Method 2 - Data informed engagement

(a)

Capacity released (kW)	76	kW

The capacity released is equivalent to connect 25 EVs or Heat Pumps.

(b)

Base Case time (months)	24

(c)

Method time (months)	6

(d)

Base Case costs	
Description of cost	**Cost (£)**
Cost of LV major works with transformer (£)	£250,000
Total	£250,000

Summary for this Scenario:

	Method 1	Method 2	Method 3	Method 4
Saved budget due to deferred reinforcement (£)	£190,000	£202,000	£162,000	£132,667
GB saved budget due to deferred reinforcement (£)	£80,047,000	£85,102,600	£68,250,600	£55,892,467

For full range of scenarios please refer to Appendix N

(e)

Method costs	
Description of cost	**Cost (£)**
Design, Implement and Manage the Campaign	£48,000
Total	£48,000

We anticipate that the SAVE project will validate our assumptions and results.
The final network investment model will consider the additional parameters such as types of customers, customer behaivour changes, demand profiles and the sustainability of each method.

Net financial benefit	**£202,000**

(f)

Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Total sites where method replicated	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	0	0	0	0	0	0	0

Method 3 - DNO rebates

(a)

Capacity released (kW)	102	kW

The capacity released is equivalent to connect 35 EVs or Heat Pumps.

(b)

Base Case time (months)	24

(c)

Method time (months)	6

(d)

Base Case costs	
Description of cost	**Cost (£)**
Cost of LV major works with transformer (£)	£250,000
Total	£250,000

(e)

Method costs	
Description of cost	**Cost (£)**
Design, Implement and Management the Rebates	£88,000
Total	£88,000

Net financial benefit	**£162,000**

(f)

Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Total sites where method replicated	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	0	0	0	0	0	0	0

Method 4 - Community Coaching

(a)

Capacity released (kW)	102	

The capacity released is equivalent to connect 35 EVs or Heat Pumps.

(b)

Base Case time (months)	24

(c)

Method time (months)	12

(d)

Base Case costs	
Description of cost	**Cost (£)**
Cost of LV major works with transformer (£)	£250,000
Total	£250,000

(e)

Method costs	
Description of cost	**Cost (£)**
Implement Staekholder Engagement Operation	£117,333
Total	£117,333

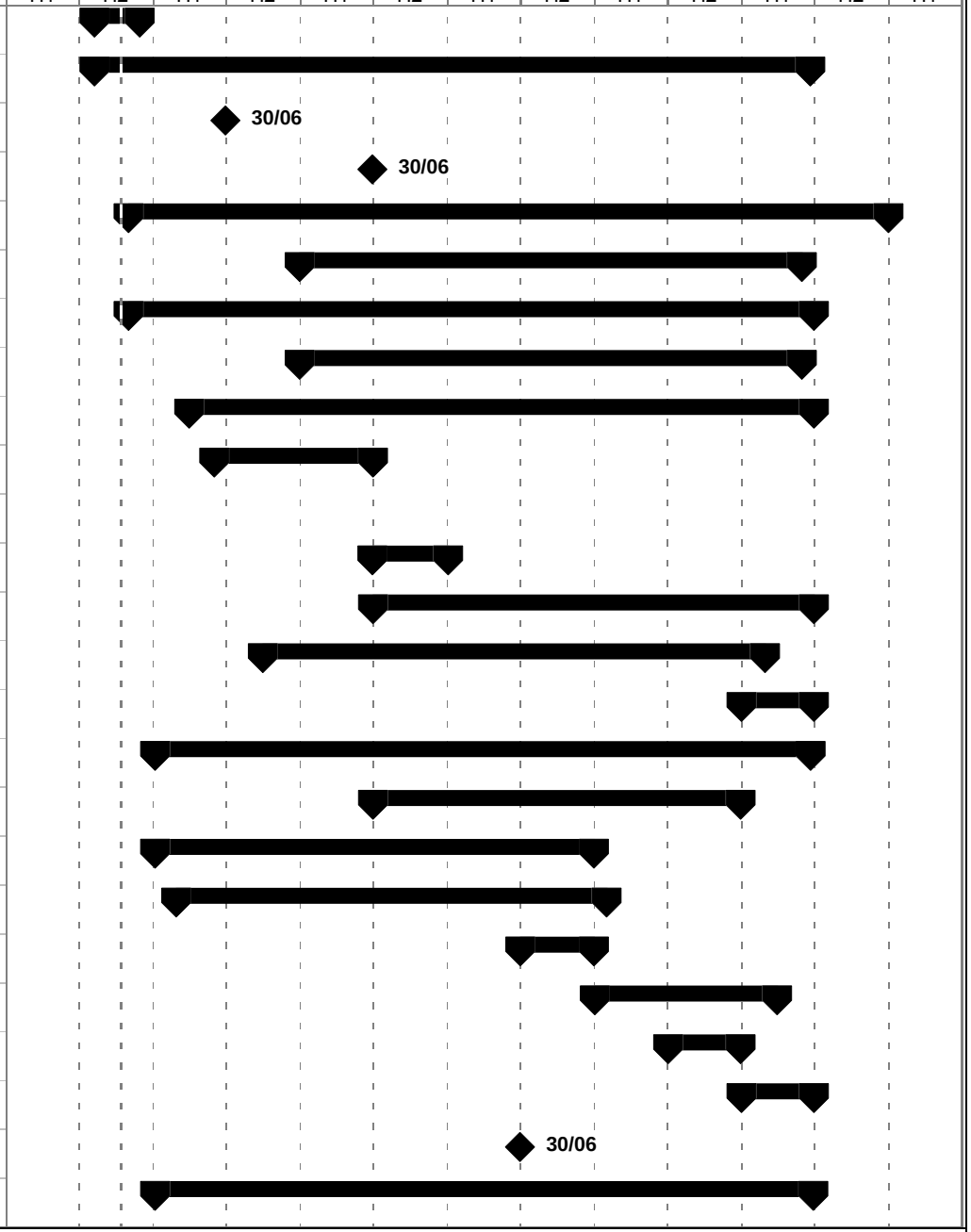
Net financial benefit	**£132,667**

(f)

Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Total sites where method replicated	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	572	0	0	0	0	0	0	0

Appendix B Project Plan

ID	Task Name	Duration	Start
1	**Start Up**	**80 days**	**Fri 09/08/13**
4	**Workpackage 1 Project management**	**1269 days**	**Fri 09/08/13**
157	**SDRC 1 Review Learnings from Other Projects**	**0 days**	**Mon 30/06/14**
159	**SDRC 5 Identify control and trial sample groups**	**0 days**	**Tue 30/06/15**
161	**Workpackage 2 - Customer Model Development Data Analy**	**1347 days**	**Fri 01/11/13**
175	**SDRC 2 Create Customer Model**	**891 days**	**Wed 31/12/14**
179	**Workpackage 3 - Network Model Development**	**1216 days**	**Fri 01/11/13**
189	**SDRC 7 Create Network Investment Tool**	**891 days**	**Wed 31/12/14**
193	**Workpackage 4 - Participant Recruitment, Participant Recr**	**1109 days**	**Tue 01/04/14**
198	**Workpackage 5 - Meter & Data Gathering, Collation, Centra**	**282 days**	**Mon 02/06/14**
203	**SDRC 6 Install 80% sensors and smart meters**	**0 days**	**Tue 30/06/15**
205	**Integration/UX work**	**134 days**	**Tue 30/06/15**
208	**Baseline Monitoring**	**783 days**	**Wed 01/07/15**
210	**Support Services**	**891 days**	**Wed 01/10/14**
214	**De-Commissioning**	**130 days**	**Mon 01/01/18**
216	**Workpackage 6 - Knowledge Dissemination**	**1164 days**	**Mon 06/01/14**
226	**Trial Set Up**	**653 days**	**Wed 01/07/15**
241	**1st Trial Iteration**	**780 days**	**Mon 06/01/14**
253	**SDRC 3 Improved Customer Engagement**	**762 days**	**Fri 28/02/14**
256	**1st Trial Review**	**131 days**	**Fri 01/07/16**
259	**2nd Trial Iteration**	**325 days**	**Mon 02/01/17**
271	**2nd Trial Review**	**130 days**	**Mon 03/07/17**
274	**Project Conclusions, Evaluation and Reporting**	**130 days**	**Mon 01/01/18**
278	**SDRC 4 Create commercial energy efficiency measures**	**0 days**	**Thu 30/06/16**
280	**SDRC 8 Close Down Reports**	**1169 days**	**Mon 06/01/14**



Appendix C Project Risk Register

SAVE RISK REGISTER

Ref No.	Description	Existing Controls	Likelihood	Severity				RISK	Mitigation / Contingency	Resp	Target Date	Actions / Status	Residual Likelihood	Residual Impacts				Residual RISK
				People	Envir't	Asset	Reput'n							People	Envir't	Asset	Reput'n	
Workpackage 1 - Project Management																		
1	Resourcing the SAVE Project internally to SEPD	Future Networks Recruitment Procedure;	Remote	2	1	1	3	L		SEPD		Arrange FN Recruitment Procedure to be initiated before the Decision Date; provide HR with advance requirments of Resource	Remote	2	1	1	3	L
2	Break up of Partnership	Memorandum of Understanding in place with all project Partners - to show commitment to project.	Probable	3	2	2	4	H	MOUs to be replaced by contracts asap, Letters of support to project from Senior Company Representatives	All Parties		Contract negotiations to start immediately after the positive decsiion date, again escalation procedure up to ISB available	Probable	3	2	2	4	H
3	Lack of budget to complete project and over spend on budget;	FN procedure PR-PS-FNP-001	Occassional	2	2	2	3	M	Regular meetings and workshops with project partners; build up the costs via bottom up approach target. Value for money exercisies will be carried out with Monitoring, Recruitment and LED trial	All parties		Continue with workshops and partner meetings up to the deceision date - just to finalise athe costs and target dates.	Occassional	2	2	2	3	M
4	Inability of recruiting the necessary number of customers for the trials across the Solent area	Professional market research company will be appointed by the SAVE project. The company will be chosen because of their experience and expertise in this area. The process will be overseem by the University of Southampton	Probable	2	2	2	4	H	Constant monitoring will be required of this key milestone. Regular review meetings will be carried out during this process. Existing escalation process in place via Project Director to SEPD ISB	All parties		No surprises - flag up issues well in advance of this happening. No contact without Customer and data strategies being agreed by OFGEM	Probable	2	2	2	4	H
5	Lack of data available to the Trial zones and an overall lack of learning to SEPD.	ICT Manager actively involved in designing the techniical and data flow architecture and method of work. This work will continue up to and beyond the decsions datesto ensure suitable solution. attendance at regular PM meetings essential	Occassional	2	2	2	2	M	Regular meetings will continue in this area. Regular reviews of this important milestone will continue. Escalation through the ISB.	SEPD		If data cannot be released to the individual trial zones, the real simulation would be limited. Resot=rce requirement has been requested in the project to make this happen. models, this risk has a low probability	Occassional	2	2	2	2	M
6	Lack of avaulability of suitable learning from the SAVE project	Follow SAVE milestaones and SDRC targets; FN Knowledge Management W1-PS-FNP-012	Remote	2	2	2	4	M	Regular meetings will continue in this area. Regular reviews of this important milestone will continue. Escalation through the ISB.	PM		The SAVE learning process will be followed and reviewed on a regualr basis	Remote	2	2	2	4	M
Workpackage 2 - Customer Model Development Data Analysis and Reporting																		
7	Inadequate data for the initial modelling	Careful and detailed planning of customer recruitment required	Remote	3	1	1	2	L		UOS		Detailed planning requirement at start up and continuos review afterwards	Remote	3	1	1	2	L
8	Inadequate numbers of customers sign up to trials	Again all in the planning of the customer recruitment strategy	Improbable	3	1	1	2	M		UOS		Detailed planning requirement at start up and continuos review afterwards	Improbable	3	1	1	2	M
9	Types of customers not suitable for modelling	Again all in the planning of the customer recruitment strategy	Improbable	2	2	1	2	L		UOS		Detailed planning requirement at start up and continuos review afterwards	Improbable	2	2	1	2	L
10	Failure of equipment and lack of data	Review with Maingate and ELEXON, plan for this events in the initial planning	Occassional	3	1	1	4	H	The length of time to recruit customer recruitment and allowed more planning time for this activity. Reguar reviewing of progress required at ISB meeting	All Parties		Continuous revoew with Mainaget and reporting	Occassional	3	1	1	4	H
11	Inadequate Outputs from Modelling	Review regualarly with the project team and UOB	Remote					L		UOS		Continuous Reviews and	Remote	0	0	0	0	L
Workpackage 3 - Network Model Development																		
12	Lack of existing network information on the Solent networks - could cause delays and inaccurate results	Planning engineering resource allocated to the SAVE the project. Existing Long Term Development Statement, GIS and SIMS to be used	Remote	2	1	1	3	M	Regular meetings will continue in this area. Regular reviews of this important milestone will continue. Escalation through the ISB.	SEPD		Authority to allow partners to use SEPD data to be requested as soon as the project is accepted	Remote	2	1	1	3	M
13	Lack of interest from industry in reviewing report and recommendation; Can't use industry feedback to improve model	The project will use project partner University of Bath - Prof Furong Li who is already an expert in this field and working on other similar LCNF projects	Remote	2	1	1	2	L		All parties		Ongoing engagement with other LCNF projects will notify them when input is wanted. Offer support to other LCNF projects in return for input	Remote	2	1	1	2	L
14	Report and recommendations insufficiently detailed or backed by evidence; Inconsistency in feedback and weak support for regulatory recommendations	The project will use an experienced organisation selected by tender to provide expert modelling advice and research insight	Occassional	2	1	1	3	M	Regular revoew meeting will be carried out and outputs regularly reviewed by senior team members.	All parties		Further research and consultation needed to develop understanding of stakeholder requirements; If undertaken within project would need diversion of budget and resources.	Occassional	2	1	1	3	M
Workpackage 4 - Participant Recruitment, Participant Recruitment/ Trial Surveys & Field Trials																		
15	Insufficient participants can be recruited afeecting the statistical validity of trials.	Although this activity os being tendered we will employ experienced and trusted recruiters; This activity will be supervised by the University of Southampton - also experieced Researchers.	Probable	3	3	3	4	H	Regularly monitoring by the SEPD Steering Board	UoS		Aim for higher level of recruitment to get required numbers.; Review requirement for the statistical sample; Employ experienced and trusted recruiters; Extend the recruitment period.	Probable	3	3	3	4	H
16	Insufficient interest from MRS companies in tendering process	Take advise from UoS who have experience in this type of ork from previous research work	Remote	3	1	2	3	M	Review at monthly procurement meetings	SEPD/ UoS		Early visibilty and details of project requirements to be passed and discussed with SEPD procurement in advance of decision date	Remote	3	1	2	3	M
17	Participant sample is skewed to a particular societal sub group; Difficult to apply findings to other areas	This will be part of the Univiversity of Southampton's priorities when designing the study areas	Remote	2	2	2	2	L		UoS		Set specific parameters for recruitment; Recruit across a wide area.	Remote	2	2	2	2	L
18	Sample is subject to self selection by participants; Outcomes are skewed and not representative	This will be part of the Univiversity of Southampton's priorities when designing the study areas	Improbable	2	2	2	2	L		UoS		Set specific parameters for recruitment; Recruit across a wide area.	Improbable	2	2	2	2	L
Workpackage 5 - Meter & Data Gathering, Collation, Central Data Repositry																		
19	Lack of broadband coverage in the study ares	working on a basis of 75% coverage in the Solent area	Occassional	3	2	2	3	M	Maingate and SEPD to review coverage and introduce new plans if reuired	Maingate/ PM		25% Sim card penetration allowed for in budget	Occassional	3	2	2	3	M

Appendix C Project Risk Register

20	Monitoring equipment cannot be installed in time to support trials; Delays to trials schedule and subsequent activities	Start installation as soon as possible; Monitor progress and employ additional resource if necessary	Probable	2	3	3	4	H	We have already doubled the length of time to recruit customer recruitment and allowed more planning time for this activity	All Parties		Start installation as soon as possible; Monitoring to be run in parallel with the recruitment process; review progress and employ additional resource if necessary.	Probable	2	3	3	4	H
21	Customers moving or circumstances change	This is part of the study trials, will be reviewed and reported on a regular basis.	Occassional	3	1	2	2	M	Recruit more and monitor closely	Maingate		Higher level of recruitment required to cover off drop outs.15 % decomisioning costs allowed for withing the budget	Occassional	3	1	2	2	M
22	Noticeable differences in accuracy/ repeatability of data metering systems; Difficulties in statistical analysis Need to replace meters and repeat trials	Calibrate critical devices in advance of delivery to customers	Remote	2	2	2	2	M	Call centre in place to support the devices and adta handling. Support team available to advise and repair devices	Maingate		Understand performance differences in systems before the trials and determine whether correction factors are needed. Check early in the trial that data is comparable and modify correction factors if necessary.	Remote	2	2	2	2	M
23	Control group not controlled or representative of sample groups; Difficulties in statistical analysis	Recruitment plans and data groups have to be agreed in advance of recruitment exercise	Probable	2	2	2	2	M	Contingency plans in place to backfill missing systems	UoS		Have surplus control group against trial sample sizes. Ensure demographic and energy use data on trial participants is well understood beforehand. Historic data could be used if necessary.	Probable	2	2	2	2	M
24	Failure in data management system; Loss or corruption of data	Trials are designed to repeat in cycles so that loss of one trial cycle doesn't affect overall validity of project results	Remote	2	2	2	2	L		Maingate		Ensure disaster recovery plans are in place and fit for purpose.	Remote	2	2	2	2	L
Workpackage 6 - Knowledge Dissemination																		
25	In adequate Resources to meet OFGEMs reprting and learning events	Employ full time Outputs Manager	Improbable	3	2	2	4	M	Subject to ISB reviews	SEPD		Full time resource emloyed to cover workload	Improbable	3	2	2	4	M
26	Iadequate budget to cover Training element of the programme	Ensure budget included in project budget	Improbable	2	1	1	2	L		SEPD		Included in SAVE budget	Improbable	2	1	1	2	L
27	Inadequate Quality of Close down reports	Follw SEPD Knowledge Learning procedure	Improbable	3	1	1	4	L				Follow SEPD Knowledge procedure	Improbable	3	1	1	4	L
28	No acess to the ENA protal and web sites	Carry out some pilot inactions with the softwate and hardware	Improbable	2	1	2	3	L		SEPD		Trial in dvance of starting project	Improbable	2	1	2	3	L
Trials																		
Workpackage 7 - LED Trial (To be Tendered as part of the project)																		
29	Lack of interest from LED suppliers in tendering request	Detailed procurement work required to ensure enough interest in the tender - seek industry advice	Occassional	2	1	2	2	L		SEPD		Tendering process to be planned and in detail in advance	Occassional	2	1	2	2	L
30	Not enough customer interest in LED project to ake a meaninful trial	Pre tendering work required after decision day	Occassional	3	1	2	3	L		SEPD			Occassional	3	1	2	3	L
Workpackage 8 - Smart Plugs																		
31	Lack of interest in project from customers in the SP trial	SP trial to support other trial eg campaigns and DNO Rebates	Occassional	2	1	2	3	L		UoS/KEMA		We have already reviewed potential companies	Occassional	2	1	2	3	L
32	Lack of equipment suppliers - use Maingates SP to reduce compexity of data and technology integration	SEPD and other partners are currently working on the design and plans for integration	Improbable	2	1	2	2	L		Maingate		Decesion to ustilise Maingates SP technlogy to mitigate the integration risks	Improbable	2	1	2	2	L
33	Equipment faullty and data not available	Equipment regualrly monitored and supported by help desk and support staff	Remote	2	1	2	3	L		Maingate		Call centre in place to support the devices and adta handling. Support team available to advise and repair devices	Remote	2	1	2	3	L
34	Customer unable to fit SP on appliances	Using the tried and tested scandanavion method of delivery and support of customers	Remote	3	1	3	3	M	SP to be send out with Gateway equipment	Maingate		Call centre in place to support the devices and adta handling. Support team available to advise and repair devices	Remote	3	1	3	3	M
Workpackage 9 - DNO Price Signals																		
35	Insufficient numbers of participants recruited	Delays to start of trial; Difficulties in statistical analysis	Probable	3	1	1	4	H	Project already focussed in getting the recruitment numbers. Use a professional market research team in the recruitment phase of the project	Elexon/ UoS		Increase engagement and comms effort in the Solent region. Introduce further incentives for participants to recruit others. Utilise Future Solent and local Authprities as contacts	Probable	3	1	1	4	H
36	Customers withdraw from trials	Need to continue recruitment activities; Loss of data to inform analysis	Occassional	2	1	2	3	L		Elexon/ UoS		Engage regularly to understand any dissatisfaction early.Understand concerns and take action to minimise further losses; Request participants allow shadow meter to remain so that data can continue to be collected without their intervention.	Occassional	2	1	2	3	L
37	Customers do not see expected savings	Customers could withdraw from trials; Could affect future recruitment; Could result in negative publicity;	Remote	2	1	2	3	L				Manage expectations at the start – customers may not see reductions but should not see increases as a result of energy saving devices. Weather conditions could cause increases to need to understand effect.	Remote	2	1	2	3	L
Workpackage 10 - Campaigns																		
38	Inability to come up with appropriate campaigns	DNV KEMA will coordinate and manage the campaigns and report to the SAVE project team	Improbable	2	1	2	2	L		DNV Kema		Agree scope in the first phase of the SAVE project - produce clear and smart integration strategy	Improbable	2	1	2	2	L
39	Break up of partnership	DNV KEMA will coordinate and manage the campaigns and report to the SAVE project team	Remote	2	1	2	3	M	Regular reviews of performnace required. Investigate alternative suppliers of the service	DNV Kema		Set out expecctations to UoW at the very start of the project. Campaigns must be tragetted and smart and suitable for the project.	Remote	2	1	2	3	M
40	Failuer to deliver on time and on budget	DNV KEMA will coordinate and manage the campaigns and report to the SAVE project team	Remote	2	1	2	2	L		DNV Kema		Set out expecctations to UoW at the very start of the project. Campaigns must be tragetted and smart and suitable for the project	Remote	2	1	2	2	L
41	Inadequate quality of campaigns	Review quality during trials	Improbable	2	1	2	2	L		DNV Kema		Set out Smart objectives to the UoWinchester	Improbable	2	1	2	2	L
42	Ineffective campaigns	DNV have responsibility ot integrate UoW into the main project	Remote	2	1	2	2	L		DNV Kema		Set out Smart objectives to the UoWinchester	Remote	2	1	2	2	L
Workpackage 11 - Community Coaching																		
43	Lack of community 'buy in' to the programme	Creative programme of engagement based on local priorities	Remote	2	1	1	3	L		NE		Design Intelligent Campaigns, integrate with DNV KEAM	Remote	2	1	1	3	L

Appendix C Project Risk Register

44	Coaches leaving to find on-going employment before the end of the programme	Alternative income generatiuon in place, secure HR procedure	Improbable	2	1	1	3	L		NE		Regulkar Performmance Management	Improbable	2	1	1	3	L
45	Community coaching impacts other trials	Trial outcomes are not representative of trial effects alone	Occassional	2	1	1	3	L		NE		Ensure that other trial participants are not selected from areas close to the Community Coaching trial area	Occassional	2	1	1	3	L
46	Lack of adequate funding/ resource secured to sustain the programme	Shared ownership of benefits of programme/ KPIs from programme inception to ensure longer term buy in	Improbable	2	1	1	3	L		NE		Budget approved in Project Budget	Improbable	2	1	1	3	L
47	Key stakeholders unable to deliver focussed delivery of effort within traget communities	Use postion of SEPD and innovative nature of research to champion support at high level	Remote	2	1	1	3	L		NE		Reguklar Project Team meetings to discuss progress	Remote	2	1	1	3	L
48	OtherExternal factors impacting on load causes disruption to research progression	Wide range stakeholder engagement to ensure good knowledge of external impacting factors	Improbable	2	1	1	3	L		NE		Agree priorities at initial project team meetings and liase with UoS	Improbable	2	1	1	3	L
49	Inadequate Larning from Trial	Regularl reporting at project review meetings - remedial action agreed as required	Remote	2	1	1	3	L		NE		Regular review meetinsg required	Remote	2	1	1	3	L

Appendix D Project Contingency Plan

SAVE CONTINGENCY PLAN

Ref No.	Description	Existing Controls	Likelihood	Severity				RISK	Immediate Action	Interim Measures	Long Term Recovery	Target	Resp
				People	Envir't	Asset	Reput'n						
2	Break up of Partnership	Memorandum of Understanding in place with all project Partners - to show commitment to project.	Probable	3	2	2	4	H	Secure confidential and/or commercial data Inform stakeholders and other project partners Identify remaining common ground and seek continued engagement as appropriate	Assess impact on specific task and on wider project deliverables If appropriate, complete debrief/lessons learnt process with existing partner Identify alternative partners as appropriate and required Assess impact on specific task and on wider project deliverables	Completion or cancellation of specific tasks - cancellation only with consent from relevant stakeholders		
3	Lack of budget to complete project and over spend on budget;	FN procedure PR-PS-FNP-001	Occassional	2	2	2	3	M	Regular meetings and workshops with project partners to build up costs from bottom up approach. Value for money exercisies will be carried out with Monitoring, Recruitment and LED trial	Continue with workshops and partner meetings up to the decision date to further refine costs.- Value for money exercisies will be carried out with Monitoring, Recruitment and LED trialjust to finalise athe costs and target dates.	Look at reducing scope of project to fit budget		
4	Inability of recruiting the necessary number of customers for the trials across the Solent area	Professional market research company will be appointed by the SAVE project. The company will be chosen because of their experience and expertise in this area. The process will be overseem by the University of Southampton	Probable	2	2	2	4	H	Utilise experience market research company for this exercise University of Southampton to supervise Contract preparation Employ experience and quality company for the project No contact without Customer and data strategies being agreed by OFGEM	Carry out regular reviews of numbers; No surprises - flag up issues well in advance of a programme. Escalation to ISB.	Implement task to achieve deliverables – though, this may require an alternative company our technique.		
5	Lack of data available to the Trial zones and an overall lack of learning to SEPD.	ICT Manager actively involved in designing the techniical and data flow architecture and method of work. This work will continue up to and beyond the decsions datesto ensure suitable solution. attendance at regular PM meetings essential	Occassional	2	2	2	2	M	Regular meetings will continue in this area. Regular reviews of this important milestone will continue. Escalation through the ISB.	If data cannot be released to the individual trial zones, the real simulation would be limited. Resource requirement has been requested in the project to make this happen. models, this risk has a low probability	Implement task to achieve deliverables – though, this may require an alternative company our technique.		
6	Lack of avaulability of suitable learning from the SAVE project	Follow SAVE milestaones and SDRC targets; FN Knowledge Management W1-PS-FNP-012	Remote	2	2	2	4	M	Regular review meetings will continue in this area. Complete learning logs, learning meetings, reviews with PM	The SAVE learning process will be followed and reviewed on a regualr basis	Re-visit project output stratgey and produce new learning plan		
8	Inadequate numbers of customers sign up to trials	Again all in the planning of the customer recruitment strategy	Improbable	3	1	1	2	M	Utilise experience market research company for this exercise University of Southampton to supervise Contract preparation Employ experience and quality company for the project No contact without Customer and data strategies being agreed by OFGEM	Carry out regular reviews of numbers; to avoid surprises - flag up issues well in advance of a programme.. Detailed planning requirement at start up and continuos review afterwards	Implement task to achieve deliverables – though, this may require an alternative company our technique.		
10	Failure of equipment and lack of data	Review with Maingate and ELEXON, plan for this events in the initial planning	Occassional	3	1	1	4	H	The length of time to recruit customer recruitment and allowed more planning time for this activity. Reguar reviewing of progress required at ISB meeting	Triggered by performance trials Complete peer review of technology to identify potential solutions Review alternative technologies Explore long-term application of other similar technologies	Record findings for learning outcomes Mitigate impact on other tasks by implementing simulations		
12	Lack of existing network information on the Solent networks - could cause delays and inaccurate results	Planning engineering resource allocated to the SAVE the project. Existing Long Term Development Statement, GIS and SIMS to be used	Remote	2	1	1	3	M	Regular meetings will continue in this area. Regular reviews of this important milestone will continue.	Authority to allow partners to use SEPD data to be requested as soon as the project is accepted	Implement task to achieve deliverables – though, this may require an alternative technology/design strategy.		
16	Report and recommendations insufficiently detailed or backed by evidence; Inconsistency in feedback and weak support for regulatory recommendations	The project will use an experienced organisation selected by tender to provide expert modelling advice and research insight	Occassional	2	1	1	3	M	Regular review meeting will be carried out and outputs regularly reviewed by senior team members.	Further research and consultation needed to develop understanding of stakeholder requirements; If undertaken within project would need diversion of budget and resources.	Record the current findings for learning outcomes Mitigate impact on other tasks by implementing simulation		
17	Insufficient participants can be recruited afeecting the statistical validity of trials.	Although this activity os being being tendered we will employ experienced and trusted recruiters; This activity will be supervised by the University of Southampton - also experieced Researchers.	Probable	3	3	3	4	H	Utilise experience market research company for this exercise University of Southampton to supervise Contract preparation Employ experience and quality company for the project No contact without Customer and data strategies being agreed by OFGEM	Aim for higher level of recruitment to get required numbers.; Review requirement for the statistical sample; Employ experienced and trusted recruiters; Extend the recruitment period.	Implement task to achieve deliverables – though, this may require an alternative company our technique.		
18	Insufficient interest from MRS companies in tendering process	Take advise from UoS who have experience in this type of ork from previous research work	Remote	3	1	2	3	M	Plan the customer campaigns carefully; Review at monthly procurement meetings	Early visibilty and details of project requirements to be passed and discussed with SEPD procurement in advance of decision date	Implement task to achieve deliverables		
23	Lack of broadband coverage in the study areas	working on a basis of 75% coverage in the Solent area	Occassional	3	2	2	3	M	Maingate and SEPD to review coverage and introduce new plans if reuired	Maingate/ PM		25% Sim card penetration allowed for in budget	Occassional
24	Monitoring equipment cannot be installed in time to support trials; Delays to trials schedule and subsequent activities	Start installation as soon as possible; Monitor progress and employ additional resource if necessary	Probable	2	3	3	4	H	Doubled the length of time to recruit customer recruitment and allowed more planning time for this activity Assess significance of delay to task delivery and discuss alternative programme phasing with project partners Trial other tasks using simulated data whilst delay is worked-through	Monitoring to be run in parallel with the recruitment process; Review progress and employ additional resource if necessary.	Implement task to achieve deliverables – though, this may require an alternative technology/design strategy.		

Appendix D Project Contingency Plan

20	Customers moving or circumstances change	This is part of the study trials, will be reviewed and reported on a regular basis.	Occassional	3	1	2	2	M	Recruit more and monitor closely	Higher level of recruitment required to cover off drop outs.15 % decomisioning costs allowed for withing the budget	Mitigate impact on other tasks by implementing simulation		
27	Noticeable differences in accuracy/ repeatability of data metering systems; Difficulties in statistical analysis Need to replace meters and repeat trials	Calibrate critical devices in advance of delivery to customers	Remote	2	2	2	2	M	Call centre in place to support the devices and data handling. Support team available to advise and repair devices	Review performance differences in systems determine whether correction factors are needed. Check early in the trial that data is comparable and modify correction factors if necessary.	Mitigate impact on other tasks by implementing simulation		
28	Control group not considered as representative of sample groups; Difficulties in statistical analysis	Recruitment plans and data groups have to be agreed in advance of recruitment exercise	Probable	2	2	2	2	M	Contingency plans in place to backfill missing systems	Have surplus control group against trial sample sizes. Ensure demographic and energy use data on trial participants is well understood beforehand. Historic data could be used if necessary.	Record the current findings for learning outcomes Mitigate impact on other tasks by implementing simulation		
30	Inadequate resources to meet Ofgem's reporting and learning events requirement	Employ full time Outputs Manager	Improbable	3	2	2	4	M	Appoint full time resource to handle task	Full time resource emloyed to cover workload	Mitigate impact on other tasks by implementing simulation		
40	Customer unable to fit SP on appliances	Using the tried and tested scandanavion method of delivery and support of customers	Remote	3	1	3	3	M	Smart Plugs to be sent out with Gateway equipment	Call centre in place to support the devices and adta handling. Support team available to advise and repair devices	Review process and change with manual process if required		
48	Break up of partnership	DNV KEMA will coordinate and manage the campaigns and report to the SAVE project team	Remote	2	1	2	3	M	Regular reviews of performnace required	DNV Kema	Set out expecctations to UoW at the very start of the project. Campaigns must be tragetted and smart and suitable for the project		

Notes:
In line with SEPD's FN Governance Framework the SAVE project risks have been identified and assessed in terms of probability and impact.
All risks are managed by identifying a risk owner and developing a series of controls designed to maintain risks within the accepted appetite for SAVE.

In addition to the control measures specified in the risk register and managed by the respective risk owners, key project risks have been specifically considered in order to develop contingency plans should management controls fail.

It should be noted that contingency planning is inherent to the risk management process adopted by SAVE. Specifically – as all risks are continually reviewed the relevant mitigating actions are modified to meet any change in severity or need. The contingencies identified below are updated during the risk register review process to keep both documents aligned.

Specific contingency plans have been adopted for all risks with MEDIUM or HIGH residual risk, with HIGH inherent risk. Contingency planning considers three timescales: 1) immediate actions, 2) interim measures and 3) long term recovery.

Naturally, the project plan, risk register and contingency plan are live documents and will continue to evolve as the project progresses.

Appendix E

Organogram & Roles and Responsibilities

Other Steering Groups

Partner Review Board
Technical Review Board

SSEPD Project Director

Stewart Reid

Members of the SSEPD Innovation Steering Board

Networks MD
Dir of Distribution
Head of Finance
Head of Engineering
Head of Networks Legal
Head of Major Projects
Procurement Manager
Strategy Manager SSE Telecoms
Head of IT

ICT Manager

Henrik Magnusson

Development Manager

Brian Shewan

SSEPD Project Delivery Manager (South)

Nigel Bessant

R&D Manager

David MacLeman

Future Networks Support Functions

Liz Barrett

SAVE Project Manager

Communications/ Output Manager

Project Suppliers;

- Customer Recruitment Company
- University of Winchester
- LED provider
- Network modeller
- Local Authorities

Project Patners;

- Maingate
- DNV KEMA
- University of Southampton
- Future Solent

SEPD Project Support Delivery Team;

Planning Engineers

ICT Technicians

Contractors

Project Delivery

Future Networks;

- PMO
- Administration
- Knowledge
- Corporate Affairs
- Human Resources

Other Corporate Support Functions;

- Legal
- Regulation
- Finance
- Corporate Affairs
- IT
- Telecoms
- Operations

Support & Advisory Roles

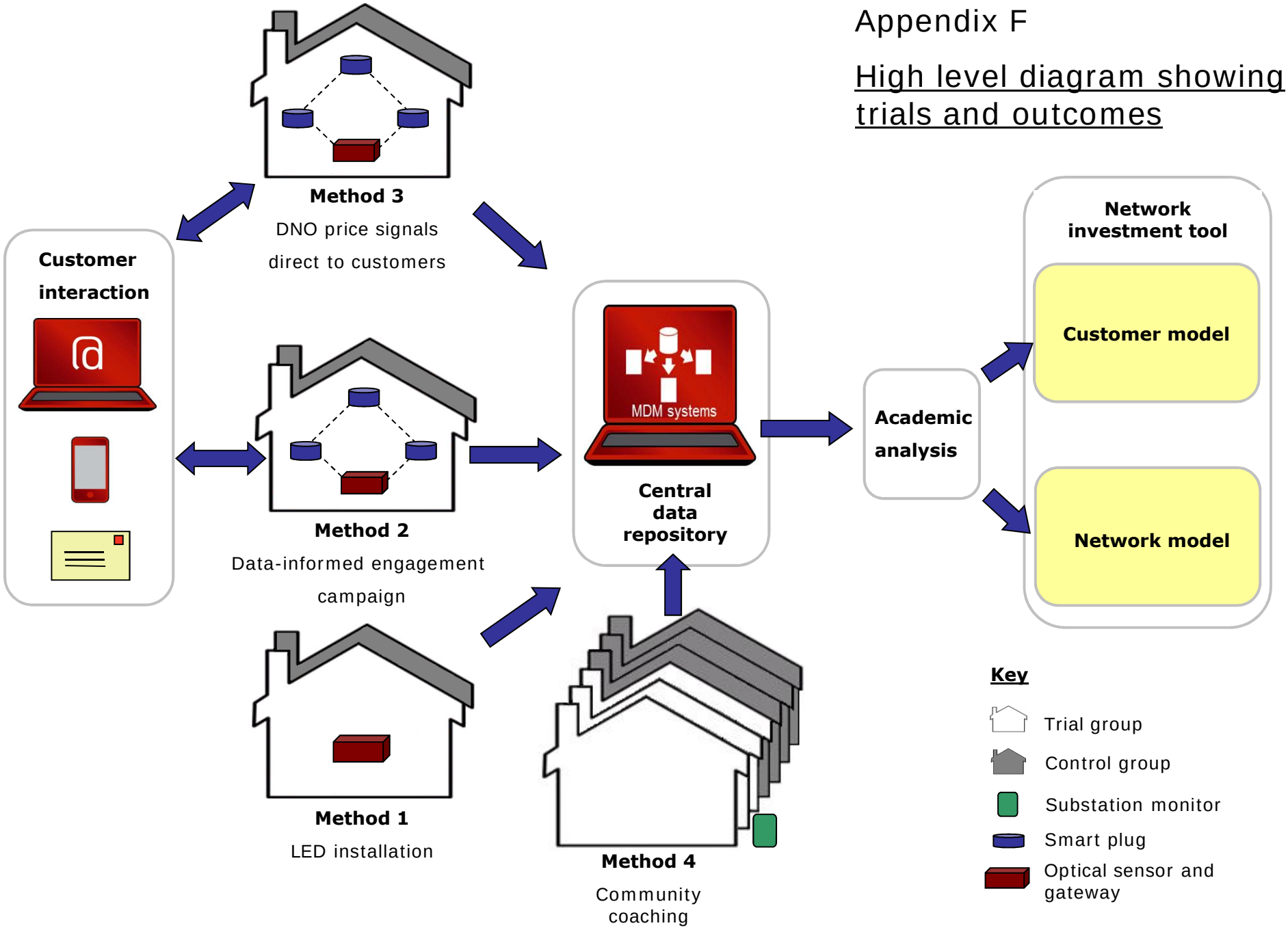
PROJECT ROLES AND RESPONSIBILTIES

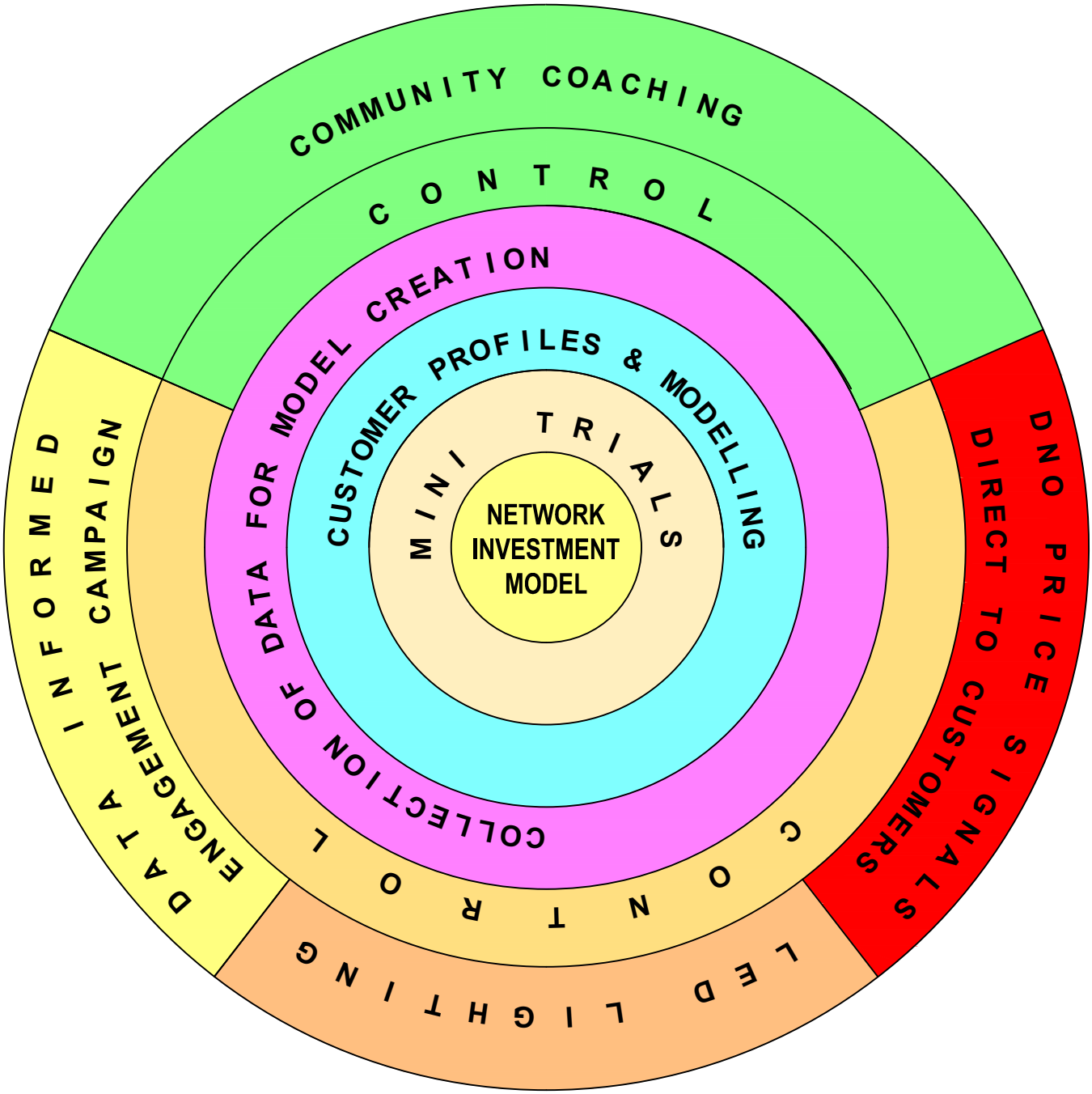
ROLE	RESPONSIBILITY AND ACCOUNTABILITIES
SSEPD INNOVATION STEERING GROUP	• Overall responsibility for the delivery of the New Thames Valley Vision Project and other LCNF and Innovation projects; • Review and approve innovation bids; • Review and Approve funding; • Regularly review progress; • Major problem resolution; • Responsibility for project authorisation and approval, achieving the financial model targets.
SAVE Project Director	• Overall accountability for the successful delivery of the SAVE project; • Provision of leadership and direction for the individual project and feedback to the SSEPD Innovation steering group; • Accountable for project authorisation and approval, achieving the financial model targets • Responsibility for risk management and mitigation; • Primary external customer and partner company contact point.
Project Delivery Manager (South)	• Provision of leadership and direction for the delivery and partnership teams; • Delivery of legal documentation for asset transfer, and leases for the infrastructure; • **COST:** Responsible for delivering the agreed project scope to or better than budget; • **PROGRAMME:** Monitor performance against programme and achieve key milestones and handover dates; • **SAFETY:** Act as ambassador for the project, promoting a proactive culture at site level. Ensure all documentation is in place and to the requisite standard; • **QUALITY:** Handover of the agreed scope of works, completed to a high standard of workmanship. Monitor and maintain customer satisfaction;

SAVE Project Manager	• Responsibility for the day to day running of the project; • Procurement and coordination of services and interfaces, including Internal and External resources and documentation to achieve programme delivery; • Manage all Project Partners and Project Suppliers; • Provide all testing and commissioning resources; • Customer communication and progress feedback to Communications and Outputs Manager.
Communications and Outputs Coordinator	• Manage collection of project data and customer data; • Collect learning and communications from all parts of the trials; • Provide Communications/ Learning, Outputs support to the SAVE project team; • Coordinate Learning and Output sessions and reports; • Provide Communications/ Learning, Outputs support to the OFGEM Innovation team.
Development Manager	• Accountable for bid project authorisation and approval; • Responsibility for the project handover to the SEPD (South) Delivery team; • Providing support to the SAVE project team regarding on Partners, Partner Suppliers, OFGEM, Local Authorities, Future Solent
ICT Manager	• Project ICT Advise and Guidance to the SAVE project team; • Design the data and technology solutions for the SAVE project; • Advise team on best practices and new solutions in the design to achieve most economical solutions; • Ensure design complies with all relevant statutory and regulatory standards.
R&D Manager	• Provide advise and guidance on all things R&D to the SAVE team; • Ensure best R&D practices are followed; • Ensure Learning is captured for other parts of business and sector partners.
PMO MANAGER	• Provide the SAVE team with Finance, Legal, Procurement, Knowledge and Administration support.

Appendix F

High level diagram showing trials and outcomes





THE SAVE MODEL

Appendix H - Network Modelling and Investment Tool

Expected Input and Output Parameters of the Network Investment Tool

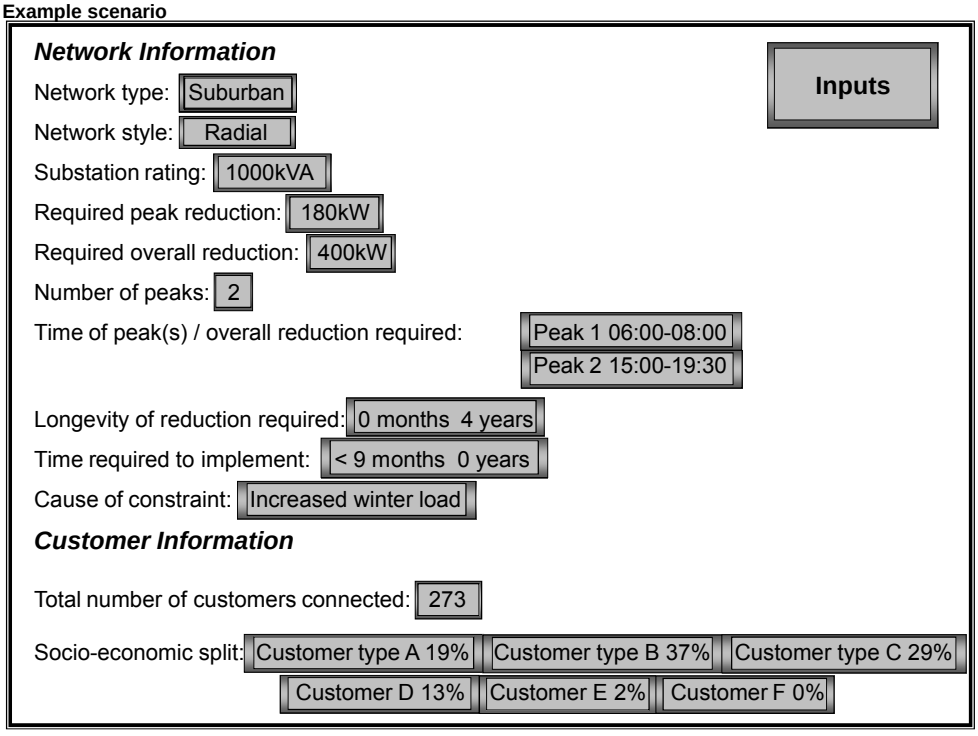
Inputs:

Network type
Network style
Substation rating
Required peak reduction
Required overall reduction
Number of peaks
Time of peak(s) / overall reduction required
Longevity of reduction required
Time required to implement
Cause of constraint

Customer Information

Total number of customers connected
Socio-economic split

Example scenario

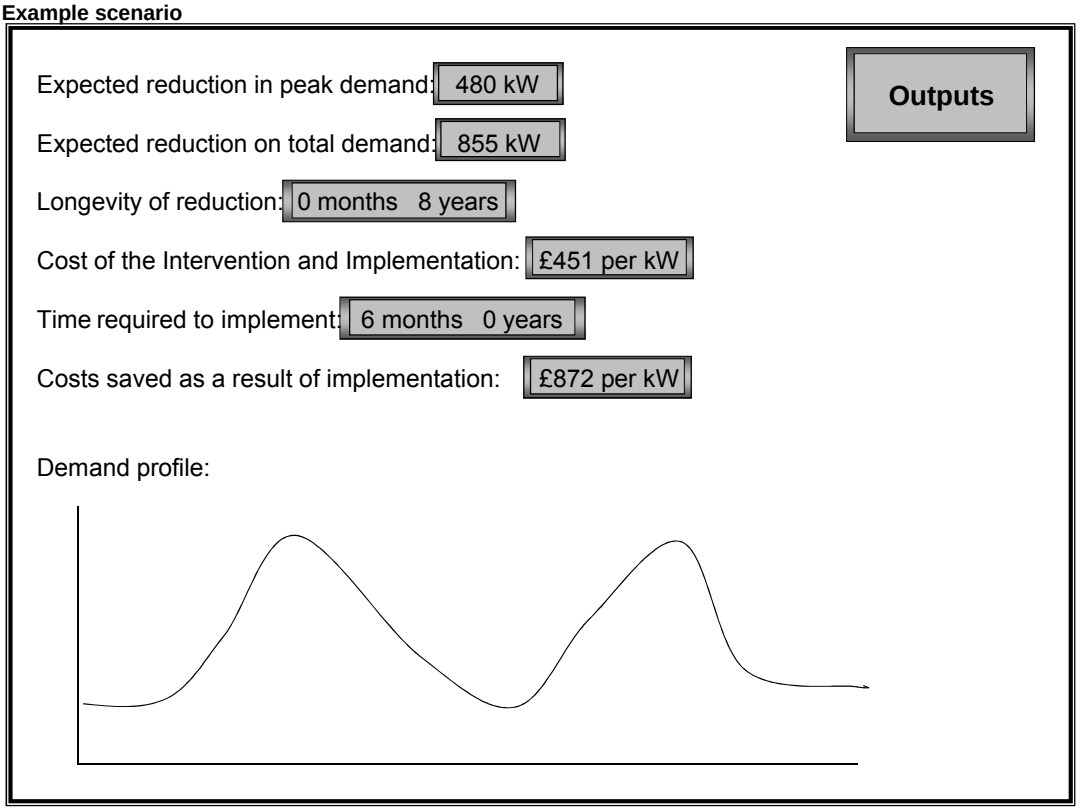


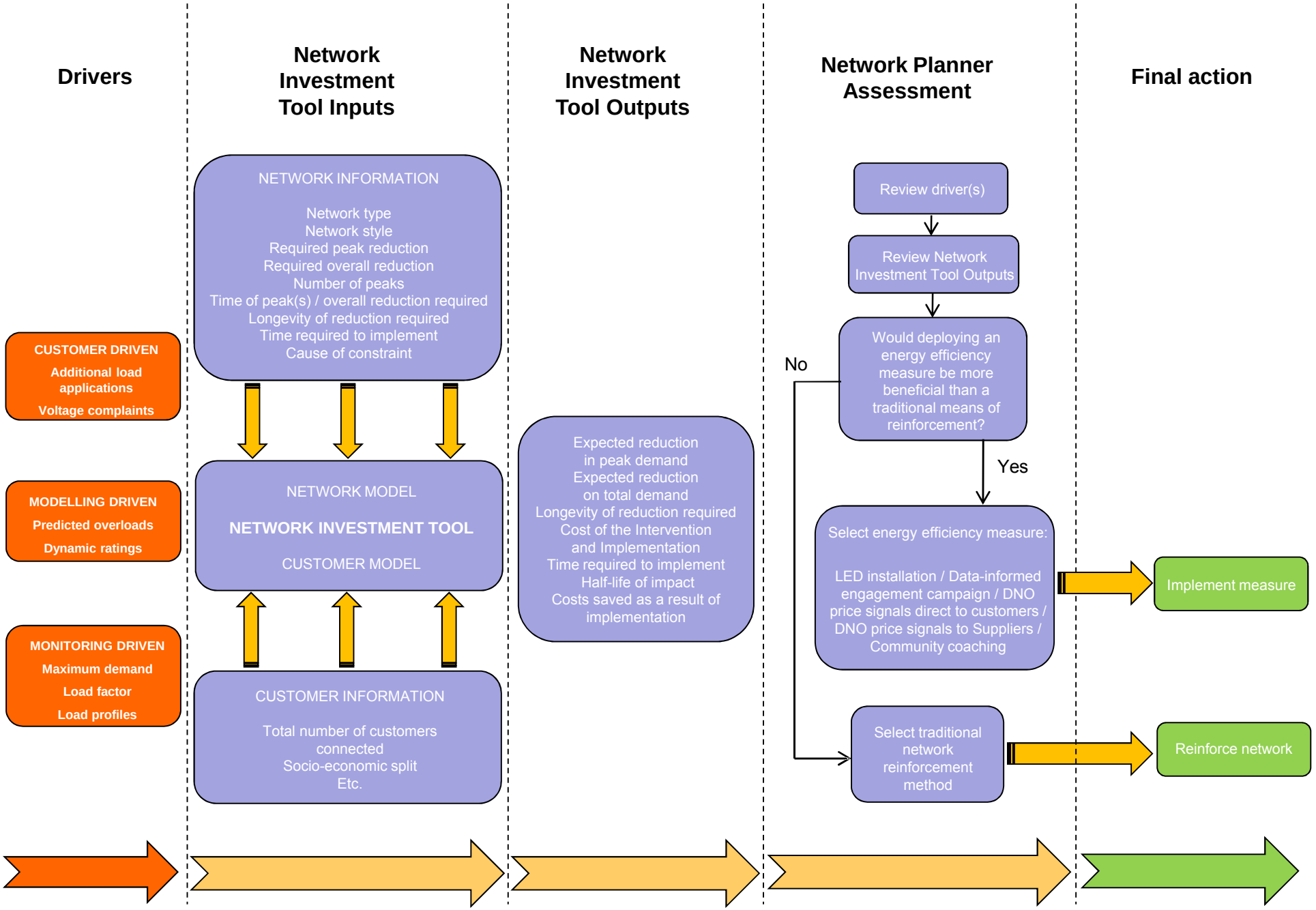
Outputs:

Expected reduction in peak demand
Expected reduction on total demand
Longevity of reduction
Cost of the Intervention and Implementation
Time required to implement
Costs saved as a result of implementation
Demand profile
Daily Profiles
Seasonal Profiles

These outputs will allow the Planning Engineers to make a decision on what is the best "value for money" solution for that particular network.

Example scenario




Drivers
Network Investment Tool Inputs
Network Investment Tool Outputs
Network Planner Assessment
Final action
CUSTOMER DRIVEN
Additional load applications
Voltage complaints
MODELLING DRIVEN
Predicted overloads
Dynamic ratings
MONITORING DRIVEN
Maximum demand
Load factor
Load profiles
NETWORK INFORMATION
Network type
Network style
Required peak reduction
Required overall reduction
Number of peaks
Time of peak(s) / overall reduction required
Longevity of reduction required
Time required to implement
Cause of constraint
NETWORK MODEL
NETWORK INVESTMENT TOOL
CUSTOMER MODEL
CUSTOMER INFORMATION
Total number of customers connected
Socio-economic split
Etc.
Expected reduction in peak demand
Expected reduction on total demand
Longevity of reduction required
Cost of the Intervention and Implementation
Time required to implement
Half-life of impact
Costs saved as a result of implementation
Review driver(s)
Review Network Investment Tool Outputs
Would deploying an energy efficiency measure be more beneficial than a traditional means of reinforcement?
No
Yes
Select energy efficiency measure:
LED installation / Data-informed engagement campaign / DNO price signals direct to customers / DNO price signals to Suppliers / Community coaching
Implement measure
Select traditional network reinforcement method
Reinforce network

Scoping of the SAVE Network Modelling and Investment Workpackage No 3

(This work will now be tendered as part of the SAVE project)

We propose that the SAVE Work package 3 - Network Modelling, will produce a Network Model and Investment tool capable of considering the effects of different types and degrees of using Energy Efficiency measures as a tool to manage networks for the DNOs. The outputs will form a stand alone tool that will allow planning engineers to consider and evaluate energy efficiency methods and also establish how this tool will integrate into planning processes

Traditionally low voltage network modelling has involved little network information and utilised demand profiles based on basic parameters, such as property size and number of connections.

The SAVE project will produce a Network Investment Tool that uses customer behaviour data in response to energy efficiency measures to create a tool that network planners are able to utilise to manage network challenges more effectively and without resorting to traditional reinforcement.

The role will require forming a close working relationship with SEPD (understand the requirements of DNOs) and the University of Southampton (integrate customer behaviour model) in order to design, inform and finalise the tool.

A key use of the tool will be to inform network planners' demand forecasts on the LV and 11kV networks, impacting on the 33kV and EHV networks, and as a result impact on the investment planning models DNOs propose.

The early work undertaking on the SAVE project could improve our knowledge of what's needed and/or outputs from other projects might appear that could change our plans e.g. results of the NTVV customer modelling work, tools or outputs from other LCNF projects. Therefore we reserve the right to refine or develop this proposed scope for the work package, should internal or external developments between now and tender make this appropriate.

The Scope of the Work

The main tasks within the Network Modelling work package are as follows and it is expected that the scope of work will entail:

- Review existing projects and network modelling tools
    - Understand requirements of network planners, review existing projects that are modelling networks, review existing tools and implications for integration/interoperability

- Design and implement the initial modelling tool
    - Build the tool using above findings and the parameters/hypothesis provided by project

- Review the tool and enhance with outputs from interventions and trials
    - Engage with planners and discuss design, input data from trials, update design to improve functionality based on inputs/outputs
- Build the final modelling and investment tool

    - Finalise design and ensure planners are able to use tool to make informed decisions on tackling network challenges

- Evaluation, documentation and dissemination
    - Ensure data, progress and results are analysed and recorded, ensure documents are shared with project team, liaise with planners and University of Southampton at all stages to deliver robust tool

Additional notes on key tasks:

- the tool must be able to analyse the impacts of deploying the energy efficiency measures on a model network. To do so it will be expected to provide simulations of urban, rural and suburban networks

- the tool must be able to evaluate which measure is best suited to be deployed on the simulated network, with a comparison of measures available for planners to select from

- it should be shown how the use of the tool will impact on forecasting demand and therefore investment planning models for DNOs

SAVE Project
Sample Area, Size and Approach
University of Southampton

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AbuBakr Bahaj (a.s.bahaj@soton.ac.uk)

Contents

1 Sample Region

We have selected the overall Solent region as the target area for the study within the project. This will facilitate rigor and significantly improve potential impacts in both analysis and outcomes. The need for a larger region of study is based on the following premise:

1. If it is the case that the eventual 'network effects' model needs to be able to estimate the local 'impacts' of the intervention measures across all population groups and thus across all areas then we **must** have control sample and test samples which is representative of all entities in the Solent area.
2. If we assume that there are no specific 'living in the Solent region' effects (ref: CLNR regional project findings) then the dataset and the results can also be used to model effects across all DNOs.

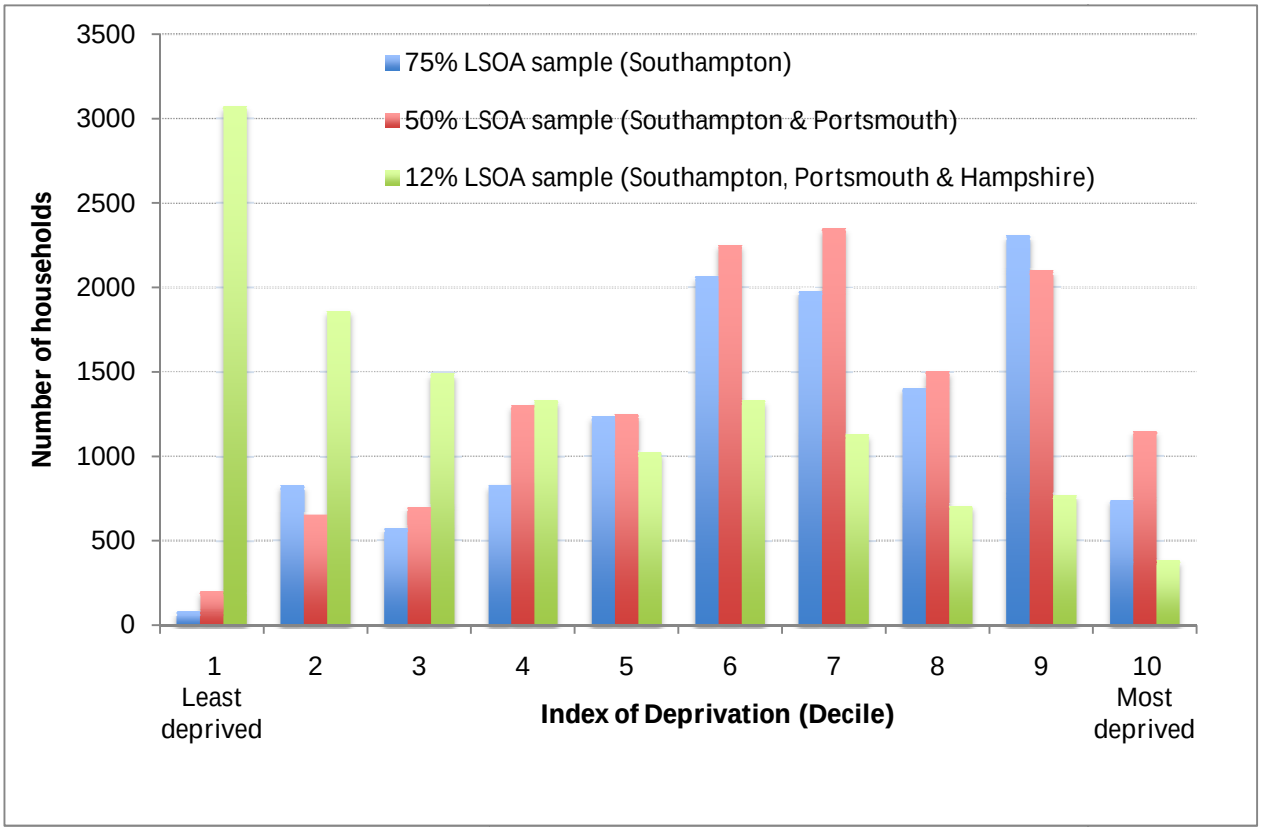


Figure 1: Distribution of exemplar 12,000 sample under different sampling area assumptions

This is clearly demonstrated by Figure 1which shows the distribution of an exemplar n = 12,000 sample across small area, known as the lower super output area (LSOA), deprivation deciles if; (i) we obtained the sample within Southampton, (ii) we obtained it in Southampton & Portsmouth and (iii) if we obtained it across Southampton, Portsmouth & Hampshire. Note that the size of the sample is irrelevant – it is the area it is sampled from that matters.

Clearly if we only sampled within the urban areas we would generate a sample which is predominantly from the deprived or very deprived areas and our model will be able to say very little about the kinds of people who tend to live in less deprived areas even though we know they tend to have higher levels of consumption and that they represent the greatest proportion of households in the region.

2 Justification of Sampling Approach

2.1 How best to conduct the trials?

The project should commit to carrying out experimental trials/intervention/campaign tests of the highest quality in order to achieve the following objectives:

- distinguish between selection and actual intervention/campaign effects
- distinguish between novelty effects and longer term / permanent change
- be able to detect statistically significant effects and
- generalize the results to the general customer population

Further this approach will provide:

- a key differentiator for the proposed project against competitors and existing running LCNF projects (e.g. Customer Led Network Revolution)
- justification for LCNF funding as the level of research investment than could normally be risked by the industrial and other partners

2.2 Overall approach

To achieve the above objectives the trials should take the following form:

1. Recruitment of a representative random sample of size n (see below for sample size discussions) via:
    a. a structured sampling process (see below)
    b. a face-to-face household survey to establish socio-demographics, appliance ownership, heating and hot water systems and energy-use habits etc
2. Initiation of baseline energy use data collection for 6 months prior to any intervention/campaign via:
    a. (Ideally) newly installed monitoring equipment
    b. (not ideal) linkage to regular customer meter readings/billing records
3. **Random allocation** of sample households (or 'streets') to equal sized control and intervention groups[1] using a factorial design.
4. After 6 months: start intervention/campaigns
    a. Must begin at the same time to avoid seasonality problems
    b. Must be appropriately chosen so that season is not a confounder (e.g. if main focus is winter evening peak, do not implement intervention in spring/summer)
5. Continue automatic data collection for whole sample (control + intervention)
6. After a minimum of 12 months (i.e. after at least 6 months of intervention/campaign iteration I)
    a. Repeat household survey to establish any changes to habits, appliances, socio-demographics and check same occupants etc. Could be implemented as an online survey to save costs but beware:
        i. Mode differences
        ii. Non-response in less well off & elderly households due to lack of effective internet access (ref: CHARM project)
        iii. House-movers need to be accounted for
    b. Iterate interventions but beware:
        i. Ordering effects of interventions
7. After a minimum of 18 months (i.e. after at least 6 months of intervention iteration II):
    a. Repeat household survey

[1] See https://www.gov.uk/government/publications/test-learn-adapt-developing-public-policy-with-randomised-controlled-trials for a useful summary of this approach

b. Iterate intervention but beware:
    i. Ordering effects of interventions

This process could be iterated again but this might take the study outside the project's permissible duration. However the study should be conducted in such a way that further study – e.g. continuous collection of data and repeated surveys etc can be continued (open ended permissions and consent for re-contact)

We should allow 6 months before the sample recruitment for:

- the development of the research methods
- the development of interventions
- piloting of the data collection methods

We should allow at least 6 months after for final data analysis, reporting etc

This produces a project timeframe of 30 months (2 iterations) or 36 months (3 iterations) but:

- We should allow for project start-up and especially sample recruitment and baseline data collection to take longer than expected (up to 12 months to establish).
- We need to allow sufficient time for analysis of data to underpin intervention iteration/redesign

These may prevent 3 iterations within the 36 months.

2.3 Sampling process

Assuming the focus is households the only effective way to generate a representative random sample sufficient for our analytic needs is to use a randomised stratified approach to sampling which has the following steps:

1. Stratify census areas (LSOAs or OAs) in the region by deprivation quintile & urban/rural location (for example);
2. Randomly select n census areas in each strata - ideally some of these would match to the DNO's constrained network areas but this should not be a design constraint as it will lead to a biased sample;
3. Randomly select addresses from these areas from the Postcode Address File;
4. Work through addresses until overall required sample size achieved & baseline survey completed.

The last two actions and the follow-up surveys (see above) are probably best done by a subcontracted market research company.

2.3.1 A case based approach

An alternative approach would be to identify 6 areas which are either sufficiently heterogeneous to be able to meaningfully represent the wider population or are sufficiently homogenous that they all represent a particular socio-demographic group. Random samples within each area could then be drawn in a similar manner to that described above. Randomisation could also occur at the street or area level.

The main drawback of this approach is that the initial selection of areas will introduce unknown sources of bias to the sample. This might include:

1. A skewed socio-demographic profile and thus a high likelihood of omitting customer/household types of interest
2. A tendency (accidentally or otherwise) to select areas with a particular energy usage profile
3. A tendency to select areas potentially more amenable to 'change'
4. A tendency to select areas who have already undergone interventions of some sort

Any of these effects would substantially reduce the validity of the results and in particular the degree to which the study could generalize its findings beyond the particular cases studied.

2.4 Sample sizes

The size of effect we are likely to find dictates the required sample size.

Data to hand (electricity monitoring on c 300 households over 18 weeks in March – June 2011): mean kWh per day ~= 11.30852 sd ~= 5.643383

We can use this with a sample power calculator to estimate n required...

Assumed size of effect:

- 5% reduction in mean kWh per; effective n required ~= 2000 EACH for control and intervention samples – so total n = 4000
- 7.5% reduction; effective n required ~= 1000
- 10% reduction; effective n required ~= 550
- 20% reduction; effective n required ~= 150

What can we assume about effect sizes?

The other LCNF results for time of use tariffs[2] have suggested c 7% overall reduction with a c 14% reduction during the peak tariff period. The Charm project suggested 2.5-5% depending on intervention condition.

We also need to allow for up to 15% attrition (dropout) through the data collection period due to non-response, refusal (withdrawal) and untraceable house movers.

This implies that an initial effective sample size of c. 2000 for each control/condition (separately under a randomized control trial (RCT) type approach) will be needed if we assume an effect size of 5%. If we assume an effect size of 7.5% then we can reduce effective n to 1000 each. The latter will be used as it will be within discussed budgets

Therefore we will aim to recruit up to 1000 properties for each intervention group (including the control), with the recruitment rate being part of the trial itself- understanding uptake rates is an important stage in measuring impacts. The sample sizes are the ideal, yet if the numbers do not reach the desired levels it will simply mean that it may be harder to determine small changes in behaviour.

If the number of recruited properties is significantly lower than this, we will move away from using the approach where each intervention sample is kept strictly separate, and instead look to use a factorial design. In this approach the effective n required is distributed across the intervention groups and interventions are combined for some groups.

This is explained below.

Table 1 shows the sample size required if each intervention is kept separate. We would require n = 4000 households to be recruited.

Table 1: RCT approach – each intervention group separated

Intervention group	Required n
Engagement + smart plug	1000
LED	1000
DNO ToU + smart plug	1000
Control	1000
Sum:	4000

[2] See http://www.networkrevolution.co.uk/industryzone/projectlibrary/learning-outcome-2-results

Table 2 shows the effect of a factorial design. In this case the intervention samples are split into groups of 250. 3 groups receive a 'pure' intervention whilst the others receive combinations of interventions. We maintain 1000 as a control group.

If all of the intervention sample who receive 'Engagement' or 'Engagement &...' are summed we find the effective n for this intervention is 1000 (see right hand columns of Table 2). This is true for all interventions. Thus we maintain the required effective n for each intervention at 1000 but as the left hand side of Table 2 shows we only need to recruit 2750 households.

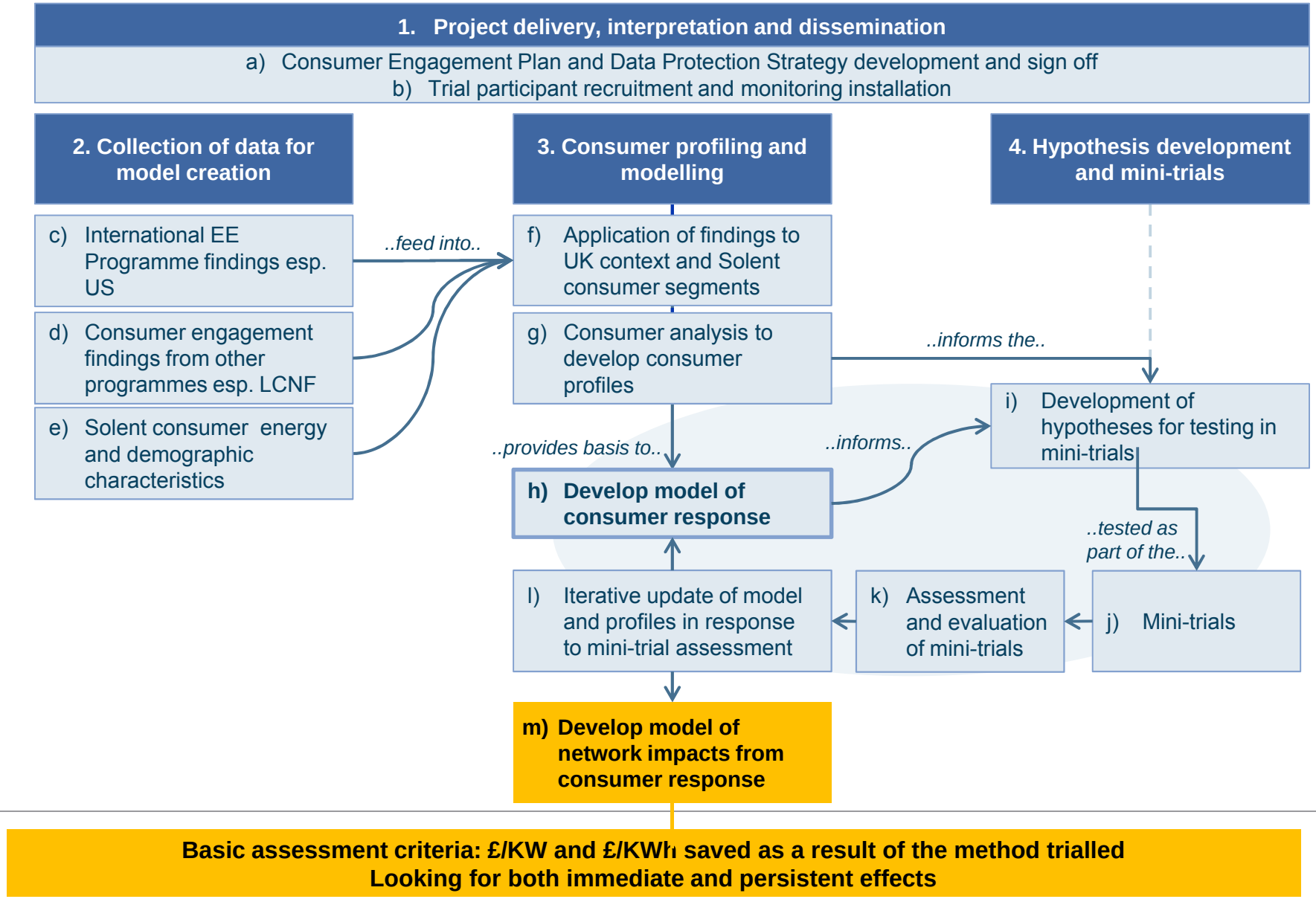
Table 2: Factorial approach –intervention groups combined to allow all combinations but maintain effective n of 1000 for each single intervention

		Actual n		Effective n
Pure intervention	Engagement	250	Sum of all with 'Engagement'	1000
	LED	250	Sum of all with 'LED'	1000
	DNO ToU	250	Sum of all with 'ToU'	1000
Combinations of interventions	Engagement + LED	250		
	Engagement + DNO ToU	250	Control	1000
	LED + DNO ToU	250		
	DNO ToU + engagement + LED	250	Sum (effective)	4000
	Control	1000		
	Sum (actual)	2750		

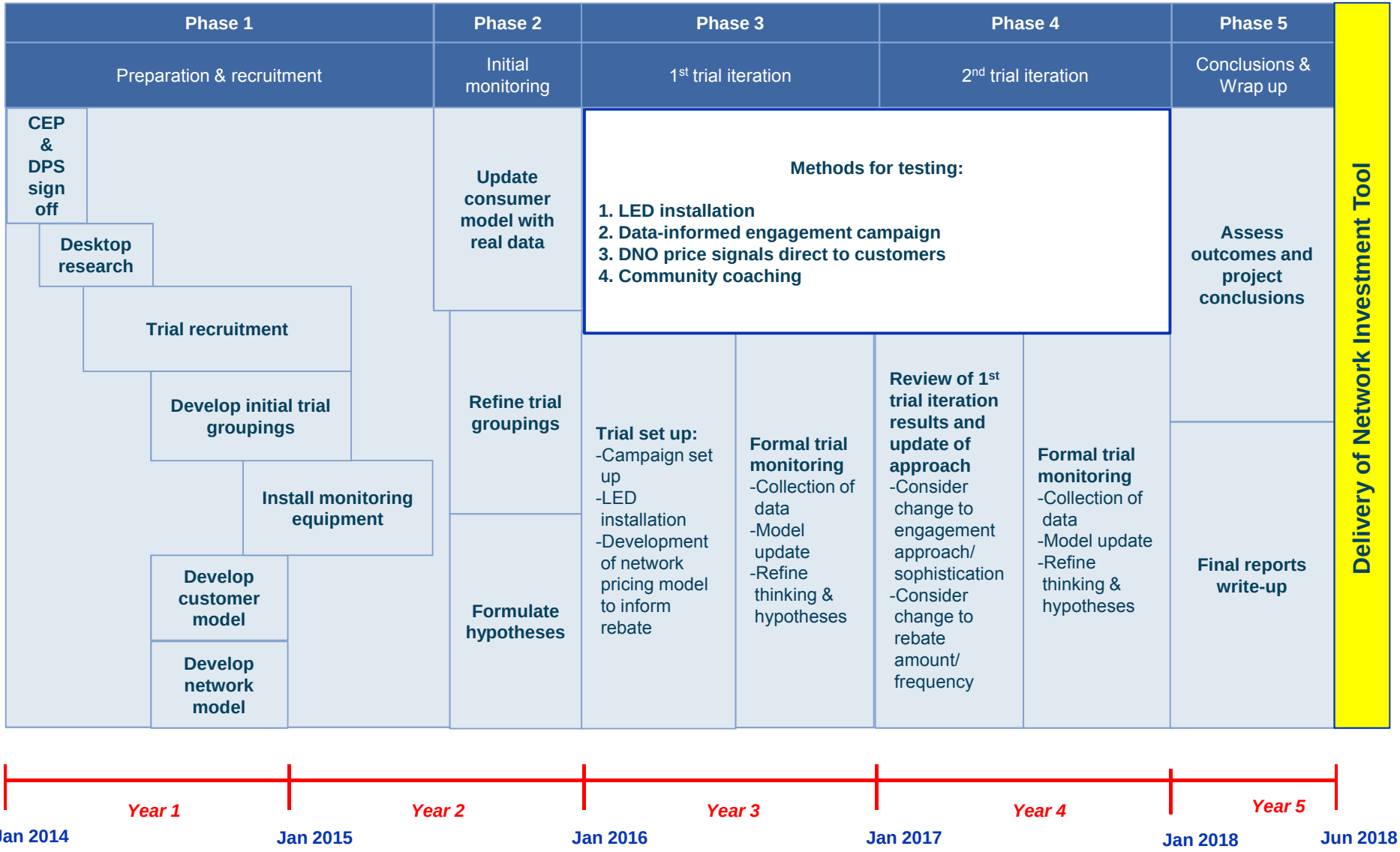
A disadvantage is that multivariate analytic techniques will be required to tease out the effects of the different interventions.

Therefore to meet the effect size of 7.5%, we will attempt to recruit up to 1000 properties per intervention, however if recruitment rates don't meet this level then we will employ a factorial design to ensure we are able to recruit an effective n of 1000 per intervention and still detect effect sizes of 7.5%.

Appendix J High-level project concept



Appendix K Project phasing diagram



Appendix L Maingate proposal

1 – Maingate

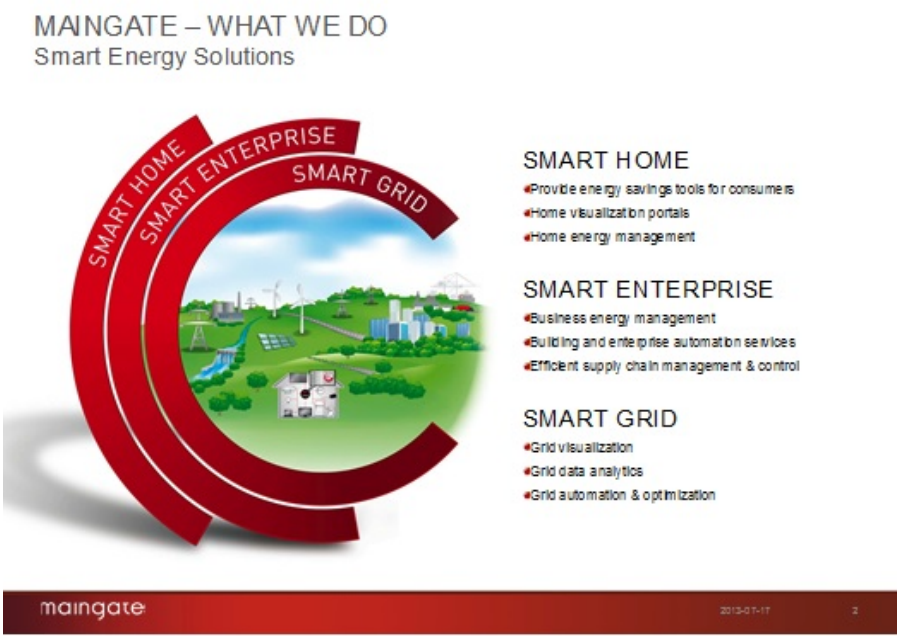


Figure 1 – Maingate Overview

Maingate has significant experience across the Smart Grid, Smart Home and Smart Enterprise and works with over 300 utilities daily, connecting almost 8 million energy users in real time. This is in addition to the 1,000+ industrial clients and our activities in the connected residential security and mobile payment gateway sectors. Maingate currently connects:

- 55% of all smart meters in Sweden
- 20% of all smart meters in Finland
- 70% of all mobile payments terminals in Sweden
- 40% of all residential alarms in Sweden

Our solutions enable a real-time overview of the energy consumption as well as access to historical data. The solution allows for user interaction, information management and device control.

VISUALISING ENERGY CONSUMPTION

Maingate's user interface, called UX, is straightforward and easy to use. Users access the system through any browsing device where they can look at the visualisations, analyse, compare and take actions on energy savings. Connections to social media help the customer (should they wish to) spread awareness of energy consumption (users are able to post their own data to enable friends/family to view and compare usage).

MANAGING CONSUMPTION DATA

Maingate gather all energy consumption data in a cloud-based solution called mVio, which supports information management and integration to other systems as well as data analytics and reporting.

EQUIPPING A SMART SOLUTION

Maingate provides hardware products measuring and collecting energy consumption data and ensures reliable and secure connections between devices and information management systems. An optical reader can be installed on non-smart meters. Smart plugs measure energy consumption on specific appliances or groups of appliances and can be used to switch them on and off. Thermostats are used to monitor and control the heating. The collected data is sent through a home gateway to Maingate's database. The visualisations are available through any browsing device.

Our focus is to develop customised energy solutions, based on our clients' specific requirements. Based on our capabilities and systems for Information Management, User Interaction and Device Access & Control, our energy solutions will benefit both our clients' end customers and their operations.

2 – Previous Projects

Maingate has established itself as a key partner in several high profile projects within Europe, with similar solutions and aims as those being trialled in the SAVE project. Maingate brings both knowledge gained from these trials as well as the technological capability to ensure that the trials can run with the levels of integration and data granularity required to prove the effectiveness of any methods being tested.

Examples of past projects include:

2.1 - E.ON, Sweden – Energy Visualisation and Customer Engagement

The concept is a real-time visualisation of energy consumption, which E.ON offers to the market under the name "100koll" (approx. 100% control). The concept gives consumers the ability to follow their consumption in real time and thus be able to influence it in order to lower their use, cost and environmental impact.

"Consumers must understand and be involved. For this to happen we need flexible tools that help consumers to understand the energy system and by doing so we'll get more active customers. The 100koll project is a first step in making the customer more aware" says Mr Anders Olsson, member of Executive Management E.ON Nordic.

The idea with the 100koll concept is to give consumers direct knowledge about their consumption, as close as real-time as possible. The knowledge is accessible in real time via any internet-enabled device.

"We believe this knowledge will lead to more active choices being made and that people will be able to identify unnecessary consumption and better understand the connection between consumption and cost", says Mrs Karin Rådegran, Project Manager 100koll, E.ON Retail.

The 100koll solution has proven to reduce energy consumption with an average of 11% in total during the pilot period and a high of more than 20% during specific active periods.

The table below shows actual results from a marketing campaign run by E.ON that supported the 100Koll project.

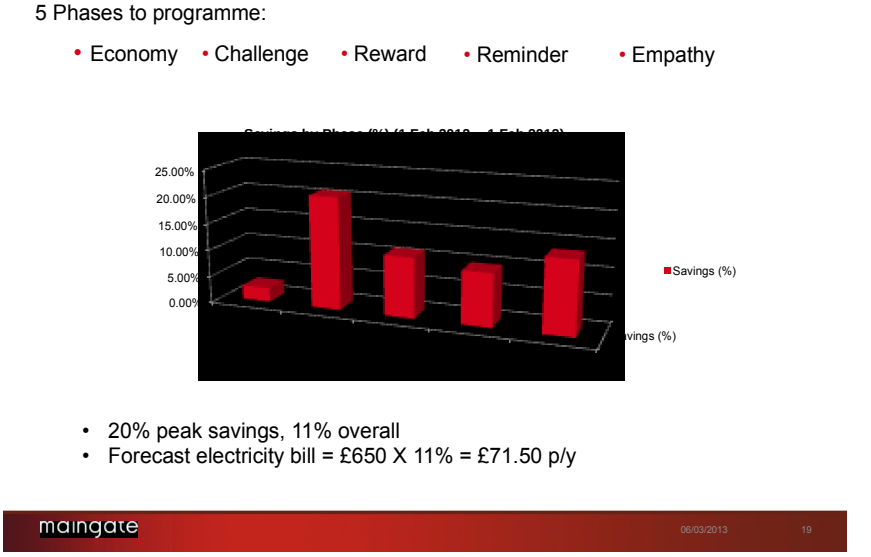


Figure 2 –Energy saving per phase.

Surprisingly, the idea of saving money yielded savings of around 5% yet challenging consumers, through peer or individual targets, yielded 20% in energy savings.

An example of how this approach was applied to individual consumers is the case of Lotta, a 29 years old single-occupancy householder. By combining the energy data produced through Maingate's solution with the customer data held by the utility, it was identified Lotta used as much energy as a multiple occupancy household. This gave the utility an opportunity to work with Lotta to educate and inform. The result of this was a reduction in energy consumption of over 70% and the utility now had a trusted relationship upon which they could start to offer new, chargeable, services to Lotta.

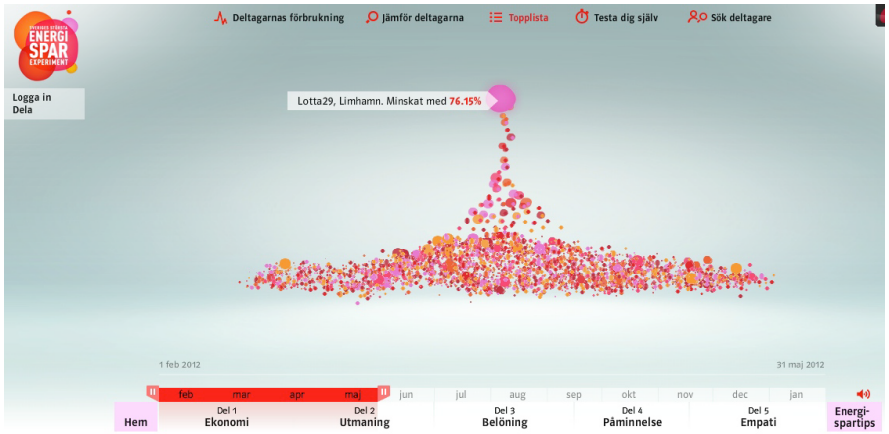


Figure 3 – Eon trial data – As can be seen, Lotta's consumption is considerably higher than the average for her peers.

Overall, this campaign is a classic example of the key stages to get a utility and customer from engagement to commercialisation:

- Improving the relationship consumers have with energy:
  - Energy ignorance
  - Energy engagement
  - Energy reduction
- Deepening the relationship and trust between consumer and utility:
  - Proactive communications with consumers to reduce energy consumption

- Reducing energy spend
- Helping consumers be as efficient with energy as possible

- A platform for new services that capitalises on the deeper, more trusted relationship:
  - Control of home devices
  - Automation and remote steering of home devices
  - Recipes/Scenarios to combine different data sources to provide a better, cheaper lifestyle for consumers

We are now working with E.ON to implement the platform for new revenue-based services.

2.2 - JM – one of Europe's largest social housing providers

Maingate provided real-time energy feedback in to the consumer's home. Using real-time data to compare one home against similar homes in the programme, users were alerted through red and green LEDs whether they were on par with their community, or using more energy.
With such as simple consumer interface, energy consumption across the community reduced by an average 12%, peaking at 17%.

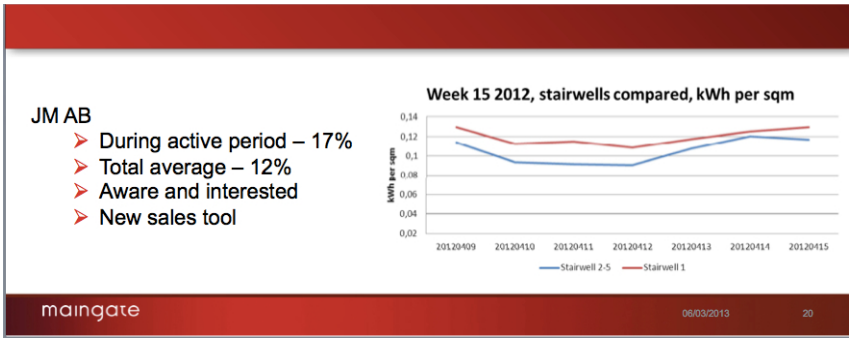


Figure 4 –Energy savings/consumption per period.

3 – Technology

The uniqueness of the Maingate solution is that it encompasses all aspects required from an end to end perspective with regard to the user experience, as detailed in the below high level diagram

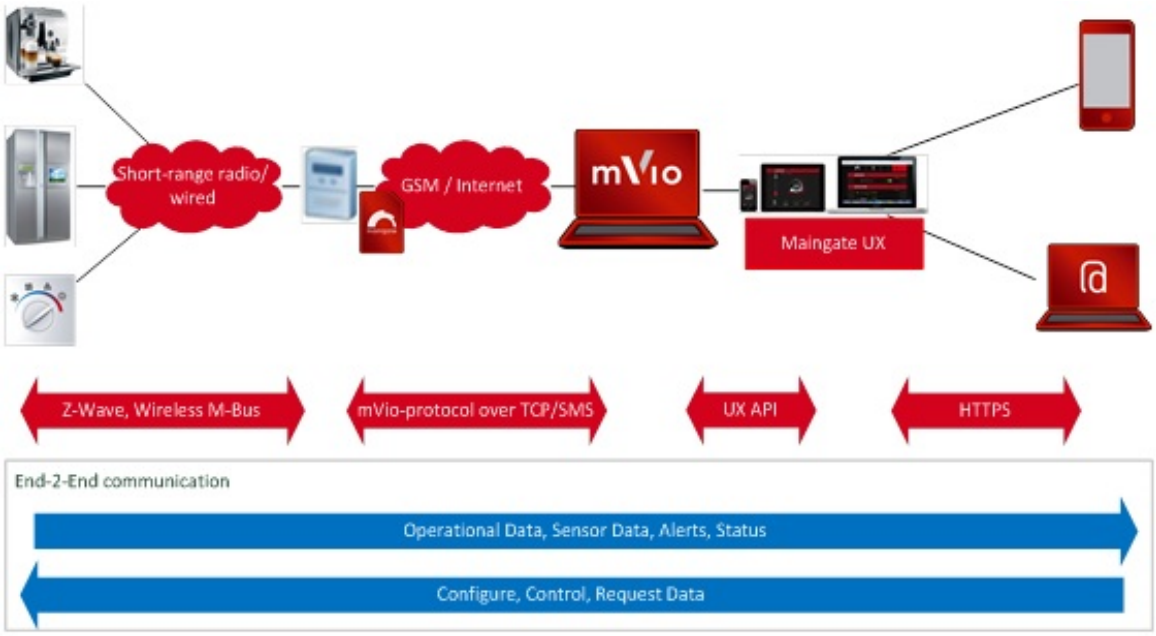


Figure 5 – E2E Coms Overview (excludes 3rd party integration)

The main components of the solution are:

- **Sensors and Actuators** – These are hardware components located on the premises that record respective data. The sensors each communicate with the Gateway in order to transmit the data to (and depending on functionality receive commands from) the mVio system. Below are examples of both smart plugs and optical sensors being used within the trials.

- **Smart Plugs**
  Maingate has been providing pioneering solutions for monitoring and control of energy use for over a decade. In doing so, we have deep experience in sourcing and developing products to seamlessly integrate with an end-to-end solution, at the same time as giving consumers a great experience.
  For appliance monitoring and control we integrate the Aeon Labs Smart Energy Switches:

With an unobtrusive small form factor, the Smart Energy Switch will not block other nearby AC sockets; it will report immediate wattage energy usage or kWh energy usage over a period of time using Z-Wave communications protocol.

- **Maingate Gateway** – The Gateway is also located within the premises and connects via a broadband router in order to communicate with the mVio system. The Maingate Gateway is currently able to support communication via the following standards:
  - Ethernet
  - Z-Wave
  - wMbus

  As the Gateway is able to support communication via various standards, this ensures that the solutions in place are not only flexible, but they are also scaleable (as additional devices can be included as and when required), and as the standards preferred are open, maximum interoperability is assured. The recommended Gateway is designed by Maingate and built by Gemalto, one of the world's biggest technology manufacturers and also a strategic partner of Maingate.

Maingate Gateway.

- **mVio** – Is the hub of the solution, and provides not only a data source for the aggregation of all data obtained but, the ability to integrate with third party data sources as well as offer API's to external trusted parties enabling data access. The below diagram illustrates not only mVio functionality, but internal and external integration points.

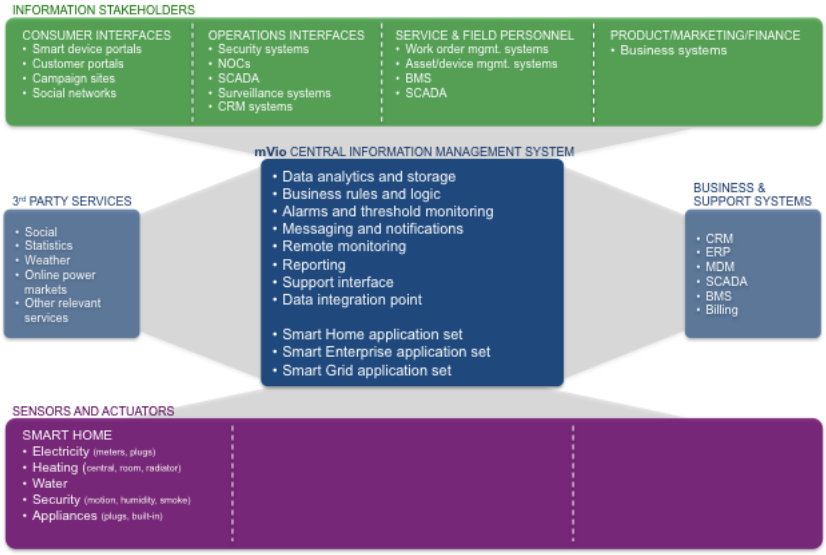


Figure 6 – mVio as the hub of the solution

As can be seen from the above, the mVio suite provides a central data source for any stakeholder to connect to as well as having the ability to perform data analytics and reporting. mVio is also capable of integration with 3rd parties to obtain data via feeds, this can range from usage data (e.g. via head end systems) to weather forecasts utilising many common formats e.g. XML).

mVio is hosted on a secure cloud platform which is both cost effective and highly scaleable and ensures that as such, initial costs can be kept to a minimum and increased in line with rollout/demand. mVio is a proven and stable platform that currently handles almost 8m energy user's data, securely managing access rights to various stakeholders including operations, marketing, consumers etc. In addition to this, mVio handles secure transaction data and provides stable services across 43 countries.

- **Maingate UX** – The Maingate UX allows access to not only real time data usage, but historical and projected usage based on information obtained from mVio and integrated sources. The UX provides a clear visual representation of not only total energy usage, but individual breakdowns of feeds obtained from the premises (i.e. from sensors and actuators).

  Example screenshots of the UX can be seen below detailing some of the display options available to the end user:

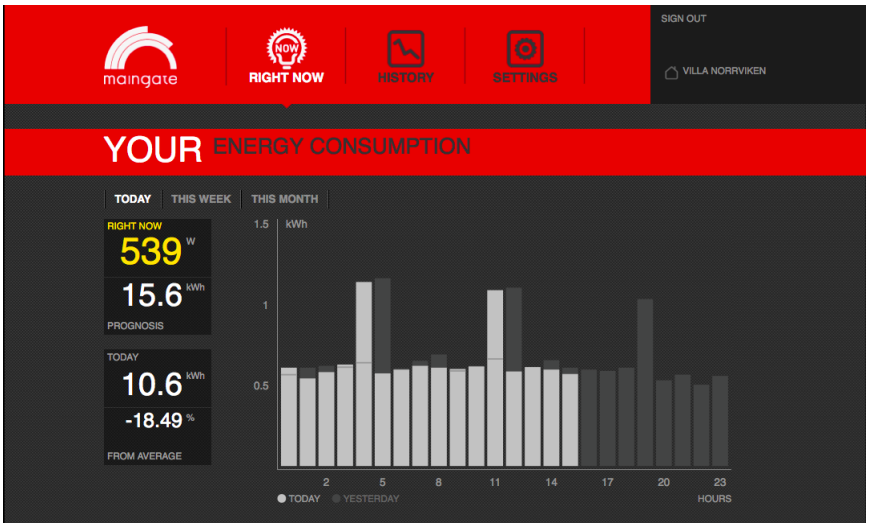


Figure 7 – Current Usage (light grey current, dark grey historic/not yet available)

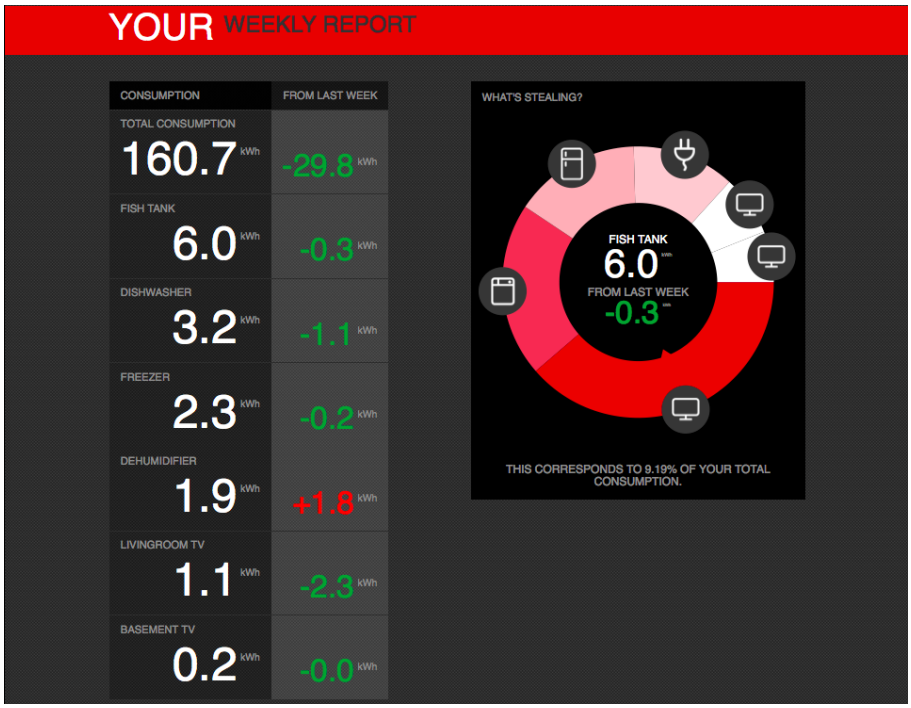


Figure 8 – Current Usage (with sensor input display)

4 – Solution Overview

The intended solution for the Save project consists of the following elements which fit in with the Maingate solution detailed within section 3 (figure 5), and consisting of the following components:

- Maingate Gateway – This will be installed in every home and connect via the homes ADSL router.
- Power Reader – This is an optical sensor capable of reading consumption from both mechanical and solid state meters. Power readers will also be installed in every home.
- Smart Plugs – Homes taking part in the Engagement trials will receive Smart Plugs to allow them to visualise and monitor their energy usage effectively (as shown in Figure 8, above).

The above hardware is easily installed by the end user, and comes with both comprehensive installation instructions and support. This installation method has been used successfully in previous trials, and will help not only simplify the rollout process within the SAVE project, but help in cost reduction (as home visits would be minimised).

In addition to the physical equipment being used within the solution, both mVio and the UX will be utilised:

- mVio – All data will be securely fed in to mVio as the data hub, either via the Gateway directly in to mVio, or via integration to head end systems (e.g. CGI via XML) to obtain read data from smart meters. All data will then be collated and presented to external parties in the same format to allow required data to be extracted. Any extracts will take place via secure API's presented by Maingate.
- UX – Given that the UX is tried and tested, with various visualisation methods (web/smartphone) it is envisaged that this will be utilised to display the data in a common format to all trial participants (other than the control group).

For detail on both upstream and downstream integration please refer to the dataflow diagram detailed within the main section of the proposal document.

4.1 – Data Feeds

As mentioned above, all data will be fed in to mVio there will be several data feeds, as shown in the following diagram.

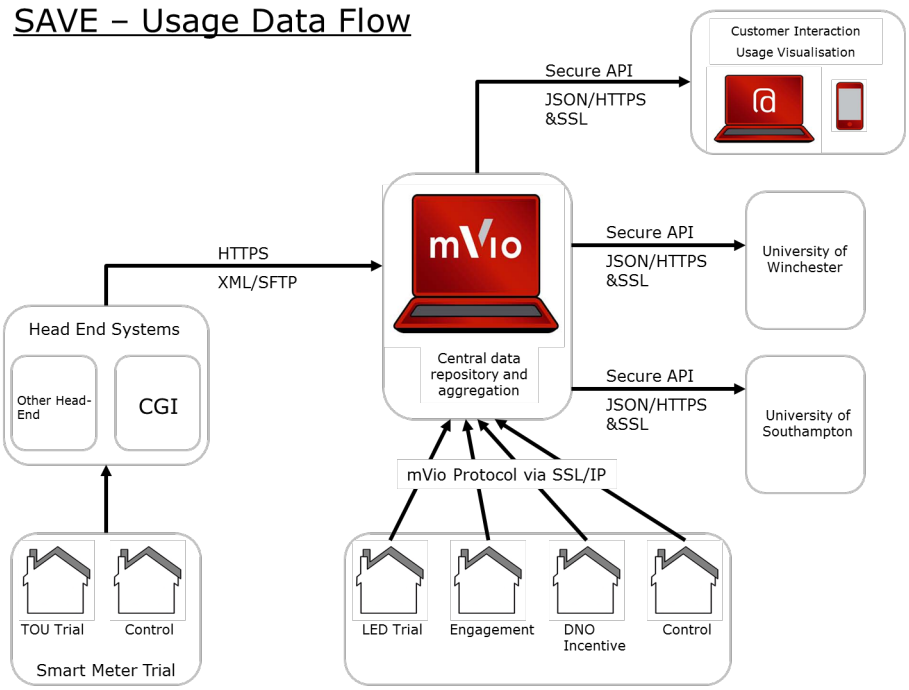


Figure 9 –SAVE data flows and mechanisms.

mVio is able to accept data in various formats for ease of integration, however for the SAVE project data will be transferred to trusted (authorised) parties using the following standard methods:

- XML Files via SFTP
- Restricted APIs (using access control, and authorisation to ensure data privacy using JSON/HTTPS&SSL)

Both of the above methods ensure that data security and privacy are ensured whenever data is either received in to mVio, or sent to trusted parties (e.g. authorised Academia). Although mVio will be the hub of all data feeds, mVio will not hold any personal data. All consumption data will have a customer/trial ID associated with it (an ID unique to the trial). This approach simplifies the process of removing data should any participant leave the trial.

5 - Security & Support

As previously mentioned, Maingate currently has both trials and long term solutions in place for various high profile clients dealing with highly sensitive data. To ensure the security of the data, continued client confidence, and regulatory adherence, Maingate has tight security protocols in place. An outline of the solution security can be found below, with all solutions regardless of scale adhering to the same policies and standards.

5.1 Security

All customer connections to Maingate are protected by controlled firewalls at all times. The access net at Maingate is considered a DMZ “De-Militarized Zone”, it is not as exposed as the real Internet but it is connected to the Internet via firewalls. Only users that are authorised via Login/Password mechanism are authorised to access mVio.

Maingate uses firewalls in two different levels. The first level of protection is the firewall connected directly to the Internet; this is where most attempts are made to attack the network. The second level of protection comes from the firewalls connected between the access net and the systems net.

5.1.1 Physical Security

The physical security of Maingate is based on redundant server systems with geographical dispersion. Maingate system components are placed in a Telco security grade server room in Sweden.

This server room is:

- Telecom certified.
- Fully manned 24/7 security.
- Redundant power – UPS and diesel generators.
- Fire protected.

5.1.2 Data security

The measurement data is stored in a noSQL cluster. The data in the cluster is automatically replicated to multiple nodes for fault-tolerance. Failed nodes can be replaced with no downtime. All data is also backed up.

The data is stored in a relational database. The data in the master node is replicated to a hot standby node. All data is also backed up.

5.1.3 Information security

The device management system is able to handle multiple enterprise customers. The data in the system is stored in a hierarchical structure where users only can traverse from their own root position; i.e. you can't access data above your own level in the structure, and ensuring that users can only access data that they are authorised to view ensuring security and separation.

An enterprise customer would login with a unique login to be able to access their end users. An end user must login with a unique login to be able to access their data.

5.1.4 Application security

All API request are performed in atomic transactions - if something goes wrong during a transaction all calls within the failed transaction are rolled back.

5.1.5 Network security

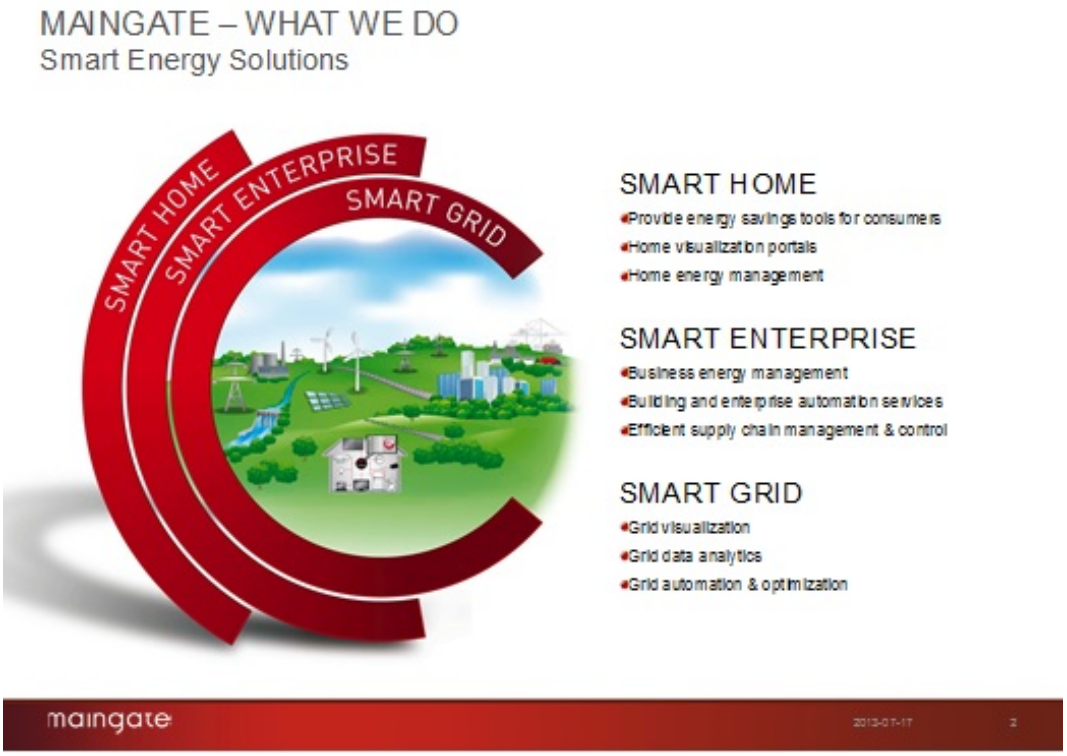
All calls through the user interface API are encrypted with SSL. The calls pass a firewall before they execute in the DCS.

- Calls between the Enterprise service bus and the device management system are unencrypted.
- Calls between the Device Communication Server and the Enterprise service bus pass through a firewall.
- Calls between the Gateway device and the DCS are encrypted with SSL and challenged by the DCS.
- The calls go through an internal firewall on each node of the cluster.

5.2 Support

Maingate has an existing support mechanism in place for current solutions including supporting trials and enterprise customers, this ensures the smooth running of all current operation solutions and trials. This same mechanism will be utilised for the support of the SAVE project.

Maingate Appendix – Summary



Maingate has significant experience across the Smart Grid, Smart Home and Smart Enterprise and works with over 300 utilities daily, connecting almost 8 million energy users in real time. This is in addition to the 1,000+ industrial clients and our activities in the connected residential security and mobile payment gateway sectors.

Maingate has been involved in various similar high profile projects within Europe, and brings the learnings from these projects combined with the proven track record of smart grid, enterprise and home. Maingate has experience of trials with various partners including suppliers such as E.ON and Vattenfall as well as projects with other partners such as housing associations (JM).

The solution proposed for the save project involves both hardware and software elements to enable accurate measurement and recording of energy usage. Optical sensors will be used to accurately record usage, which will then be sent to Maingate's mVio system which will act as a core central data store. mVio will take feeds from the Smart Meter Head-End Systems and aggregate this with other trial data sources ready for collection by the downstream systems (Acadmia) for analysis. Control groups will merely have energy usage recorded, whereas other groups will also have smart plugs to allow a more granular level of usage measurement. All usage information will be transmitted to the mVio system via a gateway within the customers home (as shown in section 3 above).

Given Maingate's proven track record with previous trials, together with existing solutions being in place, there are tried and tested procedures in place to ensure the security and confidentiality of data within Maingate systems. The solution is built on existing systems and methodologies, ensuring a robust trial with accurate data and secure flows.

THE COMMUNITY ENERGY COACHING PROGRAMME

Scottish and Southern Energy Power Distribution

NEIGHBOURHOOD ECONOMICS

energyinnovationcentre ...ideas into reality

START-UP MANUAL

Draft, April 2013

Appendix N Benefits Case

We have undertaken a number of scenarios to evaluate the expected impacts and benefits from the measures being deployed in the trials.

LEDs

Lighting is responsible for 11.5% domestic consumption (19% at evening peak). For a typical household, this demand is driven by 14 light bulbs, each with the power of 60 Watts. Our base case is assuming incandescent lighting and this is due to the slow transition to efficient fittings. There are still approximately 651million filament bulbs still in use in the UK (source: EST) and in any event LEDs are still a further 50% more efficient that CFLs. We therefore feel that this assumption is an honest estimate for our base case.

From our calculations the deployment of LEDs is a viable alternative for all scenarios bar HV minor works, where the number of customers and budget available do not make it financially viable.

Data-informed engagement

As discussed with the Expert Panel various projects, including the EON project in Sweden that utilised data to change customer behaviour, were reviewed. Taking an average result of a 11% overall reduction in demand and a 20% peak reduction we have used the conservative figure of 11% as the base for our calculations.

From our calculations the use of data-informed engagement is a viable alternative for all scenarios bar HV minor works and low cost HV major works, where the number of customers and budget available do not make it financially viable.

DNO price signals direct to customers plus data-informed engagement

Results of previous trials, such as the Customer Led Network Revolution, confirm that customers do react to price signals with reduction in the order of 8% on overall consumption and 14% on peak. The EON 100k project indicates larger reductions of 11% overall and 20% peak. A report by Sarah Darby, 2006, on the effectiveness of feedback on energy consumption suggested that even higher reductions will be required if we were to introduce dual interventions, therefore our baseline figure of 15% is seen as a very achievable figure for our assumptions and target.

Our calculations show that this measure is suitable for a localised deployment, as HV minor and HV major works.

Community Coaching

As part of SEPD's feasibility study, previous research has been reviewed and a number of discussions have been held with national interest bodies and research agencies regarding expected reductions, and as a result we expect 5-10% as a minimum reduction output for the SAVE project arising from typical interventions with up to 15% as a potential expectation.

Calculations have shown that due to the costs being spread across communities, this measure is not suitable for LV works or low cost HV minor works, with the greatest benefits coming where there is higher cost and customer numbers involved.

Note

It is important to note that the results of the scenarios do not take into account disruption costs when conducting traditional reinforcement works, which have been calculated to be between 20-40% of the capital cost. Additionally, they do not take into account demand profiles, diversity, changes in customer behaviour or sustainability of reduction, which will form a key part of the calculations in the project.

Please see below for scenarios and full workings, split into 5 sections:

1. **Base Case**

2. **Headroom Scenarios,**
   Small, Medium and Major Urban

3. **Part Two - Urban reinforcement scenarios**
   LV Minor, LV Major and HV Minor with Low, Average and High Costs

4. **Part Three - Rural reinforcement scenarios**
   LV Minor and LV Major only

5. **Part Four - Estimated Costs of EE Measures**
   Includes our estimated costs and assumptions

6. **Part Five - Scenarios using real networks**
   1. Reinforcement of 33kV circuit (Suburban)
   2. EV Connections (Urban)
   3. EV Connections (Rural)
   4. 7000 New Connections (Suburban)

SAVE PROJECT - Benefit Case Secenarios

Base figure Calculation

Assumptions and Reports

Average annual household consumption (kWhs per year)	4,226	4,226	4,226	4,226	*Source: DECC report: Energy Consumption in the UK (2013) in 2012 68% study of all houses in UK use gas heating with an average consumption of 4,226kwh*
Measure	**LEDs**	**Data informed engagement**	**DNO rebates**	**Community Coaching**	*We have therefore used a gas heated house in our base case*
Average annual household lighting consumption (kWhs per year)	634				*Lighting accounts for 15% of the energy consumption*
Expected total reduction (%)	10.5	11	15	15	*Expected % Reduction - based upon findings from previous research*
Expected annual reduction (kWhs per year)	444	465	634	634	*Reduction per customer*
Expected hourly reduction (kWhs)	0.05	0.05	0.07	0.07	*Reduction per customer*
Expected hourly reduction (Watts per hour)	5	5	7	7	*Reduction per customer*
Expected daily reduction (Watts per day)	122	127	174	174	*Reduction per customer*

Part One - Headroom scenarios

Small LV Urban

Daily reduction on LV cable with 150 customers (kW)	18	19	26	26	*Assumption average of 150 customers on LV Feeder*
Rating of circuit (kW)	200	200	200	200	*Assumption aAverage size of LV cable - 185 sqmm*
Headroom made available (%)	9.12	9.55	13.03	13.03	*% headroom on Cable*
Equivalent to connection a number of 3kW heat pumps or EVs now able to connect (without diversity)	6	6	9	9	*Potential for connection of additional load*

Major LV Urban

Daily reduction on HV substation with average 600 customers (kW)	73	76	104	104	*Assumption average of 600 customers on Distribution Substation*
Rating of circuit (kW)	1,000	1,000	1,000	1,000	*Assumption average size of distribution substation 1000kW*
Headroom made available (%)	7.29	7.64	10.42	10.42	
Equivalent to connecting a number of 3kW heat pumps or EVs now able to connect (without diversity)	24	25	35	35	*Potential for connection of additional load*

HV Urban

Daily reduction on HV circuit with average 6000 customers (kW)	729	764	1,042	1,042	*Assumption average of 6000 customers on High Voltage Circuit*
Rating of circuit (kW)	6,000	6,000	6,000	6,000	*Assumption average size of High Voltage Circuit 6MVA*
Headroom made available (%)	12.16	12.74	17.37	17.37	
Equivalent to connecting a number of 3kW heat pumps or EVs now able to connect (without diversity)	243	255	347	347	*Potential for connection of additional load - shown in the form Nos of Evs and Heat Pumps*

Part Two - Urban reinforcement scenarios

LV Minor

LV MINOR LOW COST

Cost of LV minor works (£)	45000	45000	45000	45000	*Taken from a review of historical works*
Maximum funds available to supply measures to 100 customers (£)	450	450	450	450	*Costs divided by number of customers to give budget available per customer*
Cost for measure per customer (£)	200	120	220	1467	*Cost of measure per customer*
Cost for measure for 100 customers (£)	20000	12000	22000	146667	*Cost of measure multiplied by number of customers*
Saved budget due to deferred reinforcement (£)	25000	33000	23000	-101667	*Budget saved as a result of deploying measure instead of traditional reinforcement*
GB LV minor works expected to be undertaken	11,436	11,436	11,436	11,436	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
GB cost of LV minor works (£)	514,620,000	514,620,000	514,620,000	514,620,000	*Cost of works multiplied by number of expected works in GB*
Potential number of GB LV minor works deferred by use of measure	1,144	1,144	1,144	1,144	*Assumption 10% of LV minor works*
Cost to reinforce suitable networks in GB (£)	51,462,000	51,462,000	51,462,000	51,462,000	*Cost of works multiplied by number of deferred works*
Cost to implement measure on suitable networks in GB (£)	22,872,000	13,723,200	25,159,200	167,728,000	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
GB saved budget due to deferred reinforcement (£)	28,590,000	37738800	26302800	-116266000	*Budget saved as a result of deploying measure instead of traditional reinforcement*

LV MINOR AVERAGE COST

Cost of LV minor works (£)	80,000	80,000	80,000	80,000	*Average Costs from Work Stream 3*
Maximum funds available to supply measures to 100 customers (£)	800	800	800	800	*Costs divided by number of customers to give budget available per customer*
Cost for measure per customer (£)	200	120	220	1467	*Cost of measure per customer*
Cost for measure for 100 customers (£)	20,000	12,000	22,000	146,667	*Cost of measure multiplied by number of customers*
Saved budget due to deferred reinforcement (£)	60,000	68,000	58,000	-66667	*Budget saved as a result of deploying measure instead of traditional reinforcement*
GB LV minor works expected to be undertaken	11,436	11,436	11,436	11,436	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
GB cost of LV minor works (£)	914,880,000	914,880,000	914,880,000	914,880,000	*Cost of works multiplied by number of expected works in GB*
Potential number of GB LV minor works deferred by use of measure	1,144	1,144	1,144	1,144	*Assumption 10% of LV minor works*
Cost to reinforce suitable networks in GB (£)	91,488,000	91,488,000	91,488,000	91,488,000	*Cost of works multiplied by number of deferred works*
Cost to implement measure on suitable networks in GB (£)	22,872,000	13,723,200	25,159,200	167,728,000	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
GB saved budget due to deferred reinforcement (£)	68,616,000	77,764,800	66,328,800	-76240000	*Budget saved as a result of deploying measure instead of traditional reinforcement*

LV MINOR HIGH COST

Cost of LV minor works (£)	110000	110000	110000	110000	*Taken from a review of historical works*
Maximum funds available to supply measures to 100 customers (£)	1100	1100	1100	1100	*Costs divided by number of customers to give budget available per customer*
Cost for measure per customer (£)	200	120	220	1467	*Cost of measure per customer*
Cost for measure for 100 customers (£)	20000	12000	22000	146667	*Cost of measure multiplied by number of customers*
Saved budget due to deferred reinforcement (£)	90000	98000	88000	-36667	*Budget saved as a result of deploying measure instead of traditional reinforcement*
GB LV minor works expected to be undertaken	11,436	11,436	11,436	11,436	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
GB cost of LV minor works (£)	1,257,960,000	1,257,960,000	1,257,960,000	1,257,960,000	*Cost of works multiplied by number of expected works in GB*
Potential number of GB LV minor works deferred by use of measure	1,144	1,144	1,144	1,144	*Assumption 10% of LV minor works*
Cost to reinforce suitable networks in GB (£)	125,796,000	125,796,000	125,796,000	125,796,000	*Cost of works multiplied by number of deferred works*
Cost to implement measure on suitable networks in GB (£)	22,872,000	13,723,200	25,159,200	167,728,000	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
GB saved budget due to deferred reinforcement (£)	102,924,000	112,072,800	100,636,800	-41932000	*Budget saved as a result of deploying measure instead of traditional reinforcement*

LV Major

LV MAJOR LOW COST	Cost of LV major works with transformer (£)	190,000	190,000	190,000	190,000	*Taken from a review of historical works*
	Maximum funds available to supply measures to 400 customers (£)	475	475	475	475	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	150	120	220	293	*Cost of measure per customer*
	Cost for measure for 400 customers (£)	60,000	48,000	88,000	117,333	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	130,000	142,000	102,000	72,667	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB LV major works expected to be undertaken	4,213	4,213	4,213	4,213	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of LV major works (£)	800,470,000	800,470,000	800,470,000	800,470,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB LV major works deferred by use of measure	421	421	421	421	*Assumption 10% of LV minor works*
	Cost to reinforce suitable networks in GB (£)	80,047,000	80,047,000	80,047,000	80,047,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	25,278,000	20,222,400	37,074,400	49,432,533	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	54,769,000	59,824,600	42,972,600	30,614,467	*Budget saved as a result of deploying measure instead of traditional reinforcement*

(Taken as example for the Main Net Benefits spreadsheet)

LV MAJOR AVERAGE COST	Cost of LV major works with transformer (£)	250,000	250,000	250,000	250,000	*Average Costs from Work Stream 3*
	Maximum funds available to supply measures to 400 customers (£)	625	625	625	625	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	150	120	220	293	*Cost of measure per customer*
	Cost for measure for 400 customers (£)	60,000	48,000	88,000	117,333	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	190,000	202,000	162,000	132,667	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB LV major works expected to be undertaken	4,213	4,213	4,213	4,213	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of LV major works (£)	1,053,250,000	1,053,250,000	1,053,250,000	1,053,250,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB LV major works deferred by use of measure	421	421	421	421	*Assumption 10% of LV minor works*
	Cost to reinforce suitable networks in GB (£)	105,325,000	105,325,000	105,325,000	105,325,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	25,278,000	20,222,400	37,074,400	49,432,533	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	80,047,000	85,102,600	68,250,600	55,892,467	*Budget saved as a result of deploying measure instead of traditional reinforcement*

LV MAJOR HIGH COST	Cost of LV major works with transformer (£)	290,000	290,000	290,000	290,000	*Taken from a review of historical works*
	Maximum funds available to supply measures to 400 customers (£)	725	725	725	725	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	150	120	220	293	*Cost of measure per customer*
	Cost for measure for 400 customers (£)	60,000	48,000	88,000	117,333	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	230,000	242,000	202,000	172,667	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB LV major works expected to be undertaken	4,213	4,213	4,213	4,213	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of LV major works (£)	1,221,770,000	1,221,770,000	1,221,770,000	1,221,770,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB LV major works deferred by use of measure	421	421	421	421	*Assumption 10% of LV minor works*
	Cost to reinforce suitable networks in GB (£)	122,177,000	122,177,000	122,177,000	122,177,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	25,278,000	20,222,400	37,074,400	49,432,533	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	96,899,000	101,954,600	85,102,600	72,744,467	*Budget saved as a result of deploying measure instead of traditional reinforcement*

HV Minor

HV MINOR LOW COST	Cost of HV minor works (£)	390,000	390,000	390,000	390,000	*Taken from a review of historical works*
	Maximum funds available to supply measures to 6000 customers (£)	65	65	65	65	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	100	120	220	73	*Cost of measure per customer*
	Cost for measure for 6000 customers (£)	600,000	720,000	1,320,000	440,000	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	-210,000	-330,000	-930,000	-50,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB HV minor works expected to be undertaken	1,292	1,292	1,292	1,292	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of HV minor works (£)	503,880,000	503,880,000	503,880,000	503,880,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB HV minor works deferred by use of measure	129	129	129	129	*Assumption 10% of LV minor works*
	Cost to reinforce suitable networks in GB (£)	50,388,000	50,388,000	50,388,000	50,388,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	77,520,000	93,024,000	170,544,000	56,848,000	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	-27,192,000	-42,636,000	-120,156,000	-6,460,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*

HV MINOR AVERAGE	Cost of HV minor works (£)	450,000	450,000	450,000	450,000	*Average Costs from Work Stream 3*
	Maximum funds available to supply measures to 6000 customers (£)	75	75	75	75	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	100	120	220	73	*Cost of measure per customer*
	Cost for measure for 6000 customers (£)	600,000	720,000	1,320,000	440,000	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	-150,000	-270,000	-870,000	10,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB HV minor works expected to be undertaken	1,292	1,292	1,292	1,292	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of HV minor works (£)	581,400,000	581,400,000	581,400,000	581,400,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB HV minor works deferred by use of measure	129	129	129	129	*Assumption 10% of LV minor works*
	Cost to reinforce suitable networks in GB (£)	58,140,000	58,140,000	58,140,000	58,140,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	77,520,000	93,024,000	170,544,000	56,848,000	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	-19,380,000	-34,884,000	-112,404,000	1,292,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*

HV MINOR HIGH COST	Cost of HV minor works (£)	490,000	490,000	490,000	490,000	*Taken from a review of historical works*
	Maximum funds available to supply measures to 6000 customers (£)	82	82	82	82	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	100	120	220	73	*Cost of measure per customer*
	Cost for measure for 6000 customers (£)	600,000	720,000	1,320,000	440,000	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	-210,000	-330,000	-930,000	50,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB HV minor works expected to be undertaken	1,292	1,292	1,292	1,292	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of HV minor works (£)	633,080,000	633,080,000	633,080,000	633,080,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB HV minor works deferred by use of measure	129	129	129	129	*Assumption 10% of LV minor works*
	Cost to reinforce suitable networks in GB (£)	63,308,000	63,308,000	63,308,000	63,308,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	77,520,000	93,024,000	170,544,000	56,848,000	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	-14,212,000	-29,716,000	-107,236,000	6,460,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*

HV Major

HV MAJOR LOW COST						
	Cost of HV major works (£)	700,000	700,000	700,000	700,000	*Taken from a review of historical works*
	Maximum funds available to supply measures to 6000 customers (£)	117	117	117	117	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	100	120	220	73	*Cost of measure per customer*
	Cost for measure for 6000 customers (£)	600,000	720,000	1,320,000	440,000	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	100,000	-120,000	-420,000	260,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB HV minor works expected to be undertaken	1,292	1,292	1,292	1,292	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of HV major works (£)	904,400,000	904,400,000	904,400,000	904,400,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB HV minor works deferred by use of measure	129	129	129	129	*Assumption 10% of LV major works*
	Cost to reinforce suitable networks in GB (£)	90,440,000	90,440,000	90,440,000	90,440,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	77,520,000	93,024,000	170,544,000	56,848,000	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	12,920,000	-2,584,000	-80,104,000	33,592,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*

HV MAJOR AVERAGE						
	Cost of HV major works (£)	900,000	900,000	900,000	900,000	*Average Costs from Work Stream 3*
	Maximum funds available to supply measures to 6000 customers (£)	150	150	150	150	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	100	120	220	73	*Cost of measure per customer*
	Cost for measure for 6000 customers (£)	600,000	720,000	1,320,000	440,000	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	300,000	180,000	-420,000	460,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB HV minor works expected to be undertaken	1,292	1,292	1,292	1,292	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of HV major works (£)	1,162,800,000	1,162,800,000	1,162,800,000	1,162,800,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB HV minor works deferred by use of measure	129	129	129	129	*Assumption 10% of LV major works*
	Cost to reinforce suitable networks in GB (£)	116,280,000	116,280,000	116,280,000	116,280,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	77,520,000	93,024,000	170,544,000	56,848,000	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	38,760,000	23,256,000	-54,264,000	59,432,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*

HV MAJOR HIGH COST						
	Cost of HV major works (£)	1,300,000	1,300,000	1,300,000	1,300,000	*Taken from a review of historical works*
	Maximum funds available to supply measures to 6000 customers (£)	217	217	217	217	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	100	120	220	73	*Cost of measure per customer*
	Cost for measure for 6000 customers (£)	600,000	720,000	1,320,000	440,000	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	700,000	580,000	-20,000	860,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB HV minor works expected to be undertaken	1,292	1,292	1,292	1,292	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of HV major works (£)	1,679,600,000	1,679,600,000	1,679,600,000	1,679,600,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB HV minor works deferred by use of measure	129	129	129	129	*Assumption 10% of LV major works*
	Cost to reinforce suitable networks in GB (£)	167,960,000	167,960,000	167,960,000	167,960,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	77,520,000	93,024,000	170,544,000	56,848,000	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	90,440,000	74,936,000	-2,584,000	111,112,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*

THE MODEL SHOWS THAT IN AN URBAN ENVIRONMENT MOST OF THE MEASURES ARE BETTER SUITED TO LV NETWORKS AND SOME HV NETWORKS, HOWEVER COMMUNITY COACHING DOES NOT WORK FOR LV MINOR SCENARIOS

Part Three - Rural reinforcement scenarios

Minor works

LV MINOR LOW COST						
	Cost of LV minor works (£)	45,000	45,000	45,000	45,000	*Taken from a review of historical works*
	Maximum funds available to supply measures to 20 customers (£)	2,250	2,250	2,250	2,250	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	200	120	220	1,467	*Cost of measure per customer*
	Cost for measure for 20 customers (£)	4,000	2,400	4,400	29,333	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	41,000	42,600	40,600	15,667	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB LV minor works expected to be undertaken	16,120	16,120	16,120	16,120	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of LV minor works (£)	725,400,000	725,400,000	725,400,000	725,400,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB LV minor works deferred by use of measure	1,612	1,612	1,612	1,612	*Assumption 10% of LV minor works*
	Cost to reinforce suitable networks in GB (£)	72,540,000	72,540,000	72,540,000	72,540,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	6,448,000	3,868,800	7,092,800	47,285,333	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	66,092,000	68,671,200	65,447,200	25,254,667	*Budget saved as a result of deploying measure instead of traditional reinforcement*

LV MINOR AVERAGE COST						
	Cost of LV minor works (£)	80,000	80,000	80,000	80,000	*Average Costs from Work Stream 3*
	Maximum funds available to supply measures to 20 customers (£)	4,000	4,000	4,000	4,000	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	200	120	220	1,467	*Cost of measure per customer*
	Cost for measure for 20 customers (£)	4,000	2,400	4,400	29,333	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	76,000	77,600	75,600	50,667	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB LV minor works expected to be undertaken	16,120	16,120	16,120	16,120	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of LV minor works (£)	1,289,600,000	1,289,600,000	1,289,600,000	1,289,600,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB LV minor works deferred by use of measure	1,612	1,612	1,612	1,612	*Assumption 10% of LV minor works*
	Cost to reinforce suitable networks in GB (£)	128,960,000	128,960,000	128,960,000	128,960,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	6,448,000	3,868,800	7,092,800	47,285,333	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	122,512,000	125,091,200	121,867,200	81,674,667	*Budget saved as a result of deploying measure instead of traditional reinforcement*

LV MINOR HIGH COST						
	Cost of LV minor works (£)	110,000	110,000	110,000	110,000	*Taken from a review of historical works*
	Maximum funds available to supply measures to 20 customers (£)	5,500	5,500	5,500	5,500	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	200	120	220	1,467	*Cost of measure per customer*
	Cost for measure for 20 customers (£)	4,000	2,400	4,400	29,333	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	106,000	107,600	105,600	80,667	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB LV minor works expected to be undertaken	16,120	16,120	16,120	16,120	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of LV minor works (£)	1,773,200,000	1,773,200,000	1,773,200,000	1,773,200,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB LV minor works deferred by use of measure	1,612	1,612	1,612	1,612	*Assumption 10% of LV minor works*
	Cost to reinforce suitable networks in GB (£)	177,320,000	177,320,000	177,320,000	177,320,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	6,448,000	3,868,800	7,092,800	47,285,333	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	170,872,000	173,451,200	170,227,200	130,034,667	*Budget saved as a result of deploying measure instead of traditional reinforcement*

Major Works

LV MAJOR LOW COST	Cost of LV major works with transformer (£)	190,000	190,000	190,000	190,000	*Taken from a review of historical works*
	Maximum funds available to supply measures to 120 customers (£)	1,583	1,583	1,583	1,583	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	200	120	220	1,467	*Cost of measure per customer*
	Cost for measure for 120 customers (£)	24,000	14,400	26,400	176,000	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	166,000	175,600	163,600	14,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB LV major works expected to be undertaken	5,939	5,939	5,939	5,939	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of LV major works (£)	1,128,410,000	1,128,410,000	1,128,410,000	1,128,410,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB LV major works deferred by use of measure	594	594	594	594	*Assumption 10% of LV minor works*
	Cost to reinforce suitable networks in GB (£)	112,841,000	112,841,000	112,841,000	112,841,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	14,253,600	8,552,160	15,678,960	104,526,400	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	98,587,400	104,288,840	97,162,040	8,314,600	*Budget saved as a result of deploying measure instead of traditional reinforcement*

LV MAJOR AVERAGE	Cost of LV major works with transformer (£)	250,000	250,000	250,000	250,000	*Average Costs from Work Stream 3*
	Maximum funds available to supply measures to 120 customers (£)	2,083	2,083	2,083	2,083	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	200	120	220	1,467	*Cost of measure per customer*
	Cost for measure for 120 customers (£)	24,000	14,400	26,400	176,000	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	226,000	235,600	223,600	74,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB LV major works expected to be undertaken	5,939	5,939	5,939	5,939	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of LV major works (£)	1,484,750,000	1,484,750,000	1,484,750,000	1,484,750,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB LV major works deferred by use of measure	594	594	594	594	*Assumption 10% of LV minor works*
	Cost to reinforce suitable networks in GB (£)	148,475,000	148,475,000	148,475,000	148,475,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	14,253,600	8,552,160	15,678,960	104,526,400	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	134,221,400	139,922,840	132,796,040	43,948,600	*Budget saved as a result of deploying measure instead of traditional reinforcement*

LV MAJOR HIGH COST	Cost of LV major works with transformer (£)	290,000	290,000	290,000	290,000	*Taken from a review of historical works*
	Maximum funds available to supply measures to 120 customers (£)	2,417	2,417	2,417	2,417	*Costs divided by number of customers to give budget available per customer*
	Cost for measure per customer (£)	200	120	220	1,467	*Cost of measure per customer*
	Cost for measure for 120 customers (£)	24,000	14,400	26,400	176,000	*Cost of measure multiplied by number of customers*
	Saved budget due to deferred reinforcement (£)	266,000	275,600	263,600	114,000	*Budget saved as a result of deploying measure instead of traditional reinforcement*
	GB LV major works expected to be undertaken	5,939	5,939	5,939	5,939	*Number of networks at risk in GB and reinforcements expected to be required (source: OFGEM Report - Assessing the Impact of Low Carbon Technology on the Electrical Networks - August 2012)*
	GB cost of LV major works (£)	1,722,310,000	1,722,310,000	1,722,310,000	1,722,310,000	*Cost of works multiplied by number of expected works in GB*
	Potential number of GB LV major works deferred by use of measure	594	594	594	594	*Assumption 10% of LV minor works*
	Cost to reinforce suitable networks in GB (£)	172,231,000	172,231,000	172,231,000	172,231,000	*Cost of works multiplied by number of deferred works*
	Cost to implement measure on suitable networks in GB (£)	14,253,600	8,552,160	15,678,960	104,526,400	*Cost of measure for LV minor works with 100 customers multiplied by number of deferred works*
	GB saved budget due to deferred reinforcement (£)	157,977,400	163,678,840	156,552,040	67,704,600	*Budget saved as a result of deploying measure instead of traditional reinforcement*

THE MODEL SHOWS THAT MOST OF THE MEASURES ARE BETTER SUITED TO LV NETWORKS HOWEVER COMMUNITY COACHING ONLY WORKS FOR HV MINOR WORKS

Part Four - Estimated Costs of EE Measures

Estimated measure costs per property

EE Measure	Cost £ (per Customer)	Assumptions and Comments
LED		
100 units	200	Costs for the LED Solution include for the bulbs and install fees
500 units	150	Discounted for the larger installation area and numbers of cutomers
5000 units	100	Information provided by our project partner
Data informed engagement		
100	120	Costs include for management, design and implimentation of campaigns
500	120	Assume Smart Meters installed so no monitoring required, (£220k / 2000 customers per year)
5000	120	(£220k / 2000 customers per year = £120 per customer)
DNO rebates		
100	220	Management and designing campaigns plus incentives
500	220	Assume Smart Meters installed so no monitoring required,
5000	220	(£220k / 2000 customers per year + £100 Incentive = £220 per customer)
Community Coaching		
100	1467	Costs are broken down costs from NE proposal
500	293	Community/ Stakeholder Engagement, Coach, Management (£440k / 3year/ no of customers)
5000	73	

Part Five - Scenarios using real networks

1. Reinforcement of 33kV circuit (Suburban)

Cost of HV minor works (£)	1,200,000	1,200,000	1,200,000	1,200,000	*Average Cost of EHV Reinforcement*
Number of customers connected	7,352	7,352	7,352	7,352	*No of Customers supplied from Primary Substation*
Maximum funds available to supply measures per customer (£)	163	163	163	163	
Cost for measure per customer (£)	100	120	220	73	
Overall Cost for measure as alternative (£)	735,200	882,240	1,617,440	539,147	
Saved budget due to deferred reinforcement (£)	464,800	317,760	-417,440	660,853	*Savings (£'s) with Intervention*
Rating of circuit (kW)	22,000	22,000	22,000	22,000	*Average size of EHV Circuit*
Forecast max demand	22,000	22,000	22,000	22,000	*Existing Loads - more anticipated*
Headroom made available (kW)	2,310	2,420	3,300	3,300	*Headroom on Cable*
New forecast max demand	19,690	19,580	18,700	18,700	
Equivalent to connection a number of 3kW heat pumps or EVs now able to connect (without diversity)	770	806	1,100	1,100	*Indicative only - Potential for connection of additional load*

THIS MODEL SHOWS THAT ALL MEASURES BAR DNO REBATES DEFER REINFORCEMENT AND BRINGS THE 33KV CIRCUIT BACK TO WITHIN ACCEPTABLE LIMITS, ALTHOUGH IT DOES NOT FACTOR IN DISRUPTION COSTS, WHICH COULD BE APPROXIMATELY £100K AND FURTHER IMPROVE THE COST BENEFIT OF DEPLOYING ENERGY EFFICIENCY MEASURES

2. EV Connections (Urban)

Cost of LV minor works (£)	80,000	80,000	80,000	80,000	*Average Cost of LV Minor Works*
Maximum funds available to supply measures to 374 customers (£)	214	214	214	214	*Number of Customers connected to the Network*
Cost for measure per customer (£)	200	120	220	293	
Cost for measure for 374 customers (£)	74,800	44,880	82,280	109,707	
Saved budget due to deferred reinforcement (£)	5,200	35,120	-2,280	-29,707	*Savings (£'s) with Intervention*
Rating of circuit (kW)	306	306	306	306	*Average size of LV Circuit*
Forecast max demand	330	330	330	330	*Anticipated increase in Demand*
Headroom made available (kW)	32	34	46	46	*Headroom on Cable*
New forecast max demand	298	296	284	284	
Equivalent to connection a number of 3kW heat pumps or EVs now able to connect (without diversity)	10	11	15	15	*Indicative only - Potential for connection of additional load*

THE ABOVE MODEL INDICATES THAT LEDs, DATA INFORMED ENGAGEMENT AND DNO REBATES REDUCE THE REQUIRED REINFORCEMENT COSTS, ALTHOUGH IT DOES NOT FACTOR IN DISRUPTION COSTS, WHICH COULD BE BETWEEN £20-50K AND FURTHER IMPROVE THE COST BENEFIT OF DEPLOYING ENERGY EFFICIENCY MEASURES

3. EV Connections (Rural)

Cost of Rural minor works (£)	45,000	45,000	45,000	45,000	*Average Cost of LV Minor Works*
Maximum funds available to supply measures to 128 customers (£)	352	352	352	352	*Number of Customers connected to the Network*
Cost for measure per customer (£)	200	120	220	1,467	
Cost for measure for 128 customers (£)	20,000	12,000	22,000	146,667	
Saved budget due to deferred reinforcement (£)	25,000	33,000	23,000	-101,667	*Savings (£'s) with Intervention*
Rating of circuit (kW)	242	242	242	242	*Average size of LV Circuit*
Forecast max demand	229	229	229	229	*Anticipated increase in Demand*
Headroom made available (kW)	25	27	36	36	*Headroom on Cable*
New forecast max demand	204	202	193	193	
Equivalent to connection a number of 3kW heat pumps or EVs now able to connect (without diversity)	8	8	12	12	*Indicative only - Potential for connection of additional load*

THE ABOVE MODEL INDICATES THAT LEDs, DATA INFORMED ENGAGEMENT AND DNO REBATES REDUCE THE REQUIRED REINFORCEMENT COSTS, ALTHOUGH IT DOES NOT FACTOR IN DISRUPTION COSTS, WHICH COULD BE BETWEEN £20-50K AND FURTHER IMPROVE THE COST BENEFIT OF DEPLOYING ENERGY EFFICIENCY MEASURES

4. 7000 New Connections (Suburban)

Cost of EHV major works (£)	2,000,000	2,000,000	2,000,000	2,000,000	*Average Cost of EHV Reinforcement*
Maximum funds available to supply measures to 10000 EXISTING customers (£)	200	200	200	200	*No of Customers supplied from Primary Substation*
Cost for measure per customer (£)	140	120	220	146	
Cost for measure for 10000 customers (£)	1,400,000	1,200,000	2,200,000	1,460,000	
Saved budget due to deferred reinforcement (£)	600,000	800,000	-200,000	540,000	*Savings (£'s) with Intervention*
Rating of circuit (kW)	60,000	60,000	60,000	60,000	*Average size of EHV Circuit*
Forecast max demand	49,000	49,000	49,000	49,000	*Existing Loads - more anticipated*
Headroom made available (kW)	6,300	6,600	9,000	9,000	*Headroom on Cable*
New forecast max demand	42,700	42,400	40,000	40,000	
Equivalent to connection a number of 3kW heat pumps or EVs now able to connect (without diversity)	2,100	2,200	3,000	3,000	*Indicative only - Potential for connection of additional load*

THIS MODEL INDICATES THAT WHILST DEPLOYING THE MEASURES WOULD NOT REDUCE DEMAND ON THE CIRCUIT ENOUGH TO NEGATE THE MAJOR WORKS TO CONNECT 7000 PROPERTIES, IT WOULD ENABLE THE DNO TO BUILD A SMALLER SUBSTATION AND USE SMALLER CABLES. ALTERNATIVELY IT WOULD ALLOW THE CONNECTION OF LARGE NUMBERS OF EVs OR HEAT PUMPS

Appendix O Partner information

Organisation	**Future Solent**
Relationship to DNO (if any)	There is no ownership relationship between DNO and the collaborator.
Type of Organisation	Future Solent is a joint initiative by the Solent LEP, PUSH and Hampshire Chamber of Commerce responsible for the development and delivery of the low carbon plans in the Solent area. Future Solent aims to bring together a variety of initiatives, activities and projects from Local Authorities, large and small businesses, universities and colleges in the Solent and Isle of Wight area.
Role in Project	Future Solent's role in the project provides credibility and the ability to broker with businesses, local authorities and academia. Future Solent will provide some of the services required to implement the outputs of the SAVE project in the form of access to information on communities and having an active dialogue with businesses and local authorities. Furthermore, Future Solent brings private sector commitment and support.
Prior experience brought to Project	Future Solent has successfully developed and implemented a handful of projects which currently assist the UK SME supply chain. Future Solent has a unique insight into the challenges of growth on local infrastructure and is proactively addressing these by participating in the project. Future Solent's intellectual capital and regional experience will leverage lessons from outside the Solent region and ensure UK's continued leadership in the sector moving forward.
Funding	Future Solent will contribute 'in kind' assistance where appropriate in relation to its resources available, comprising labour, data collections, networking and marketing and promotion of the SAVE project.
Contractual relationship	**Will the DNO have a contr act in place which ensures the External Collaborator complies with the LCN Fund Governance Document?** No
External Collaborator benefits from the Project	Future Solent will see the benefits from the project as it will prepare electricity networks for supporting a range of low carbon initiatives and will also see business and local communities compliment each other's energy spectrum. By increasing resilience in networks to improve supply security, increases local sustainable generation and delivery efficiency benefits through investment in low carbon. Furthermore, Future Solent will also establish a strategic dialogue between local communities and DNOs.

Organisation	**University of Southampton**
Relationship to DNO (if any)	There is no ownership relationship between DNO and the collaborator. Collaborator is an existing, legally arms-length supplier to DNO.
Type of Organisation	Collaborator is a university dealing with research and development
Role in Project	Our role will be in construction of the engagement survey, data analysis and reporting and the development of the model and initial disaggregated demand-response scenarios based on appropriate statistical and analytical GIS tool. An interactive web-mapping based tool will then be developed to allow partners to interrogate the results of these scenarios and to undertake their own simulations using variations of the implemented models and scenarios. Downloading of area level results for input to internal DNO models will be supported.
Prior experience brought to Project	The University's Faculty of Engineering and the Environment has a strong track record of driving research in the areas of renewable energy, energy efficiency and consumption (user behaviour) as well as in the generation of tools to support industry and practitioners to achieve optimal solutions in these areas. Within the Faculty, the Sustainable Energy Research Group (SERG) and the Energy and Climate Change Division ECCD (see www.energy.soton.ac.uk), bring together a unique combination of skills and expertise to identify approaches and solutions to address the relevant aspects of the themes of the proposal. The ECCD team is working extensively to promote the low carbon route for cities and regions. The team's research projects encompass the study of eco-city development, resource assessment, technology pathways for producing/conserving energy, forward planning, and social and economic studies required in establishing eco-regions -both within the UK and internationally. In addition, ECCD/SERG brings to the project a wealth of experience gained through previous and current funded programme in areas which has relevance to the SAVE project. These are programmes are listed in Appendix S – UoS Track record and role in the project.
Funding	Collaborator will contribute £X to support X PhD studentships as benefit in kind to the project, comprising labour, facilities, and services.
Contractual relationship	**Will the DNO have a contract in place which ensures the External Collaborator complies with the LCN Fund Governance Document?** SEPD and University of Southampton are engaged in negotiation and targeting signature prior to funding award.
External Collaborator benefits from the Project	University of Southampton will benefit through: (i) Learning outcomes that will drive research and development, the creation of capacity in energy efficiency, development of courses, publications, and societal impacts (ii) LCNF projects are integral to UK's future Grid roadmap providing exemplars in technology adoption facilitating further development and research (iii) Regional impacts through adoption of measures identified within the project and (iv) the creation low carbon networks domain leadership at building, community, city and regional levels.

Organisation	**DNV KEMA Ltd**
Relationship to DNO (if any)	There is no ownership relationship between DNO and the collaborator. Collaborator is an existing, legally arms-length supplier to DNO.
Type of Organisation	DNV KEMA Energy & Sustainability specialises in providing world-class, innovative solutions in the fields of business & technical consultancy, testing, inspections & certification, risk management, and verification. DNV KEMA is part of DNV, a global provider of services for managing risk with more than 10,000 employees in over 100 countries.
Role in Project	DNV KEMA will undertake the following roles: • Project Design Authority, including the methodology and technical co-ordination across the project • Management of the project customer engagement, including the strategy and planning, provision of the customer engagement lead, and reporting on the customer engagement trials • Research into international Energy Efficiency programmes, and LCNF programme learning on consumer engagement • Evaluation and assessment including Project Summary report, Network Toolkit outcomes report, LED trials report, Network Rebate Trials report
Prior experience brought to Project	DNV KEMA brings the following experience to the project: • Customer engagement learning from the similar role carried out for the LCNF Thames Valley Vision project • Smart Energy experience and stakeholder engagement capability from programmes such as Smart Energy Collective in the Netherlands, and EVs in Germany and US • Energy Efficiency programmes learning from the US, including trial design and evaluation where we have several hundred project references • Results analysis, e.g. for PowerMatching City in Holland
Funding	DNV KEMA has applied a X% discount to its standard rates.
Contractual relationship	**Will the DNO have a contract in place which ensures the External Collaborator complies with the LCN Fund Governance Document?** Yes Collaborator engaged in negotiation and targeting signature prior to funding award.
External Collaborator benefits from the Project	As a result of participation in the project DNV KEMA will apply learning and experience from the project in, for example: • The application of Energy Efficiency schemes in the UK and Europe, including a focus on user benefits • Enhanced Consumer Engagement strategies

Organisation	**Wireless Maingate ("Maingate")**
Relationship to DNO (if any)	There is no ownership relationship between DNO and Maingate. Maingate is an existing, legally arms-length supplier to DNO.
Type of Organisation	Founded in 1998, Maingate is the world's first service operator specialising in secure and scalable management solutions that connect people, machines, and information. Our solutions provide end-to-end network control for energy service and industrial companies. See Appendix L for further details on this and all other areas of information.
Role in Project	With respect to the SAVE project, we will be sharing our unique insight in two main areas: 1) Consumer engagement for energy reduction, via provision of our technical solutions 2) Maingate's open-architecture platform will sit at the heart of the project acting as the central data repository. The platform is open, robust and proven and will add significant value to SAVE and bring to life the data flows from all silos, solutions and systems 3) We will apply our learning and expertise from other countries to the SAVE project
Prior experience brought to Project	• Currently working with around 300 Utilities across Grid, Metering and Home • Nearly 8 million energy user's data passing through our systems in real time currently • Technology solutions served to 1,000 clients in over 40 countries • 55% of all smart meters in Sweden are connected to Maingate • 20% of all smart meters in Finland • 70% of all mobile payments are passed through Maingate's systems • 40% of all residential alarms in Sweden are connected through Maingate
Funding	Maingate will contribute £X as benefit in kind to the project, comprising labour, facilities and discounted products and services.
Contractual relationship	**Will the DNO have a contract in place which ensures the External Collaborator complies with the LCN Fund Governance Document?** Yes Collaborator engaged in negotiation and targeting signature prior to funding award.
External Collaborator benefits from the Project	Maingate will benefit from the project as: (i) LCNF projects are integral to UK's Smart Grid roadmap and accelerated technology adoption, (ii) learning outcomes will drive national adoption of technologies, (iii) LCNF is leveraged as an exemplar of regulatory incentives across Europe, and (iv) LCNF positions UK as the thought leader in the low carbon networks domain.

Appendix P Sample of letters of support from partners

The SAVE project has received letters of support from the following partners:

- University of Southampton
- DNV KEMA
- Wireless Maingate (“Maingate”)
- Future Solent

In this Appendix are letters of support from DNV KEMA and the University of Southampton.

All letters of support are available upon request.

DNV KEMA Ltd
Palace House
3 Cathedral Street
London
SE1 9DE

OFGEM
Low Carbon Network Fund Panel
9 Millbank
London
SW1P 3GE

Subject: SEPD's 2013 Low Carbon Network Fund Bid "SAVE"

Dear Sirs

We are delighted to provide this letter of support on behalf of DNV KEMA. We have worked closely with SEPD and its partners in the preparation of this proposal to deliver a project which will greatly assist distribution companies understanding of the impact demand management will have in reducing network reinforcement costs and increase operational efficiency.

On behalf of DNV KEMA we are pleased to provide this letter of support for the SAVE LCNF bid by SEPD. In contributing to the bid, we have been impressed by the strength of the proposed partnership of SEPD, the University of Southampton, Maingate Solutions and ourselves, and believe it brings together the depth and breadth of skills and expertise required to deliver the level of innovation necessary to develop solutions for the low carbon sector.

We are pleased to support the SAVE bid and look forward to working with the SAVE project team in the very near future.

Rob Wilhite
Global Director
DNV KEMA group

Martin Chitty
Director
DNV KEMA Ltd

UNIVERSITY OF Southampton

Ofgem - London
9 Millbank,
London,
SW1P 3GE

Wednesday 31st July 2013

Dear Ofgem

RE: Solent Achieving Value from Efficiency (SAVE)

I am writing, in my capacity as Dean of the Faculty of Engineering and the Environment, in support of the above consortium proposal led by Scottish and Southern Energy Power Distribution. I feel this proposal will result in a robust understanding in relation to the extent that energy efficiency measure interventions can be utilised as a cost effective, predictable and sustainable tool for managing electrical network peak demand as an alternative to network reinforcement.

Energy is one of the pillars of the University's research activity and is supported centrally through one of the University's strategic themes for research and development. The aim of the University's research strategy is to develop and maintain an intellectual and physical environment that fosters and supports world-leading cross-disciplinary research in areas where Southampton has an outstanding track record of achievement, such as energy, The University will also continue to support and build the strength of the many individual disciplines that underpin our multidisciplinary research encompassing both national and international collaboration.

Meeting our current and future energy needs, whether regional national, or international, will create a demand for engineers and scientists with the necessary cross-disciplinary planning and integrating skills as well as technical expertise. The University's Faculty of Engineering and the Environment has a strong track record of driving research in the areas of renewable energy, energy efficiency and consumption (user behaviour) as well as in the generation of tools to support industry and practitioners to achieve optimal solutions in these areas. Within the Faculty, the Sustainable Energy Research Group and the Energy and Climate Change Division ECCD (see www.energy.soton.ac.uk), bring together a unique combination of skills and expertise to identify approaches and solutions to address the relevant aspects of the themes of the proposal. The ECCD team is working extensively to promote the low carbon route for cities and regions. The team's research projects encompass the study of eco-city development, resource assessment, technology pathways for producing/conserving energy, forward planning, and social and economic studies required in establishing eco-regions -both within the UK and internationally

The University recognises the importance of energy efficiency as a means to reduce carbon emissions and conserve resources as well as the benefits gained through the introduction of such measures by the network operators. The University is fully committed to support the SAVE project and will provide finding for [redacted] PhD studentships valued at around £[redacted], in the areas covered during the term of this proposal.

I feel the SAVE proposal is based on a strong consortium combining industry and academia, providing the necessary skills, expertise and experience for the successful execution of the project.

Should you have any further questions regarding the above, please do not hesitate to contact me.

Yours sincerely

Professor William Powrie FREng
Dean of the Faculty of Engineering and the Environment

Faculty of Engineering and the Environment, Highfield Campus, University of Southampton, SO17 1BJ United Kingdom
Tel: +44 (0)23 8059 5000 Fax: +44 (0)23 8059 3131 www.southampton.ac.uk/engineering

Appendix Q
The University of Southampton (UoS)
Track Record and Role in the Project

The University of Southampton (www.soton.ac.uk) is one of the UK's top 10 research-led universities, with a global reputation for excellence in both teaching and research and first-rate opportunities and facilities across a wide range of subjects in science and engineering, health, arts and humanities. The University has over 20,000 students and 5,000 staff at its 5 campuses in Southampton and Winchester. Its annual turnover is in the region of £440 million and has one of the highest UK's Research Councils' grant income. The University is at the forefront of energy studies including sustainable power generation and energy demand reduction at the housing, community and city levels. The SAVE project is closely aligned with the University of Southampton's strategy to grow our Faculty of Engineering and the Environment, one of the key strengths of the institution. In addition, the proposal fits with several of the University's strategic research groups, including Energy and Sustainability Science. The research and development within these areas ar conducted within the *Energy and Climate Change Division* (ECCD) encompassing the Sustainable Energy Research Group; (SERG), which was established in 1990 (www.energy.soton.ac.uk).

Within SAVE, ECCD will bring in a wealth of expertise gained through funded research programmes in energy demand reductions. Our role will be in construction of the engagement survey, data analysis and reporting and the development of the model and initial disaggregated demand-response scenarios based on appropriate statistical and analytical GIS tool. An interactive web-mapping based tool will then be developed to allow partners to interrogate the results of these scenarios and to undertake their own simulations using variations of the implemented models and scenarios. Downloading of area level results for input to internal DNO models will be supported.

ECCD within the Faculty of Engineering and Environment at Southampton has staff and researchers of around 45 and is led by **Prof A S Bahaj** - Professor of Sustainable Energy. Over the last 23 years he has established the energy theme within the University, and has developed an exemplary culture of cross-disciplinary research activities across the energy portfolio. Prof Bahaj has authored/co-authored more than 240 peer reviewed and conference papers that span urban energy systems (including demand reduction, microgeneration and monitoring and feedback) and the built environment (working at the city, village and building scales). He is the PI on the following EPSRC grants: SUE1 Innovation in the Design Construction and Operation of Buildings for People (IDCOP) (2004-09, £1,734K), EPSRC-China EcoNetworks (2008-10, £181K), Replication of Rural Decentralised off-grid Electricity Generation through Technology and Business Innovation (2009-14, £2,540K), and CoI on TEDDI Intelligent Agents for Home Energy Management (2010-13, £813K) as well as consortium member of variously funded ESRC, EU and TSB research. He is the Editor-in-Chief of the International Journal of Sustainable Energy, and Associate Editor of the Renewable & Sustainable Energy Reviews. He was a member of the Tyndall Centre for Climate Change Research Supervisory Board (2005- 2010), and from 2001 to 2007 was a member of the UK Government Department of Business and Regulatory Reform (now Department for Business Innovations and Skills, BIS) Technology Programmes Panels on Water Energy & Solar Energy, now being administered by the Technology Strategy Board (TSB). In addition, Prof Bahaj will provide senior level management oversight of the project and its staff at 20% FTE throughout the project. This will encompass the following:

- Take a lead role in the project's senior management group to ensure that all partners contribute to the successful achievement of the project's objectives.
- Lead and oversee the University's overall contribution to the project.
- Provided linkage to Local Authorities (LAs) as well as his other funded projects such as the:
    - EPSRC £6.2million Liveable Cities project www.energy.soton.ac.uk/liveable-cities/
    - EPSRC £3.4million International Centre for Infrastructure Futures (ICIF) www.energy.soton.ac.uk/international-centre-for-infrastructure-futures-icif/
    - RCUK/DFID £2.6million Energy for Development project www.energy.soton.ac.uk/category/research/energy-for-development/
- Contribute significantly to project reporting and dissemination with a particular focus on communicating results to the wider energy research partnerships in the Solent region, stakeholders (academia, LA, etc.) and across the sector.

Dr Anderson is a Senior Research Fellow with over 17 years' experience leading 'strategic social science' research projects and programmes at the intersection of infrastructure and consumer demand modelling. His initial work in the telecommunications sector (BT plc) involved the implementation of a number of large scale household surveys with linked transactional (internet usage and telephone call record) datasets. This work culminated in the development of a spatially disaggregated consumer demand model projecting small area expenditure on 'digital services' to 2021 as a basis for broadband investment cost/benefit analysis. In his subsequent academic career (University of Essex, University of

Southampton) he has applied similar approaches to studying the demand for water and energy in the home. He recently co-led a large-scale academic 'Water Practices' household survey in the South and East of England as part of the ESRC £1.6million Sustainable Practices Research Group (www.sprg.ac.uk) which is the basis for ongoing development of a spatially disaggregated water demand model. He is also a co-investigator of the ESRC/EPSRC £4.9million DEMAND End User Energy Research Centre (www.demand.ac.uk) which focuses on the temporal and spatial analysis of large scale energy-use (smart meter) datasets as well as leader of a number of smaller ONS and ESRC funded projects. We require Dr Anderson's specific skills and experience at 20% FTE throughout the project in order to:

- Ensure appropriate senior level and experienced oversight of the sample & instrument design, fieldwork contract and trial/campaign implementation.
- Ensure appropriate senior level leadership and management of the data analysis and reporting.
- Ensure appropriate senior level leadership and management of the spatially disaggregated consumer demand response model activity which will draw directly on his previous experience of developing similar models for the commercial telecommunications sector.
- Ensure strong linkage to and exploitation of relevant results from a number of RCUK funded activities in which he is involved including:
    - a £250k ESRC funded project assessing the feasibility of using temporal energy monitoring data for the production of small area socio-demographic indicators (http://www.energy.soton.ac.uk/census-2022-transforming-small-area-socio-economic-indicators-through-big-data/)
    - a £180k ESRC funded project analyzing the factors affecting the uptake of home generation technologies (http://www.energy.soton.ac.uk/esrc-sdai-attitudes/)
    - the DEMAND End User Energy Demand Centre, a 5 year programme focusing on understanding how people's everyday use of energy creates emergent patterns of demand.

Dr P A B James is a Senior Lecturer and Programme Director for postgraduate taught education in energy within the Faculty of Engineering and the Environment. He leads the built environment research portfolio of the Faculty's Sustainable Energy Research Group (www.energy.soton.ac.uk). Dr. James' interests include micro-generation in the built environment, energy policy, thermal simulation and how people impact on the energy and comfort performance of spaces. He has published over 35 articles in international journals, including, Energy and Buildings, Solar Energy, Energy Policy and Renewable and Sustainable Energy Reviews and over 60 papers in national and international conference proceedings. He is a co-author of the *Unlocking the Power House* report (RES-338-25-0003) on the potential impact of micro-generation within the UK housing stock. He was also the lead researcher of the EPSRC SUE project 'Innovation in the Design Construction and Operation of Buildings for People' (£1734K). He led the analysis of the national micro-wind trial on behalf of the Energy Saving Trust, and leads the building energy work packages within the EPSRC TEDDI funded 'Intelligent Agents for Home Energy Management' project (£982K), and the ESRC funded project 'The Role of Community-Based Initiatives in Energy Saving' (£946K, RES-628-25-0059). He is also co-author of '*Why Waste Heat*' the ICE report looking at the potential of heat recovery from centralised electricity generation in the UK. In 2009, he acted as an energy expert for DECC's *Big Energy Shift* running public consultation events across the UK.
We require Dr James' senior level research oversight at 10% FTE throughout the project in order to

- Contribute to customer engagement, oversee the implementation of the appropriately designed trial drawing directly on his experiences in the various project such as:
    - ESRC £1.0million Community Energy Project www.energy.soton.ac.uk/the-role-of-community-based-initiatives-in-energy-saving/.
    - EPSRC £1.0million Intelligent Agents for Home Energy Management www.energy.soton.ac.uk/teddi/
- Contribute significantly to the design of trial campaigns and interventions.
- Contribute to project reporting and dissemination.

Appendix R – Structured Methodology

This paper provides an insight into cost effectiveness of a variety of the measures being introduced by DNOs to encourage behaviour change by customers and how different types of measures can be designed and implemented as part of the project.

Cost effectiveness of the measures introduced by DNOs

The SAVE project will trial 4 different types of energy efficiency approaches ranging from technology installation to financial incentives and data informed customer behaviour change to customer behavioural change based on engagement alone.

During each trial a formalized process of recording the cost of the trial methodology will take place. Timesheets will be designed for all project staff both SEPD and other project participants. These timesheets will be collated and reviewed on a monthly basis to ensure costs are not omitted. Each resource will be allocated a realistic market rate including overheads. All external costs such as engagement material will be recorded for each trial. At the end of each trial period, total trial costs will be calculated. Since the robustness of the network investment model is driven by the accuracy of the cost of approach, an internal review process will take place for each total costing to ensure no costs have been missed. The frequency of engagement will be taken into account in this process ensuring the costs are valid for the length of demand reduction required.

The SAVE project team will use the existing SEPD Future Network's Financial Management procedure WI-PS-FNP-010 to manage and reconciliation costs from the individual trial costs to the SEPD recording process.

Each trial participant will be monitored for energy consumption. The monitoring process enables the project to judge whether a trial has had an impact on energy consumption. A control group will be established for comparison. The demographic characteristics of each participant will be recorded. Within each trial group a representative number of demographic groups will be present. This enables the constructing of representative substation demographics, leading to a calculation of energy consumption reduction for each method for different substations.

The calculation of relative cost effectiveness of each trial methodology is a simple division of the cost of the trial recorded in the manner described above and the total kWs and kWhs consumption reduction observed from the methodology. This will feed in to the network model as a decision tree, enabling control engineers to select the most cost-effective methodology for a given substation.

Design and implementation of measures

As outlined in the bid submission, the project will commence with a detailed process of identifying customer engagement approaches from previous LCNF project, other projects in the UK and experience from international projects. This process will be described fully in a document to be submitted to Ofgem – see SDRC No 1 – due June 2014. The document will describe which aspects of previous projects will be examined in detail to ensure learning is incorporated and no replication occurs. A project plan for the initial work will be submitted along with this document so the

process the project team will be taking in order to incorporate the learning will be clear.

This process will drive the detailed design and implementation of the measures and is key to ensuring this project leads to new learning that can be shared by all DNOs. This process will involve meetings/telephone calls with members of project teams from previous LCNF projects, Irish trials and international projects to ensure detailed approaches taken by other projects are understood by the SAVE project. This process will also draw in wider expertise such as customer recruitment marketing professionals, community engagement professionals and sustainability professionals will experience of developing programmes that rely on customer participation.

Appendix S – Incorporating prior customer engagement learning

1. Introduction

Since the inception of the LCNF, several projects have included some aspect of customer engagement. Early projects such as CLNR and LCL have quite sizeable customer engagement aspects. In these projects the customer engagement has been driven by the need for customer participation, for example in order to evaluate the network impact of electric vehicles in the future, a project would need to engage with customers in order to allow the project to monitor a customer's electric vehicle charging behaviour. For these projects customer engagement has been a means to enable an understanding of impacts on distribution networks of different loads.

2. Customer Engagement in SAVE

Customer engagement is at the heart of the SAVE project because this project is seeking to understand when it is cost-effective for distribution networks to use customer engagement for the purpose of enabling energy efficient behaviour by customers as an alternative to traditional network reinforcement. The project will derive a measure for each engagement method that will be an integral part of the investment model, the main output from the project. This investment model tool will be designed to provide £/kW and £/kWh values on different engagement approaches. DNOs across the country can use the investment model as a decision making tool when faced with demand challenges that would traditionally be resolved by physical network reinforcement. This will be particularly useful on networks with increases in demand when fundamentals point to an eventually reduction in overall substation demand as this will avoid stranded assets.

On the SAVE project each trial participant will be monitored for energy consumption. The monitoring process enables the project to judge whether a trial has had an impact on energy consumption. A control group will be established for comparison. The demographic characteristics of each participant will be recorded. Within each trial group a representative number of demographic groups will be present. This enables the constructing of representative substation demographics, leading to a calculation of energy consumption reduction for each method for different substations.

The calculation of relative cost effectiveness of each trial methodology is a simple division of the cost of the trial recorded in the manner described above and the total kWs and kWhs consumption reduction observed from the methodology. This will feed in to the network investment model as a decision tree, enabling control engineers and network planning engineers to select the most cost-effective methodology for a given substation.

3. Identifying Customer Engagement Resources

Learning from previous LCNF projects and wider global learning will be incorporated into the project in the design stage. A project plan for this process is attached as an appendix to this document. Other projects have identified effective methods for engaging with customers, difficulties in customer recruitment and means of overcoming these difficulties and; methods that are less effective at persuading customers to participate. This learning will form the basis for the project to avoid replicating the learning about methods of consumer engagement. The SAVE project is about deriving a quantifiable measure for each

approach that would traditionally not be viewed by DNOs as scientifically verifiable. The lack of cost information demonstrating £/kW and £/kWh for demand reduction is barrier to Business as Usual utilisation of energy efficiency and customer engagement approaches. The project will incorporate findings from other projects but crucially seeks to go further in turning this learning in to a tool that will drive BAU behaviour. This will therefore enable greater return on investment for network customers from previous projects.

The overall approach to incorporating learning will be:

- Conduct a literature review of relevant consumer engagement projects
- Identify consumer engagement aspects of LCNF projects
- Identify consumer engagement aspects of global projects
- Identify key people responsible for consumer engagement on these projects
- Set up meetings and conference calls with project personnel
- Design a project questionnaire to utilise in meetings to capture appropriate learning in a usable form
- Hold meetings and conference calls to capture learning
- Run a workshop with wide participation on consumer engagement trial design
- Produce draft trial designs based on collected learning
- Circulate draft trial designs to project personnel and marketing/consumer engagement professionals for comments
- Incorporate feedback in to project design
- Issue trial design document

As a result of participation in smartgrid projects, there is a growing knowledge base to leverage in order to avoid replicating learning. This knowledge base is growing both in the UK and internationally and the SAVE project is determined to leverage all possible learning. Several individuals have already been identified from their involvement in previous projects, these include:

Gary Raw, UCL – extensive evaluation of EDRP data leading to useful conclusions about the role of trial design in ensuring robust results

Harriet Bulkeley, Durham – extensive experience of evaluating results from CLNR approaches

Amanda Williams, British Gas – heavily involved in driving customer engagement on CLNR from a supplier's point of view

Vidia Palaram, UKPN – involved in LCL engagement such as organising community events in conjunction with EDF to drive trial recruitment

Philip Lewis, VaasaETT – evaluated over 200 international smart grid projects for consumer engagement and has extensive project contacts

Smart Energy Collective, Netherlands – DNV Kema led commercial collective incorporating consumer engagement

SmartGrid Consumer Collaborative, US – advisory group to smart grid projects in the US focusing particularly on consumer engagement best practice.

4. Previous LCNF projects with potential learning to incorporate in SAVE

Project	DNO	Tariffs/ contracts	Public Engagement	LCT trials	Equipment & monitoring
2010					
Customer-Led Network Revolution	CE Elec / NPG	ü	ü	ü	
Lincolnshire Low Carbon Hub	WPD			ü	ü
Low Carbon London	UKPN	ü	ü	ü	ü
LV Network Templates	WPD				ü
2011					
SoLa BRISTOL	WPD	ü	ü	ü	
Capacity to Customers (C2C)	ENW	ü	ü	ü	ü
FALCON	WPD			ü	ü
Flexible Networks for a Low Carbon Future	SP		ü	ü	ü
Flexible Plug and Play	UKPN	ü			ü
New Thames Valley vision	SSE		ü	ü	ü
2012					
Accelerating renewable Connections (ARC)	SP			ü	
Customer Load Active System Services (CLASS)	ENW				ü
Flexgrid – Advanced Fault Level Management in Birmingham	WPD				ü
Innovation Squared	SEPD		ü	ü	ü
Smarter Network Storage	UKPN/EPN				ü

5. Conclusion

SSEPD understands that to make “energy efficiency led by consumer engagement” a Business as Usual (BAU) approach for DNOs, the network investment tool must be statistically valid for all network areas. The University of Southampton has analysed sample sizes to determine necessary samples to ensure that trial result will be valid.

During the course of the project two workshops will be held for other DNOs to show, at a granular level, how the costs and demand reduction experienced on the SAVE project is fed through to the investment model. These workshops will form the basis of the design of the final tool and a user manual for the tool so that investment decision approaches across different network areas are incorporated into the tool design.

Previous experience has demonstrated that involving stakeholders early in order to incorporate their needs is more likely to result in acceptance of new approaches. Through the process described in this document the SAVE project will be incorporating previous learning from multiple projects and then designing a clear route to pushing out the learning from the project to the wider DNO community and beyond.