



Low Carbon London  
'a learning journey'

Project Progress Report  
December 2012

Final  
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# 1. Executive Summary

## 1.1 Project background

Low Carbon London (LCL) is an innovative and ambitious project to conduct a number of physical demonstration trials to assess the impact of a wide range of low carbon technologies on London's electricity distribution network as well as customers' interactions and behaviours associated with those technologies in their everyday lives. The project commenced in January 2011 and will complete in 2014. The learning, insights and data collated from the trials will enable modelling and extrapolation to other large cities and GB-wide levels of forecasting. The trials encompass residential, SME as well as industrial and commercial participants.

2013 will focus on the execution of the various trials and collection of associated empirical data and 2014 will see the completion of the data modelling and analysis phase and the production of a wide range of reports that will mark the completion of the project, detailing the results of the trials and the implications for successfully moving to a low carbon economy as well as the effects and opportunities to be managed on electricity distribution network.

## 1.2 Key highlights this period

The project has focused on the following areas of activity this period:

- a) Trial participant recruitment across all trial areas – Smart Metering, Heat Pumps (HP), Electric Vehicles (EV), Photo Voltaics (PV), Small Scale Embedded Generation, (SSEG), Distributed Energy (DE) / Distributed Generation (DG) - Active Network Monitoring (ANM), Demand Response (DR) trials;
- b) Time of Use (ToU) tariff trial design finalisation and recruitment – 1,000 participants already recruited to the trials;
- c) Deployment and installation of trial execution hardware, network monitoring and instrumentation equipment. This has included 30 secondary network substations in the Engineering and Instrumentation Zones (EIZs), as well as monitoring equipment at customers' premises and within customers' own low carbon installations. In addition, central control and monitoring systems have been installed within primary substations, along with Remote Terminal Unit Upgrades to 10 substation sites, and upgrades to network control applications such as ENMAC/Power-On Fusion;
- d) Completion of detailed trial and solution designs;
- e) Testing and use of the end to end IT system solution;
- f) Completion of the summer 2012 demand response trial;
- g) Commencement of the 2012/3013 demand response trial;
- h) Wind Twinning and DR Multipartite Knowledge Forums with National Grid and DNOs;
- i) Holding several internal and external learning dissemination events & workshops; and
- j) Preparation and submission to Ofgem in November 2012 of the project formal change request, reference 'LCL CR1'.

The project has also worked on the preparation, planning and actions to meet 2013 Successful Delivery Reward Criteria milestones. No Successful Delivery Reward Criteria were due to be delivered this reporting period, July to December 2012.

The project recognises the importance of ensuring that the adoption of low carbon distribution network management techniques within the operational DNO business is a core outcome of the project and Low Carbon London has successfully worked to begin to embed many of the components of the project (for example, demand response) learnings and insights, within UK Power Networks' operational business. This will ensure that the learning points enabling the transition to low carbon distribution network operations are realised within the context of the future business as usual operation of a DNO.

External factors beyond the control of the project continue to present challenges, which are being managed and mitigated. The enduring economic climate continues to impact the previously forecast take-up rates for electric vehicles and associated charging post infrastructure. The continued unavailability of a SMETS-compliant smart meter has required the project to adopt alternative instrumentation approaches to ensure the requisite data is still collected from the project's trials, whilst the delay in the Renewable Heat Incentive has had a detrimental impact on the previously expected growth in certain low carbon technologies.

However, Low Carbon London has put in place robust methods to maintain the original objectives and it continues to grow in profile and recognition as an innovative thought-leader and physical demonstrator in delivering practical insights into the management of the emerging low carbon energy electricity distribution network in London, nationally and internationally. Testament to its standing is the numerous approaches made by other UK and global low carbon initiatives to be associated with or endorsed by Low Carbon London and the requests to present at various international conferences.

### 1.3 Key facts

Low Carbon London has to date:

- Installed 5,814 residential and SME L&G 5236 smart meters with EDF Energy;
- Installed 806 residential and SME L&G 5236 smart meters with British Gas;
- Commenced the installation of up to 250 secondary, non-fiscal EDML single (Mk7A) and three phase (Mk10A) smart meters for EV, SSEG (PV) and heat pump trials;
- Invited over 5,600 smart meter trial participants to complete detailed energy behaviour surveys with over 2,140 returned to date;
- Commenced the recruitment of over 1,500 smart meter participants for the UK's first dynamic wind-twinning time of use tariff trial with 1,000 recruited to date;
- Conducted three separate demand response trials;
  - A winter 2011/2012 trial involving two customer participants, implementing three interventions;
  - A summer 2012 trial involving seven customer participants, implementing 12 interventions; and

- A winter 2012/2013 trial (on-going) involving two customers to date, with a plan to execute approximately five interventions at peak periods
- Created an innovative ANM-enabled demand response offering;
- Recruited 55 residential electric vehicle owners to date;
- Capturing data from over 800 to date electric vehicle charging posts;
- Purchased three new EVs for business and LCL trial use, sponsored by UK Power Networks and branded as Low Carbon London EVs;
- Establishing a residential EV trial of up to 100 vehicles within the M25 area;
- Recruiting up to 50 I&C EV trial participants, encompassing over c. 30 EV charging posts
- Completed 13 detailed ANM site installation surveys including the UK's first DNO-scaled ANM installation, with further prospects currently in the pipeline;
- Recruited five Industrial and Commercial (I&C) Active ANM trial participants and 19 other sites to date.;;
- Recruiting 20 small scale embedded generation (SSEG) trial participants;
- Created three Engineering Instrumentation Zones (EIZs), formed from three previous Mayor of London Low Carbon Zones (Brixton, Queens Park and Wandle Valley), for intensive instrumentation and measurement;
- Installed monitoring and instrumentation equipment in over 30 primary substations and secondary substations;
- Created a new Safe System of Work (SSOW) with UK Power Networks Network Operations and Health, Safety and Sustainability Directorates, which has been shared and agreed with the Health and Safety Executive (HSE) to enable the installation of associated low carbon technology and new monitoring tools (including Rogowski coils in substations to facilitate LV monitoring);
- Designed, built, tested and commissioned a comprehensive production IT system solution to underpin and enable data collection, analysis and reporting from the project's trials, collecting data from over 7,200 separate external sources of trial data, managed through UK Power Networks enterprise IT service division;
- Held five external learning dissemination events on demand response, smart meter participant trial recruitment, smart meter installation and automated network management (ANM);
- Held a number of internal seminar event and workshops to embed learning, awareness and insights into the various business units, including demand response into the DNO operational business;
- Collaborated with and endorsed several external other low carbon initiatives, e.g. London's submission to the Technology Strategy Board's (TSB) "Future Cities Demonstrator" call; a further TSB project 'Home Based Flexible Demand Management'; a TSB project "Virtual Power Plant" (CHP VPP); and an FP7 District Heating Project

entitled “Project Celsius”;

- Presented at major low carbon conferences, exhibitions and events in London, Hong Kong (Keynote speaker at the 30<sup>th</sup> Annual Symposium of the Hong Kong Institute of Engineers, Electrical Division), Germany and Spain (all funded directly by UK Power Networks and not by the Low Carbon London project); and
- Hosted several international delegations wishing to understand more about the innovative and inspirational Low Carbon Network Fund and Low Carbon London, e.g. from Canada, Sweden, Japan, Australia, Hong Kong and Vietnam.

### 1.4 Trial recruitment

Significant progress has been made on the recruitment of trial participants across all of the project’s trials. The current recruitment status is detailed in the table below.

Trial Status	Planned (at bid stage)	Current Project Plan	Current	Prospects	Trial start date	Status
<b>EVs</b>					July -12 with a ramp up to December	<p>Proceeding as planned subject to uptake, reinforce data for reports through other research data sources. Further leads being generated through Pod-point, EDF Energy, Future Transport Systems.</p> <p>Proposed EV demand shifting trial planned with CNOs.</p> <ul style="list-style-type: none"> <li>- EV ToU activated with EDF Energy - 4 participants recruited (out of 23).</li> <li>- G-Wiz owners club offer potential number (~15) of participants.</li> <li>- Peugeot (up to 100) and Nissan (20) offer potential number of EVs.</li> </ul> <p>* not including 200 Olympic vehicles.</p>
(Residential) vehicles	200 (5% of total numbers available)	Up to 50 – as per existing contacts made	33 have returned T&Cs directly to LCL plus EDF Energy contract for 23 customer vehicles	~164 EDF Energy - 19 Peugeot - 100 Nissan - 20 PodPoint - 10 G-Wiz - 15		
(Commercial) vehicles	50	Up to 50 – as per existing contacts made	56 * TfL – 7 ICL - 2 UPS – 20 Enterprise - 7 UKPN - 3 Tubelines - 10 Harrow Council – 2 UCS – 3 Manor Field – 2	39 National Grid - 5 Islington Council - 13 TfL Bus induction - 2 Qualcomm wireless EV trial - 6 UEL - 1 Siemens Crystal -2 Podpoint -10 (carbon sync)		
(Public) Charge Points	All CPs	All CPs (PiP & 3 <sup>rd</sup> party)	857 CPs + Olympic ChargePosts			
<b>Heat Pumps</b>	None in bid	Up to 50 – as per existing contacts made. Cease active recruitment	~18	None further unless directly approached.	Dec-12	<p>Proposed to stop active recruitment. Project needs to manage those customers already going through recruitment from a customer journey, the project and LCNF/UK Power Networks reputation aspect.</p>

Trial Status	Planned (at bid stage)	Current Project Plan	Current	Prospects	Trial start date	Status
<b>Small Scale Embedded Generation – SSEG (PV)</b>	None in bid	Up to 50 – as per existing contacts made. Cease active recruitment	~ 20 Peabody – 13 (Site surveyed, T&C's issued) Southern Solar T&C's issued for 5 sites Goldsmiths University - 2	916 (relevant data injects) Southern Solar - up to 100 G83 list - up to 806 UEL - 2 Brixton Energy - 5 Siemens Crystal - 1 Goldsmiths University - 2	Dec-12	Recruitment is ongoing. For both trials the project will use 'relevant data injects' into the modeling activities and learning report outputs.
<b>Distributed Generation/ANM</b>			13 sites survey and installed	20 current prospects	Sep-12	Proceeding as planned with trials. Includes additional recruitment / incentive payments to enroll Distributed CHP heat schemes Trialing ANM to actively trigger DR customer interventions – 5 customers signed up.
(MW)	5 ANM Systems	5 ANM Systems	4+1 ANM Systems	LCL UKPN Services – 2 LCA		
(Quantity) Sets Devices	9/system 25 MPCs 50 LICs	9/system 15 MPCs 30 LICs	6/systems 15 MPCs 30 LICs	Ener-G - 20 Other CHP sets - 8		
(Type)	Up to 10 DG Units per ANM system	Up to 8 DG Units per ANM system	19 DG Units			
<b>Smart Metering:</b>					Now – data being collected	Complete workstream and trials. Seek undertaking for underwriting of non-compliant meters. British Gas has offered a further potential 10,000 metered customer participants subject to demographic profile/location assessment.
(EDF Energy)	5,000 (10 LCZ areas & c.2 demographic profiles)	Up to 6,500	5,814	All of LPN		
(British Gas)		Up to 1,000 (all LPN area & 15 demographic representative groups)	806 (600 + 206 within EIZs)	Up to 10,000		



Trial Status	Planned (at bid stage)	Current Project Plan	Current	Prospects	Trial start date	Status
<b>Residential ToU:</b>					Jan-13	Continue with dynamic ToU tariff trials, delivery of static ToU with British Gas not possible - subject to uptake mitigations. Good progress is being made to date. Dependant on 30% uptake, 20% attrition rate, 95% confidence.
(EDF Energy)	Wind-twinning ToU – Up to 100 Network-based ToU – Unspecified per tariff	Single dynamic ToU tariff & multiple price signals & trial events – Maximum numbers – Up to 1,521 (likely min 600 based on current industry 10% take up rate)	1,000	~ to 1,521		
(British Gas)			N/A	N/A	Jan-13	
Engineering instrumentation zones (EIZs)	None	3 – selected from Smart Metering trial zones (LCZs) to provide clustering & density required for trials & experiments	3 Zones ~30 secondary subs LV and HV monitoring with focus on DER/PV clusters etc.	EDMI meter solution to provide voltage solution at feeder end – considering assumed profiles and ~30 subs	Jan-13	Project is using EDM I single and three phase SMETS meter solution and head-end; data measurement supplemented by use of Portable Power Quality Analysers. Project proposes to extend advanced Remote Terminal Unit (RTU) rollout.
Tools	None	30 RTUs; 7PQ units	29 eMS units 6 PQ units 10 New RTUs	N/A	Jan-13	Progress is as planned - all tools essential for project outputs and delivery. Sites surveyed, installation and deployment has commenced and safe systems of work established. To be completed by 31 <sup>st</sup> Dec 2012.
<b>DR (MW)</b>	25 MW	Up to 25 MW	20.8MW (4.5 MW of additional building turndown)	c. 65~ MW (4.5 MW of additional building turndown)	Nov-11	Continue with optimised recruitment of DR participants as current and additionally: - Pursue further building turn-down opportunities - Potentially utilise additional aggregator(s)

## 2. Project Manager's Report

### 2.1 Progress made this period

In this reporting period the project has focused on several key objectives:

- recruitment of trial participants across all trial areas – Smart Metering, Heat Pumps (HP), Electric Vehicles (EV), Photo Voltaics (PV), Small Scale Embedded Generation, (SSEG), Distributed Energy DE/DG - Active Network Monitoring (ANM), Demand Response (DR) trials. This has been a major focus of the project during this reporting period and has been a challenging but very valuable undertaking;
- accelerating the smart meter rollout for the smart meter and ToU tariff trials;
- developing time of use tariff design, customer acquisition and journey materials, treatment schedule and price point analysis and implementing the ToU tariff trial recruitment – 1,000 recruited to date;
- completed the detailed design of the various trials;
- establishing the Trials Operations Team;
- carrying out the summer 2012 demand response trials;
- developing and commencing the winter 2011 I&C demand response trial using learning and insight gained from the winter 2011/12 and summer 2012 trials, including customer and participant feedback;
- holding further learning dissemination events and workshops;
- developing the carbon reporting and benefits realisation work and learning and dissemination platforms involving other DNOs, customers and stakeholders; and
- management and mitigation of external and internal risks.

## 2.2 Successful Delivery Reward Criteria Milestones

No Successful Delivery Reward Criteria (SDRC) milestones were due to be delivered this reporting period, July to December 2012. However, significant work has been carried out on the preparation, planning and actions to meet 2013 Successful Delivery Reward Criteria milestones. The status table below therefore shows SDRC milestone progress from July to December 2012.

Build Phase SDRC	Status
Preparation of solution implementation complete: Logica smart metering Head End solution and Learning Laboratory commissioned (Appendix 2, Use Case U07.1 and U07.2).	Completed.
Preparation for c.5,000 smart meter roll out complete, including address selection, acceptance surveys, privacy and security measures	Completed by Q4 2011, development and in action during the period. Rollout continues to progress c.6,500 smart meters to be installed by December 2012 by EDF Energy and c.1,000 smart meters by British Gas (access to existing smart meter data or new installs) including within the engineering instrumentation zones – Queens Park, Brixton and Wandle Valley.
First stage of solution implementation complete: Operational Data Store and interface to Logica head end commissioned, smart meter installation underway and “carbon impact tools” delivered.	Completed.

Build Phase SDRC	Status
<p>Implementation of initial trials based on data from the initial smart meters and half hourly industrial &amp; commercial (I&amp;C) customer meters with analysed results</p>	<p>CO2 impact assessment report completed.</p> <p>Initial I&amp;C DR trials completed – winter trial results documented, and summer 2012 completed. Winter 2012/2013 trials commenced. Summer 2013 DR trial recruitment commenced.</p> <p>Multipartite demand aggregation contract (two parties) completed and in use; a further development of the initial contract form has been developed and is in use with one of the aggregators with proposals to implement with other aggregators. A national level form of aggregation contract involving National Grid is now part of developing series of workshops with National Grid and other DNOs. Although implementation of such contracts is not considered feasible in the time scales of the project, work has commenced on a tri-partite arrangement between National Grid and project aggregators and a further form of contract between UK Power Networks, another DNO, aggregator and customer.</p> <p>Three I&amp;C Demand Response learning events completed with initial views documented on conflicts and synergies.</p>

Trials Phase SDRC	Status
<p>Conclusion of “Using Smart Meters and Substation Sensors to Facilitate Smart Grids” trials – complete Q2 2012.</p> <p>Understanding customer behaviour and potential network impact (Appendix 2, Use Case U04.1)</p> <p>Use of Smart Meter information to support distribution network planning and design (Appendix 2, Use Case U04.2)</p> <p>Use of smart meter data to support network operations (Appendix 2, Use Case U04.3)</p>	<p>These SDRC should have been timed for Q2 2013 completion originally, and are now planned to be completed by Q4 2013; with an anticipation of final results and reports being available by Q3 2014.</p>
<p>Conclusion of “Enabling and Integrating Distributed Generation” trials – complete Q2 2013</p> <p>Facilitating connections to LV and HV distribution networks (Appendix 2, Use Case U02.1)</p> <p>Active Management of DG to address security of supply concerns and postpone network reinforcement (Appendix 2, Use Case U02.2)</p>	<p>Timely completion of this SDRC will depend on successful recruitment of DG owners to participate in trials. Progress has been made in identifying and signing up participants, although this has been slow, we have derived useful learning and insight. SDRC is forecast for completion by Q4 2013, and as there is value to running the trials for as long as possible; with an anticipation of final results and reports being available by Q2 2014.</p>
<p>Conclusion of “Enabling Electrification of Heat and Transport” trials – complete Q4 2013</p> <p>Exploring impact of electric vehicle charging (Appendix 2, Use Case U03.1)</p> <p>Exploring the impact of heat pump demand (Appendix 2, Use Case U03.2)</p>	<p>At this stage we anticipate no delays in completing this SDRC. However, this is dependent on sufficient ToU participants; a SMETS compliment meter being available; and the successful recruitment of trial participants. Currently amongst other leads in development we have c. 50 - 60 residual EV trial participants and c. 50 commercial EVs signed up, access to over c.800 EV charge posts, with further progress with other third parties. Sufficient HP and PV participants have been identified and recruitment campaigns designed and commenced – we have selected and are implementing a suitable smart metering device; with an anticipation of final results and reports being available by Q2 2014.</p>

Trials Phase SDRC	Status
<p>Conclusion of “Residential and SME Demand Side Management” trials – complete Q3 2013</p> <p>Energy Efficiency programmes and technologies (Appendix 2, Use Case U05.1.a)</p> <p>Consumer Behaviour demand response and responsiveness to TOU tariffs” trials (Appendix 2, Use Case U05.1.b)</p>	<p>Proposed to be completed by Q4 2013. Timely completion of this SDRC will depend on no further delays to the DECC smart meter specifications, the availability of a SMETS compliant meter; and successful participant recruitment. In addition, this SDRC is dependent on a supplier offering ToU tariffs. EDF Energy, our current supplier partner, along with ICL have completed detailed works and development of a dynamic and dynamic wind set of trial experiments and tariff and invention structure, recruitment has commenced and is planned to be completed by 31 December 2012; with an anticipation of final results and reports being available by Q4 2014.</p>
<p>Conclusion of “I&amp;C Demand Side Management” trials – complete Q1 2014</p> <p>Demand side management with I&amp;C customers (Appendix 2, Use Case U05.2)</p> <p>Demand side management conflicts and synergies (Appendix 2, Use Case U05.3)</p>	<p>At this stage we anticipate no delays in completing this SDRC. 20.8MW of I&amp;C responsive demand is currently under contract, with recruitment activity continuing. There are challenges around building turndown demand which we seeking to address in relation to recruitment of suitable customers; with an anticipation of final results and reports being available by Q3 2014.</p>
<p>Conclusion of “Wind Twinning” trials – complete Q1 2014</p> <p>Wind twinning through TOU tariffs with Suppliers (Appendix 2, Use Case U01.1)</p> <p>Wind twinning through responsive demand contracts with Commercial Aggregators (Appendix 2, Use Case U01.2)</p>	<p>At this stage we anticipate no delays in completing this SDRC, with an anticipation of final results and reports being available by Q3 2014.</p>
<p>Conclusion of trials Q2 2014 for:</p> <p>“New Network Design and Operational Practices” (Appendix 2, Use Case U08)</p> <p>“Network Planning and Operational Tools” (Appendix 2, Use Case U06)</p>	<p>At this stage we anticipate no delays in completing this SDRC, with an anticipation of final results and reports being available by Q4 2014.</p>

## 2.3 Trial participant recruitment

Trial participant recruitment has continued to be particularly resource intensive and time-consuming than originally envisaged. However, the project has responded successfully to these challenges through a sustained and comprehensive approach to trial participant recruitment.

Recruitment of participants for residential and SME trials has divided into two main categories; smart meter/dynamic and dynamic wind twinning time of use tariff trials, where recruitment has been conducted primarily through the project’s energy supplier partner EDF Energy. These trials have been supplemented by additional smart meters from British Gas, and the recruitment of participants for the other residential and SME centric trials where the recruitment has been conducted directly by the project (for EVs, heat pumps, SSEG).

Recruitment has followed and complied with the overall customer communications framework previously submitted to Ofgem, and has involved significant effort to market the project and associated trials and identify potential recruits. Incentives have been devised to attract trial participants, ranging from free EV charging posts together with an option to lease an EV by residual and commercial users.

Industrial and commercial trial participant recruitment has focused on EVs, heat pump, ANM and through demand aggregators, demand response trial participants.

## 2.4 Installation of trial hardware and monitoring equipment

Significant progress has been made in completing the work to deploy the physical instrumentation framework to capture data measuring the impact of low carbon technologies within the project's trial geographies. This has included development of new safe systems of work assessment procedures covering the new equipment to be installed on the London Power Network (LPN).

Equipment to be used includes six portable power quality analysers that will be deployed on a mobile basis to be used across a number of network locations. In addition, 32 low voltage monitoring units have been acquired and deployed across LPN in conjunction with Rogowski coils to collect data measuring the impact of the project's trials on secondary substations. High voltage RTUs and enhanced RTUs complete the network instrumentation equipment to be used.

The instrumentation approach covers the complete LPN area, including the three Engineering Instrumentation Zones (EIZ) locations, and will measure the impact across the project's full range of trials – smart meters, dynamic time of use tariffs, EV charging, SSEG, heat pumps etc.

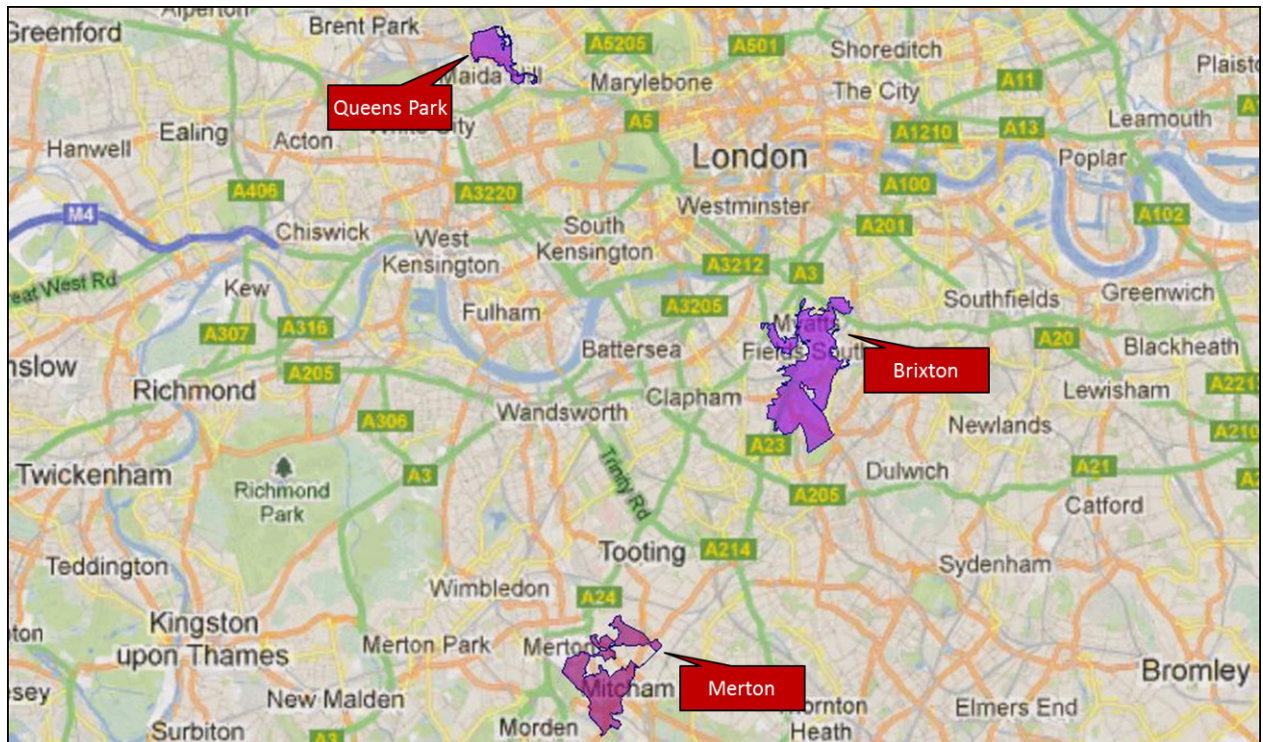
The three EIZs are constituted from what were three of the ten previous Mayor of London's Low Carbon Zones (LCZs) – Brixton, Queens Park and Wandle Valley. These zones were selected due to their broad demographic spread and the concentration and critical mass of clustered low carbon technologies, enabling extrapolation of results to London-wide, Great Britain and international levels of analysis.

The selection of these specific three ex-LCZs from the original 10 LCZs offers a better balanced demographic when compared to the original full 10 LCZs, which can then be more straightforwardly extrapolated with less work needed to model London and nation-wide analyses.

The three LCZs selected were done so following detailed analysis in conjunction with Imperial College, London.



Figure 1 below illustrates the location of the three EIZs within London.



The carbon impact across the trials is analysed and measured through a custom-built carbon tool using algorithms certified by the National Physical Laboratory.

**Figure 2- Pictures below shows the LCL instrumentation approach using Rogowski coils within the Queens Park EIZ, in the LV distribution board at 69 Third Avenue substation.**







## 2.5 Completion of detailed trial design

The overall technical solution underpinning the Low Carbon London project is complex. The project has a wide scope covering all low carbon technologies likely to be found in a large city and it aims to measure and assess the impact of these on the electricity distribution network.

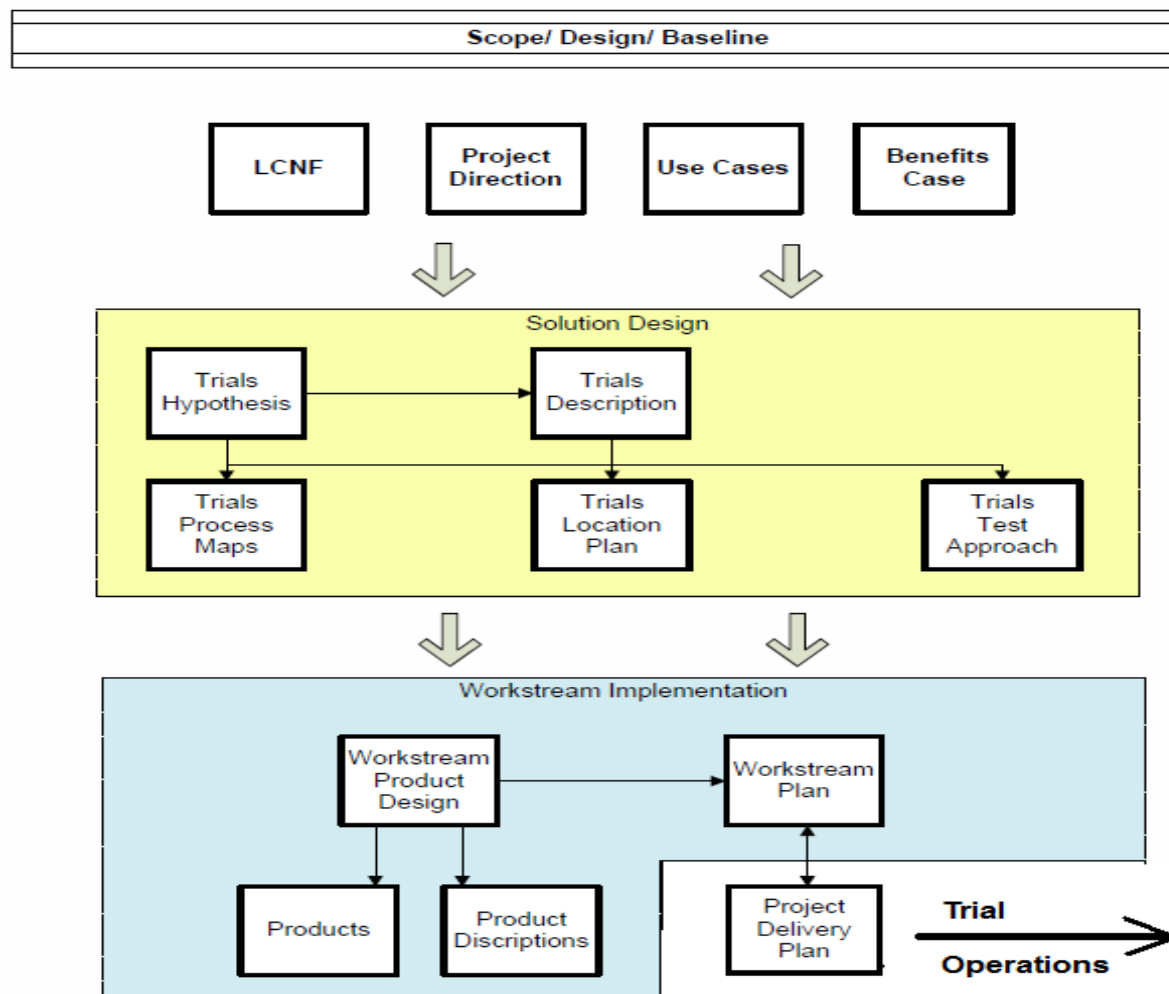
Alongside these monitoring trials, there are ambitious trials to test the desire and ability of both residential/SME and I&C customer groups to shift their energy demand in response to three main categories:

- a) peak times;
- b) planned or unexpected outages on the distribution network; and
- c) to match demand to times of expected availability of wind-generated energy.

The solution design team have developed a robust methodology to ensure consistency of approach across all the original use cases as the project developed the detailed design based on the use cases. Key solution design artefacts describe the trial hypotheses, trial descriptions, trial locations within LPN and the three EIZs, measurement criteria and the detailed trial test approach which forms the test schedule to be executed by the trials operations team in 2013.

Figure 3 below describes the overall solution framework together with the contributing components.

Figure 3 – overall solution framework



## 2.6 End to end testing of the IT system solution

The IT solution has been developed significantly through the first two years of the project, to accommodate both emerging requirements and the on-going refinement of the original high-level design to a detailed deliverable solution.

The IT architecture is based on two central data repositories:

- the Operational data Store (ODS) - a database primarily holding details of the premises involved in the various trials, together with the associated network topology; and
- the participant management system (PMS) – a database holding details of the participants in the trial.

Both databases hold essential meta-data including premises data, gathered through customer surveys, describing essential characteristics that drive and affect energy behaviours. It should be noted that no personal data is collected or held in the Low Carbon London IT solution.

A privacy impact group has been established that meets regularly to oversee the compliance to data security requirements and IT security personnel from UK Power Networks and other project partners have met regularly to ensure end to end data security is in place.

The IT solution has been embedded into UK Power Networks' enterprise IT operations and is managed as part of the wider enterprise IT portfolio, to take advantage of the production levels of back-up and security available in that service.

All trial data is collected through a series of interfaces, fed from the project's trial instrumentation layer, and transferred automatically through a secure file transfer protocol (sFTP) which ensures appropriate data security controls are in place. The data collection interfaces are:

- a) fiscal smart meters via the smart metering head-end system;
- b) public EV charging post data via the charging network operators (CNOs) EV charging post infrastructure;
- c) secondary non-fiscal smart meters monitoring SSEG, heat pumps as well as private residential and I&C EV charging posts;
- d) ANM monitoring equipment;
- e) aggregators demand response equipment; and
- f) the project's own RTU and LV monitoring equipment as described in 2.3 above.

In addition, network topology and other relevant data is captured through a number of interfaces to UK Power Networks' network control and planning systems (e.g. PowerOn, DINIS, and Ellipse etc.)

A comprehensive testing programme has been devised and is due to complete testing and release of the first version of the system on 21 December 2012. Subsequent releases are in progress and testing is scheduled to complete in Q1 2013.

**Figure 4 below illustrates the high-level IT architecture.**

[illegible]

### **3. Use Case progress**

#### **3.1 Wind Twinning**

The project use cases seek to establish learning from I&C as well as residential/SME wind twinning trials, to determine the ability for energy demand load to be shifted to coincide with times of higher availability of low carbon electricity.

##### **3.1.1 I&C wind twinning**

The use-case envisaged I&C trials for I&C wind twinning are based around the establishment of tri-partite contracts between National Grid, the demand aggregators and the DNO.

The project has initiated detailed discussions and workshops with National Grid and aggregators to explore how to resolve and then build resolutions into a contract for the potential conflicts that exist between DNO-led demand response and National Grid-led demand response (Short Term Operating Reserve - STOR). Due to the complexity of the subject matter and the need to recognise and accommodate other emerging low carbon electricity initiatives that National Grid in particular are concurrently managing, National Grid have indicated that it is unlikely that a tri-partite contract will be in place before the project completes in 2014, although that remains an endeavour by both parties.

It is important to note that the various use case learning points will be delivered as they will emerge from the detailed discussions that will take place during the project's lifetime. National Grid by request, has also established a wider forum across all the DNO community to identify and agree the way forward on demand response conflicts and synergies, which both UK Power Networks as a DNO, and Low Carbon London as a leader in DNO-led demand response, actively participate in.

##### **3.1.2 Residential and SME wind twinning**

The residential and SME wind twinning trial is based upon the application of 'time of use' tariffs to assess the ability of domestic electricity customers to shift demand to match times of expected availability of wind-generated electricity. The project has created a dynamic time of use trial that incorporates the wind-twinning scenarios exactly as described in the original use cases, and uses day-ahead notifications to trial participants of changing electricity tariffs to indicate the expected availability of low carbon electricity. The wind generated tariff is lower than the normal electricity tariff to encourage trial participants to plan ahead and shift their high-energy consuming behaviours to the following day to take advantage of the lower tariff.

The project is targeting a trial population size of 1,521 participants (all EDF Energy customers) who will actively take part in the dynamic 'time of use' tariff trials.

The multi-tier tariff is operated through EDF Energy, the project's energy supply partner, and is marketed as their "Energy Alert" tariff. There are three price tiers within the tariff and the scheme offers the trial participants protection to ensure that financially they will be no worse off at the end of the trial than if they had remained on the electricity tariff they were on immediately prior to joining the trial. Trial participants can leave the trial at any time, but they will forego the small financial incentive offered to remain on the trial to completion.

The dynamic time of use trial commences 4 January 2013 and ends 31 December 2013. The complete schedule of dynamic tariff events has been established for 2013 and handed over to the trial operations team within EDF Energy.



Figure 5 below illustrates the EDF Energy leaflet describing the Energy Alert dynamic time of use tariff trial.

**Figure 5 EDF Energy’s “Energy Alert” leaflet**



## 3.2 Active network management (distributed generation)

The two key focus areas this reporting period have continued to be on trial participant recruitment and the progression of the complex enrolment process to fully embed the participating client sites into the trial once they have been recruited.

### 3.2.1 Recruitment

An ANM recruitment task force, with additional dedicated resource, was created in July 2012 to accelerate and expand the recruitment phase. The recruitment approach adopted was wide ranging and encompassed direct cold-calling as well as presenting to numerous relevant trade bodies and meeting with intermediary actors such as CHP consultants, building management

specialists and facilities management outsourcing companies to explain the ANM proposition and engage their clients on to the trial.

Following the market research instigated earlier in 2012, which identified that the potential market-place did not fully understand the ANM offering nor was particularly attracted to the proposition, the task force developed a number of options to simplify and clarify the offerings to engage with the trials along with an incentive framework to participate.

Three separate market offerings were developed, a monitoring-only trial, an enabling trial and a full ANM security of supply offering. All three offer incentives to participate in the trials.

The task force has continued to experience reluctance to engage in a full ANM trial, although there are now selected trial participants who are prepared to engage on that basis. However, the majority of the trial participants engaged to date have done so on the basis that control of the generation installation is not passed to the project's ANM controller but retained by their own control equipment and personnel. Recruitment will continue into 2013 for this trial and it is expected that some monitoring-only trial participants may transfer to a full active control basis once they have gained confidence through the initial trial by the facilitation and visualisation of on-going monitoring.

### 3.2.2 ANM-enabled demand response

The project has created an innovative low carbon offering for the I&C marketplace by linking automated network management with demand response customers. This also creates the potential to offer flexible connection arrangements for future connection applications. Working collaboratively with two of the project's partners, Flexitricity and Smarter Grid Solutions, the project has been able to develop a unique deployment of ANM at Finsbury Market substation, co-ordinated with aggregator signals. The proposal is to roll this out to the other two aggregator customer groups as well as via direct contracts and other third parties.

Figure 6 below illustrates the configuration to co-ordinate with aggregator signals.

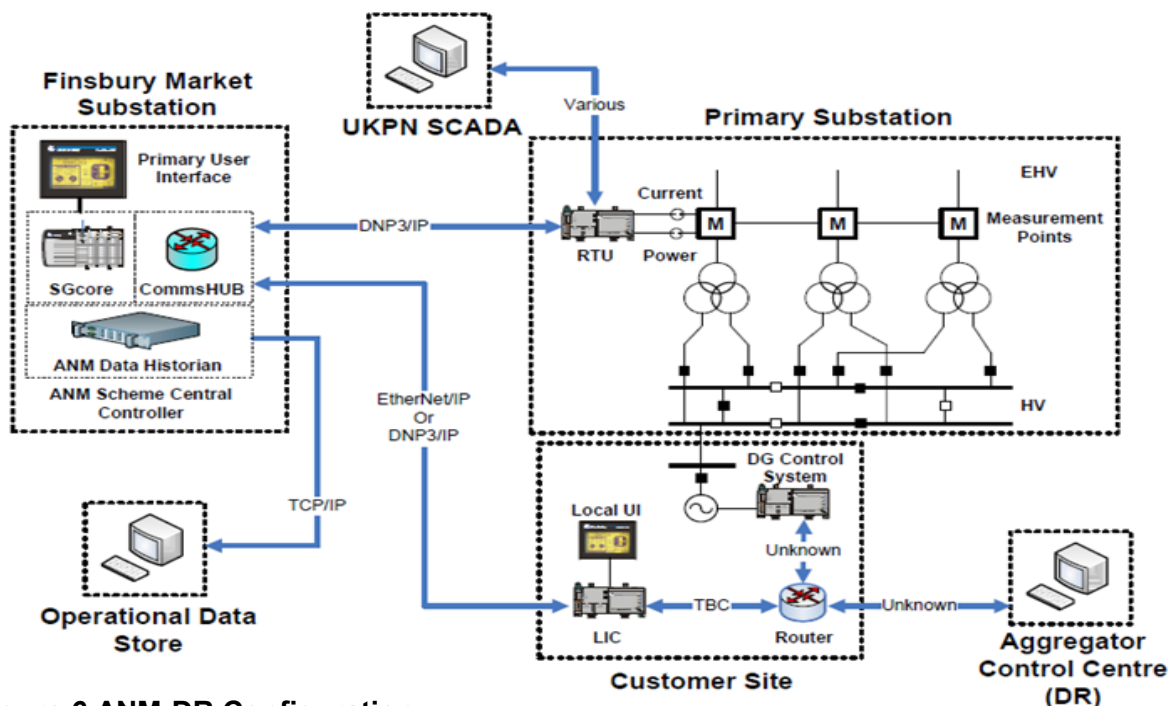


Figure 6 ANM-DR Configuration

Figure 7 below illustrates the configuration to deliver signals via the aggregator

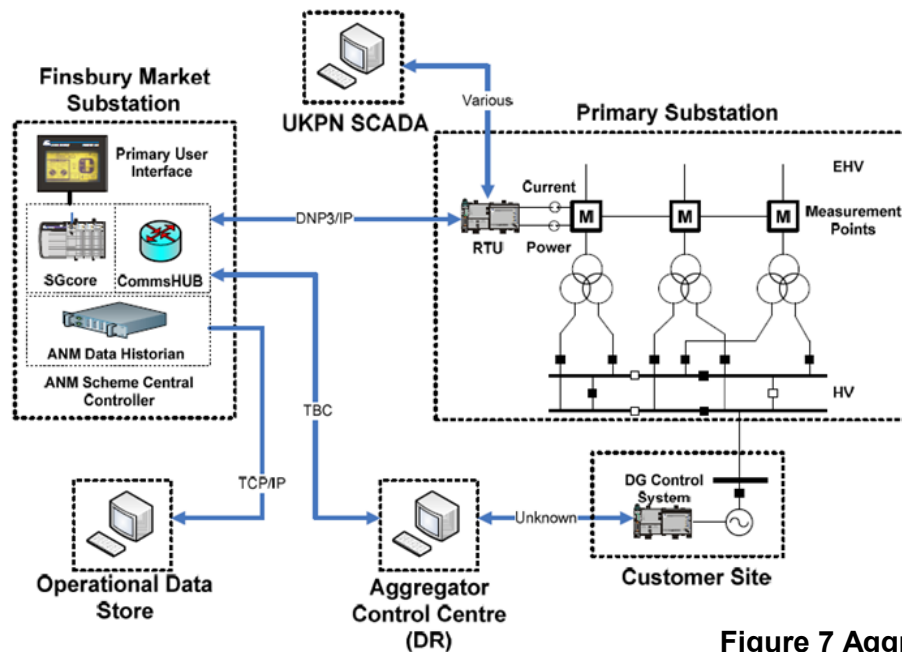


Figure 7 Aggregator signalling

Figure 8 below shows the ANM installation at Finsbury Market.





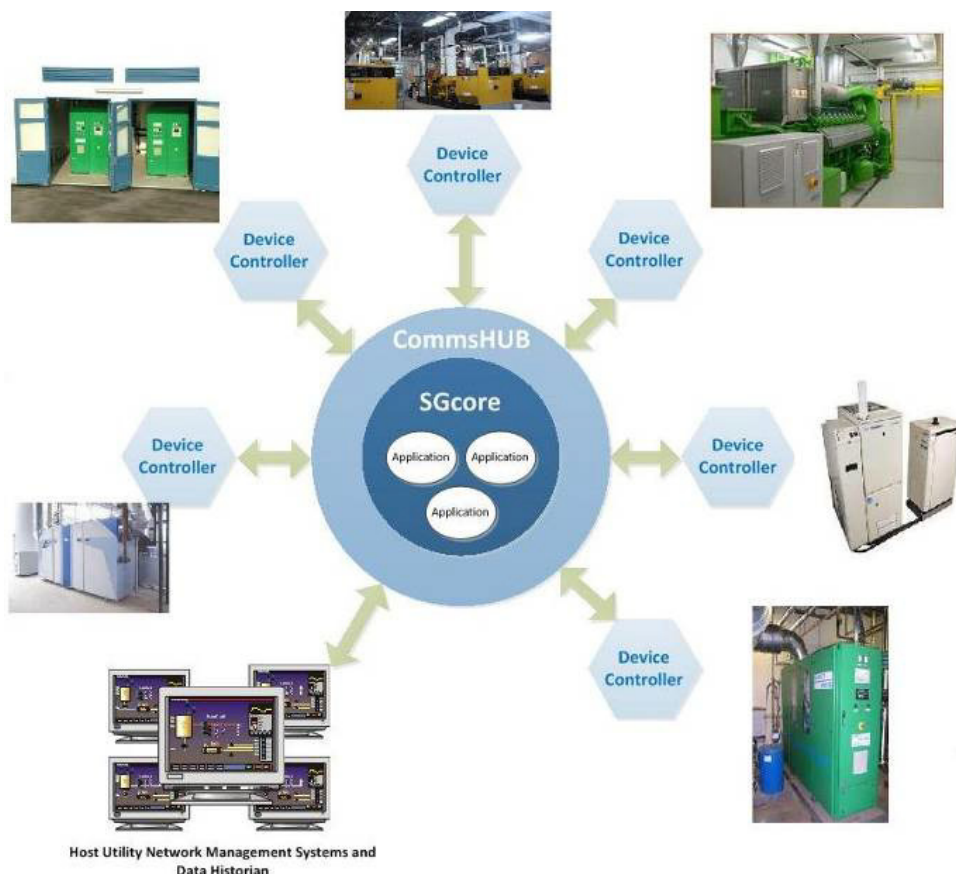
### 3.2.3 ANM Installation

ANM introduces a new layer in distributed network management systems to autonomously manage network constraints by automatic co-ordination and control of devices and resources. Figure 9 below illustrates the conceptual ANM solution used in LCL. The solution is built around three main components, the “SGcore”, the “CommsHUB” and the ANM device controllers.

The enrolment process is conducted through three phases:

- Feasibility studies – to define power systems challenge using time series or probabilistic tools and estimating energy volumes;
- System design and planning – to ensure integration with existing systems and other project components; and
- Delivery, implementation and integration of platform products and software applications underpinned by support and integration of additional controllable devices and constraint locations.

**Figure 9 – ANM conceptual diagram**



Good progress has been made on equipment installation into trial participant locations.

12 detailed ANM site surveys have been undertaken to fully assess the feasibility of potential locations being used within the ANM trials. A number of factors are taken into consideration during these surveys, e.g. proximity of power supplies, GPRS signal strength, co-location and interfacing with the existing generation equipment, other site or generation maintenance works

that may impact ANM installation, availability of client or the client's approved third parties who may be needed to undertake necessary works as part of the ANM installation etc.

This can be a long and complex process, and seemingly minor factors such as whether the site management has been outsourced to a third party and if there is on-site technical personnel present or whether this is arranged by the client on an as-needs basis from other third parties can have a major impact on the overall timescales involved.

### 3.2.3.1 GLL – Swiss Cottage Leisure Centre

The leisure centre at Swiss Cottage is managed through the GLL group, which is a charitable organisation originally established in 1993 by Greenwich Council and operates a number of leisure facilities throughout London.

Figure 10 below illustrates part of the installation using an Alstom Transducer with “power over Ethernet” solution on top of the transducer.

**Figure 10**



The ANM measurement controller is installed locally in the generation installation.

Figures 11 and 12 show one of the two measurement controllers installed as part of the GLL Swiss Cottage ANM trial.

Figure 11 – measurement controller



Figure 12 – measurement controller



Due to the basement location of most CHP installations, the GPRS signal strength necessary to ensure data transmission to the ANM hub needs careful positioning. The installation at Swiss Cottage required an elevated location remote from the main installation, to ensure good signal strength for data transmission. Figure 13 demonstrates the elevated location together with the use of an external aerial to boost signal strength.



Figure 13 - location



Elevated position of GPRS router and external antenna

### 3.2.3.2 Ofgem Millbank

The project has also reached agreement with Ofgem for the generation installation at their offices at Millbank in London to participate in the ANM trials. The installation is completed, with commissioning planned in early December. The following photographs illustrate the installation deployed.

Figure 14 CHP unit – Ofgem Millbank



**Figure 15 ANM controller Ofgem Millbank**



### 3.3 Electrification of heat and transport

#### 3.3.1 – Electric Vehicles

Good progress has been made on the recruitment of trial participants for the project's EV trials. The EV trials are split into three separate participant categories;

- a) Private residential EVs with a home-based EV charging post (CP) (however, may also use public EV CPs);
- b) I&C EVs, accompanied by an EV charging bay with a number of EV CPs (again, may also use public EV CPs); and
- c) Public EV CPs – e.g. those in public car parks or public streets.

Recruitment has been aimed across all three trial recruitment pools. Data is collected through separate data pathways. For public EV CPs in London, the data is collected via the charging network operators (CNOs) who operate the public EV CPs and others (e.g. supermarket-located EV CPs). Source London is the subscription based membership scheme that gives EV owners access to public EV CPs across London. Private residential and I&C EV CP data is collected through a secondary non-fiscal smart meter (EDMI Mk7A or Mk10A) installed at each EV CP installation, with data collected via EDM's own meter head-end IT system and transferred by secure file transfer protocol to the ODS.

The project has acquired three new Peugeot iON EVs, for use within the project and UK Power Networks. These are branded with joint LCL and UK Power Networks' brands and are illustrated in figure 16 below.



Figure 16 – UK Power Networks / LCL branded EVs



A number of EV charging posts have been installed in UK Power Networks' premises. Employees and contractors are encouraged to use EVs if they drive to work and for their daily operations.

Figure 17 below shows the EV charging posts installed at UK Power Networks' premises at Dartford and West Ham locations respectively.



Figure 17 EV charging posts at UK Power Networks offices at Dartford and West Ham

The project has created an incentive scheme to participate in the project's EV trials by offering a free EV CP to suitable trial participants who qualify for the installation of an EV CP (e.g. private off-street parking, proximity to a suitable electricity supply etc.). This has been offered with



support from TfL a project partner and has significantly increased the profile of the project's EV trials and assisted in the recruitment of trial participants.

Figure 18 shows some of the residential EV charging post installations undertaken to date.



**Figure 18 LCL residential EV charging post installations**

The project has recently developed a further EV recruitment proposition, based on offering EVs for lease to private and I&C trial participants. Up to 100 additional EVs are expected to be included in the project's trials through this scheme.

The project has recruited EVs through a number of other routes, most notably 25 EVs still in use after a previous EDF Energy EV trial had completed. The EV charging data from the official 2012 London Olympic EVs has also been made available to the project and will be included for analysis within the trials.

Figure 19 below shows the London 2012 Olympic EVs being charged – the data from these charging posts has been collected along with extensive instrumentation data using portable power quality analysers on the distribution network during the 2012 Olympics.



**Figure 19 2012 London Olympic Games EV charging posts**

### 3.3.1.1 EV Time of Use Trial

Arrangements are finalised with EDF Energy to conduct a time of use trial for EV charging, and the first recruits from a pool of c30 recruits have been recruited. This will be based on EDF Energy's "Eco 20:20" fixed time of use tariff, which offers discounted electricity at evenings and weekends, and will involve existing and new EV owners who are EDF Energy customers.

### 3.3.1.2 I&C EV charging

The project has recruited a number I&C EV charging trial participants, including Enterprise Rent-a-Car, TfL, Tubelines and Harrow Council. The EV charging posts installed at these premises are instrumented with a secondary single or three phase EDM1 smart meter, depending on the EV charging post capacity. Figure 20 illustrates the installation of LCL EV charging post at Tubelines.



**Figure 20 Installing LCL EV charging posts at Tubelines**



### 3.3.2 Heat pumps

The recruitment of trial participants for the project's heat pump trials has proved challenging. The availability of heat pumps in London has been constrained by the delayed availability of the Government's Renewable Heat Incentive (RHI) as well as the natural geology of London and availability of sufficient ground space limiting the number of ground and air sourced heat pumps.

To date, the project has been able to recruit five residential heat pump trial participants and c. 15 I&C trial participants. However, going forward, and in recognition of the diminishing returns from further intensive efforts, it has been proposed within the change request, LCL CR1, to cease any further active recruitment of heat pump trial participants. Recruitment numbers may well continue to increase, but this will be driven entirely by approaches from potential trial participants to the project, rather than active recruitment by the project itself.

Metering of heat pump installations is via a secondary non-fiscal EDM I smart meter, with data securely collected via EDM I's own smart meter IT head-end system and sFTP data transfer to the project's own data repository, the ODS. The trials are based primarily on the monitoring of the heat pumps on the electricity distribution network, there are no active trials envisaged, although this continues to be assessed.

### 3.3.3 Small Scale Embedded Generation (SSEG)

The impact of SSEG installations (essentially PV installations in London) on the distribution network is being monitored through the project's trials. Both residential and I&C installations are being enrolled and the project is working closely with the two dominant PV installation companies in the south of England to recruit participants. Installations are being instrumented via EDM I's Mk7A (single phase) or MK10A (3 phase) smart meters.

Figure 21 demonstrates a PV installation using the EDM I meter.



Figure 21 above - PV installation using EDM I secondary non fiscal smart meter

### **3.4 Smart metering**

The project has recruited a total pool of over 6,600 smart meters, comprising 5,814 smart meters from EDF Energy and 806 smart meters from British Gas. All are Landis & Gyr model 5236 smart meters, the widely available “Gen 2” smart meter. These are primary fiscal smart meters and are managed directly through EDF Energy and British Gas respectively. All have an accompanying In Home device (IHD) supplied to the trial participant.

The project is also installing up to 200 secondary non-fiscal smart meters to be used solely to measure the impact of some of the project’s low carbon trials – EVs, SSEG and heat pumps. These smart meters are managed directly by the LCL project. No IHD is supplied to the trial participant and these devices will not be marketed to the trial participants as smart meters but as trial measurement devices and installed directly in line with the electricity spur powering the particular low carbon technology being monitored (EV CP, SSEG or heat pump).

The demographic profile of the pool of smart meter trial participants has been carefully managed to achieve a spread that is representative of London and can be easily extrapolated to the GB wide level of analysis and interpretation.

The ODS contains the network topology of each smart meter MPAN and precise geographic location, enabling detailed network impact assessment and modelling to be undertaken using the empirical data collected from trials.

In addition, comprehensive energy surveys have been undertaken across the pool of 6,600, gathering essential data that will provide insights into energy consumption behaviour as well as factors influencing the propensity to shift energy demand in response to tariff signals.

### **3.5 Demand response**

#### **3.5.1 I&C Wind Twinning**

Section 3.1.1 above describes the project’s I&C wind twinning demand response trial.

#### **3.5.2 I&C demand response summer 2012 trial**

The project conducted the second of its demand response trials in the summer period 2012, with the trial running from 1 June to 31 August 2012. During the trial responses were made against four separate main substations within the LPN footprint. A total of 109.1MWh of network reinforcement was realised during the three month period of the trial, with 12 separate calls made to invoke the demand response contract.

There was a high level of performance across the generator portfolio during the trial, with all but one site reaching the contracted level of output, due to an un-associated nearby local fire which decommissioned the generation equipment for some of the trial period.

#### **3.5.3 I&C demand response winter 2012 trial**

The project has initiated its third demand response trial, running from 1 December 2012 until 31 March 2013. A total of 3.3MW has currently been contracted, including at least 300kW of building turn-down demand, which will become available after the Christmas holiday period.

#### **3.5.4 Residential and SME demand response**

The project has developed an integrated residential and SME dynamic time of use tariff trial. The trial schedule covers all the demand response scenarios described in the use case document, i.e. wind twinning, critical peak demand shifting and planned/unplanned outage management.

### **3.5.4.1 Residential and SME wind twinning demand response**

The project's residential and SME wind-twinning trial is described in 3.1.2 above.

### **3.5.4.2 Other residential and SME demand response**

The critical peak and outage scenarios offer crucial insights into opportunities to remove stress on the distribution network at times of peak demand, potentially avoiding or deferring the need for network reinforcement. The move to the electrification of heat and transport has potential to significantly increase electricity demand and so the ability to shift demand loads at times of peak demand or during outages will be an essential network demand management tool.

## **3.6 New network planning and operational tools**

Section 2 above details the instrumentation and monitoring tools framework that has been established to measure the impact of the project's trials on the distribution network.

The project has also developed a sophisticated IT system solution to underpin trial data collection and analysis. A sophisticated network planning tool, DPlan has been acquired for use in the learning lab and within the DNO network planning elements of the project. This tool will enable complex scenario modelling to be produced based on the empirical data gathered and used within the trials.

During the remainder of the project work will be undertaken to assess the tactical and strategic roadmaps for low carbon electricity distribution network instrumentation (including IT tools and systems) both for UK Power Networks and DNOs generally. This work will cover any retention and decommissioning work needed as the project nears completion and closedown.

The project has already begun the process to embed low carbon processes and tools into the operational business (see section 3.9 below on learning dissemination), and will continue to pioneer the introduction of appropriate tools and practices during the lifetime of the project.

## **3.7 Learning lab (Imperial College, London)**

In the second half of 2012 the learning lab has focussed on providing detail to trial designs as they approach execution in 2013. Particular emphasis has been placed on the dynamic ToU tariff, operated through EDF Energy, which is now in the recruitment phase. Significant effort went into the design of the household surveys which are now being completed by smart meter trial participants. Finalisation of the monthly feedback is the only outstanding design issue.

The ODS is due for release into production 21 December 2012 and Imperial College have been closely involved in the definition of the database contents. An extract of an LV network has been tested on the learning lab's LV framework, generating high resolution power flow data, and table extracts have been reviewed.

The project has been able to inject load synthesized profiles into the project's network planning tool, DPlan, and animate load flow and 'network health' on the Imperial learning laboratory's large display screens. Imperial College has recently bought an additional high performance computer to handle coming analysis (an HP Z820).

Collaboration with Imperial's Centre for Transport Studies is developing to keep pace with the projects requirements and will provide additional know how, capability and resources to EV related parts of the programme.

### 3.8 Development of new network design and operation practices

Good progress has already been made to embed some low carbon practices into the operational UK Power Networks business. This has concentrated upon establishing demand response as an operational tool for network management. An internal application, implementation readiness workshop and learning event was held in November 2012 to progress the adoption of demand response within UK Power Networks (See 3.9 below).

A portfolio of DNO-focused reports will be produced at the end of the project in Q4 2014, and the current proposal lists 14 separate reports:

1. Learning report on the use of smart meter information for network planning and operation;
2. Learning report on network impacts of energy efficiency at scale;
3. Guide to residential DR for outage management and as an alternative to network reinforcement;
4. Learning report for facilitating DG connections;
5. Learning report for DG addressing security of supply and network reinforcement requirements;
6. Guide to I&C DR for outage management and as an alternative to network reinforcement;
7. Learning report on the impacts of supply-following DR;
8. Conflicts and synergies of DR;
9. Learning report on the impact of EV, SSEG, and HP loads on network demand profiles;
10. Learning report on opportunities for smart optimisation of new heat & transport loads;
11. DNO tools and systems learning report;
12. DNO design and operational learning report;
13. Carbon impact tool final report; and
14. DNO Guide to Future Smart Management of Distribution Networks.

This list may be subject to change in the light of yet to emerge learning during the trial operations phase.

### 3.9 Learning dissemination events

Learning dissemination is a key focus for the project and to substantiate the “learning journey” tag line, Low Carbon London has been actively presenting early and emerging findings, with a number of presentations made both nationally and internationally to explain both the objectives of the project and the emerging findings and challenges faced.



### 3.9.1 Embedding learning in the DNO

There is a drive to embed low carbon practices into the operational business within UK Power Networks. The priority has been on establishing demand response as a routine operational tool to be used in network planning and operations. A major internal learning event was held in November 2012 to start the embedding process, with representatives from all parts of UK Power Networks business invited along to discuss the opportunities and challenges of adopting demand response as an operational DNO tool. The project has developed a series of follow-on actions from that event which will be progressed in 2013. Figures 22 and 23 show the internal UK Power Networks seminar held to discuss the adoption of demand response as a routine operational procedure.



**Figures 22 and 23 Commencing work to embed demand response into UK Power Networks' operational business**

### 3.9.2 External learning events

The project also held a very successful external learning event on the subject of automated network management and distributed energy. This was an event held to present findings and learning to date and also to engage the audience in discussion about how the base proposition could be developed further.

The audience was carefully selected and drawn from a range of key sectors involved in distributed energy – e.g. planners, designers, consultants, operators and the DNO. The event also saw a detailed “hands-on” demonstration of the ANM equipment from Smarter Grid Solutions.

In the light of the prior market research undertaken, the event included syndicate work within the audience leading into an open discussion on how to develop and improve the ANM offering to the marketplace. This was invaluable in the further development and refinement of the ANM offering. Figure 24 ANM below illustrates the ANM learning event held at the IET in London.



Figure 24 External ANM event at the IET London

### 3.9.3 Teen Tech

Teen Tech is an organisation to help young school children and teenagers see the wide range of career possibilities in Science, Engineering and Technology. Founded by Science broadcaster Maggie Philbin and Chris Dodson, Chairman of the Institute of Directors (South) the events are a unique collaboration, bringing together key professional organisations to create a



very special experience for young people. Low Carbon London joined a recent event at Surrey University to help educate teenagers about low carbon electricity and how the project is helping to determine that future. Figure 25 shows the Teen Tech event at Surrey University.



**Figure 25 Teen Tech event**

### 3.9.4 External conferences and events

Low Carbon London is a high-profile project that has attracted interest from the rest of the UK and internationally. The project has presented at many major low carbon and sustainability events and conferences to promote the project, the Low Carbon Network Fund in general and the drive to low carbon electricity.

The following is a list conferences and events at which Low Carbon London has presented:

- a) Base London - June 2012;
- b) Universities Power Engineering Conference Brunel University - September 2012;
- c) The Energy Event Birmingham - September 2012;
- d) IET Smart Grid 2012 London - September 2012;
- e) Distribution Automation Europe London - October 2012;
- f) Hong Kong Institute of Engineers, Annual symposium, Keynote speech - October 2012;
- g) Major Energy Users Council London - October 2012;
- h) Energy Solutions London - October 2012 ;
- i) LCNF Annual Conference Cardiff - October 2012;
- j) Smart Metering Forum London - November 2012;
- k) Teen Tech Surrey University - November 2012;
- l) Green eMotion Stuttgart, Germany - November 2012; and
- m) GEODE Barcelona, Spain - November 2012;

### 3.10 Governance

The project continues to operate a comprehensive governance framework to oversee the project including a privacy impact governance group.

On a weekly basis the project team members meet to review all active actions, which are held on a central actions tracking database. On a monthly cycle, each use case topic area (e.g. ANM, demand response, smart meters) is subject to an in-depth “deep dive” review, involving all project team members and relevant internal stakeholders working in that area.

The project steering group (PSG) meets on a monthly basis, as does the engineering governance group (EGG), which has been established to ensure the operational business within UK Power Networks is kept informed and consulted as part of the project’s routine communications activities, and to also enable that group to bring operational matters to the attention of the project. The EGG is chaired by the project’s solution design architect and focuses upon technical and engineering aspects of the project.

On a quarterly basis the project convenes the project partners steering group (PPSG), chaired by the CEO of UK Power Networks and attended by senior representatives from the project partners. This ensures appropriate executive oversight across all involved parties. Similarly, each quarter the project presents to UK Power Networks executive management team meeting (EMT), to ensure that there is good awareness of the project’s activities at a senior level within the DNO. Figure 26 below illustrates the governance framework.

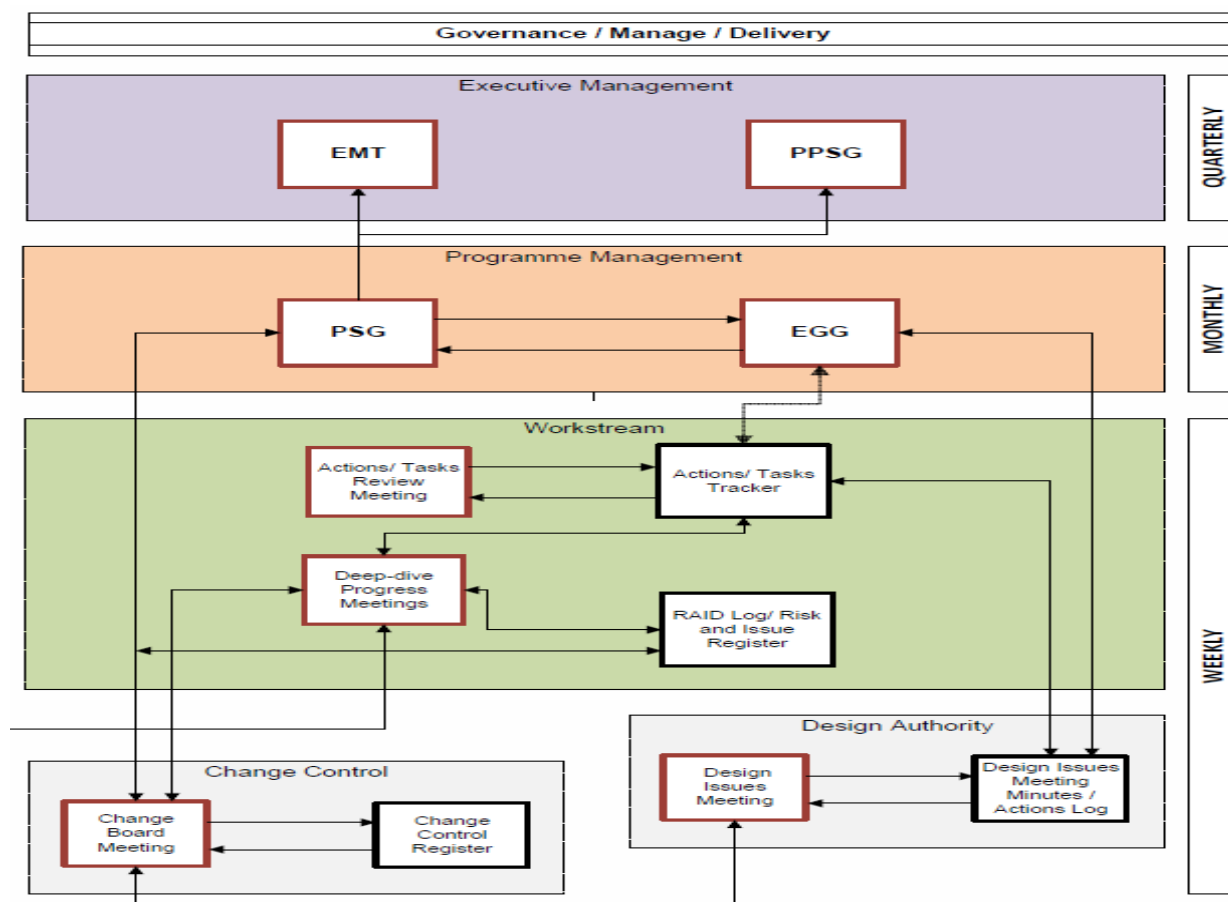


Figure 26 LCL governance framework



## 4. LCL CR1 change request to Ofgem

The project has expended significant effort in the reporting period in the production and submission of the change request, reference LCL CR1 to Ofgem.

This change request was brought about due to material changes in circumstances requiring a change to the original project direction.

The draft change request was externally reviewed by an independent assessor appointed by Ofgem, namely TNEI and the other five main UK DNO's currently engaged in LCNF Tier 2 projects.

A revised project direction has been submitted to Ofgem as part of the change request. The material changes covered three areas of the project's work:

- a) Heat pump recruitment;
- b) Expansion of the trial area within LPN – from the 10 original Low Carbon Zones (LCZs) and the developed 3 Engineering Instrumentation Zones (EIZs); and
- c) The move from ENXsuite carbon impact tools to a custom-built carbon tool.

## 5. Business case update

The business case benefits as defined in the original bid submission still apply.

Intangible benefits are built around use case learning points, which are all still forecast to be delivered, with additional learning points are being gathered during the “learning journey”, and cover a wide range of issues drawn from the practical experience gained to date within the project of addressing the challenges recruiting and incentivising trial participants, conducting a detailed solution design phase and measuring the impact of low carbon technologies on the distribution network.

The carbon impacts will be analysed and reported through the custom-built carbon tool.

## 6. Progress against plan

The project has revised the remaining timescales as part of its formal change request to Ofgem. In summary, the project is requesting an extension of six months to the end of 2014 – with no additional funding required. The extension is due to delays incurred awaiting the (still unavailable) “Gen 3” SMETS-compliant smart meter, as well as additional delays incurred due to recruitment challenges across a number of project trial areas.

2013 will see the execution of the following trials:

- a) Dynamic time of use tariff trials (incorporating residential and SME wind-twinning demand response trials);
- b) EV use and EV charging post trials;
- c) Heat pump trials;
- d) Completion of the winter 2012 demand response trial;

- e) Execution of the summer 2013 demand response trial;
- f) SSEG trials; and
- g) ANM trials.

2014 will see the closedown of trials and the completion of the modelling and data analysis phase (which will start during 2013) and the reporting writing phase.

## 7. Finance

This section is contained in the confidential annexe.

## 8. Successful Delivery Reward Criteria (SDRC)

There were no SDRC milestones due to be delivered this period.

The project has revised some of the remaining SDRC to reflect the revised project timescales contained in the aforementioned change request, reference LCL CR1.

The complete SDRC table, including revised remaining SDRC is detailed in section 2.2 above.

## 9. Learning outcomes

### 9.1 Learning dissemination

The project is fully committed to delivering all the envisaged learning outcomes included in the original bid submission. In fact, the project will deliver far in excess of that commitment due to the experience gathered during the execution of the project, as new insights emerge and early and interim learning is collected.

The project is also keen to ensure early dissemination of learning and so learning events are held throughout the project to provide a platform to present those insights and learning points during the project rather than at the end.

Each LCL project work-stream operates and maintains a learning log to allow easy collection of insights and learning points throughout the “learning journey”.

### 9.2. Embedding low carbon practices into the operational business

As previously stated, the project is working closely with UK Power Networks operational business to begin the process to embed learning, insights and operational practices coming from the application of low carbon technologies and techniques into the routine operational business. This has initially focused substation equipment and tools installation and on demand response as an early low carbon process that can be successfully adopted as a routine operational procedure within the DNO.

The project is also working with UK Power Networks’ ED1 team to ensure that low carbon requirements are appropriately factored into UK Power Networks’ future plans, investment and funding forecasts.

### 9.3 Other learning points

The project continues to gather early learning. Key insights to date include:

- a) The need to provide incentives to attract participants onto the project's trial – this applies across the board to I&C, residential and SME participants;
- b) The I&C marketplace is complex, with many different segments of actors, with a variety of potentially conflicting motives, making the introduction of trial propositions challenging;
- c) Through targeted market research, the I&C ANM marketplace has fed back that the ANM proposition needs to be simpler to understand and be more attractive to potential participants – this feedback has been recognised and used to develop the ANM proposition for potential trial participants; and
- d) Conflicting and contradictory messaging to electricity consumers on tariffs – i.e. the project has been attempting to recruit participants onto the dynamic time of use tariff trial against a media backdrop promoting energy tariff simplification – this has impacted recruitment rates; and
- e) The delay in the Green Deal has impacted the take-up of low carbon technologies.

## 10. IPR

The project has initiated work to identify potential foreground IPR candidates.

An initial draft list is contained in the confidential annexe.

Given the early stage of development of this work, the list is provided for illustrative purposes only at this stage and should not be taken as an indication of any likely formal final IPR.

## 11. Risks and Issues

Risk / Issue	Description	Mitigation / resolution	RAG Status
SMETS-compliant smart meter	Continued unavailability of a SMETS-compliant meter requires alternative metering and instrumentation solutions to be developed.	"Near 3G" EDMl single and three phase smart meters (Mk7A and Mk10A) that capture voltage data to be used as a secondary, non-fiscal instrumentation device in Electric Vehicle, Heat Pump and Small Scale Embedded Generation installations. Both single phase and three phase versions available. Data to be collected via EDMl's own head-end system and passed into ODS via a new generic ODS data interface. Supplemented with additional RTUs and portable power analysers. Gen 2 L&G 5236 meter to be used as residential fiscal smart meter. L&G 5236 Gen 2 smart meter used in all primary fiscal smart meter residential and SME installations.	

		used in all primary fiscal smart meter residential and SME installations.	
Active Network Management (ANM) trial recruitment is challenging, complex and prolonged.	Many stages with several third involved to carry out small but essential activities. Reluctance from prospects to agree to <i>active</i> trial role (i.e. not just a passive monitoring-only involvement). Trial recruitment and completion of prospects in the pipeline is expected to continue into 2013.	Task force created to focus on recruitment and to provide support during the various stages of recruitment and equipment installation. Extensive campaign to obtain and develop prospects from many sources. Many in-process prospects expected to complete enrolment in November and December 2012. ANM Active participants now successfully being recruited.	
Data security	EDF Energy and British Gas require assurance over data security provision in place to ensure all data privacy obligations are met and maintained	The Project is working with IT Security Managers from UK Power Networks, EDF Energy and British Gas to provide assurances. Specific high security provisions in place to control access to data.	

## 12. Other

There are no other items to report.

## 13. Accuracy assurance statement

I hereby confirm that this report represents a true, complete and accurate statement on the progress of the Low Carbon London project in its third six month period, and an accurate view of our understanding of the activities for the next reporting period. A robust process was in place to produce the report.

Signed

*Ben Wilson*

Date

*14/12/12*

Ben Wilson  
Director of Strategy & Regulation and CFO  
UK Power Networks

## 14. Glossary of terms and abbreviations used

ANM	Active network management
CNO	Charging network operator
CHP	Combined heat and power
DG	Distributed generation
DNO	Distributed network operator
DRM	Demand response management
EV	Electric vehicle
HP	Heat pump
LCL	Low Carbon London
LCNF	Low Carbon Network Fund
LCZ	Low Carbon Zone
LPN	London Power Networks
LV	Low voltage
PHEV	Plug-in electric vehicle
PV	Photo-voltaic
SDRC	Successful delivery reward criteria
SSEG	Small scale embedded generation
SMETS	Smart metering equipment technical specifications
ToU	Time of Use (tariff)