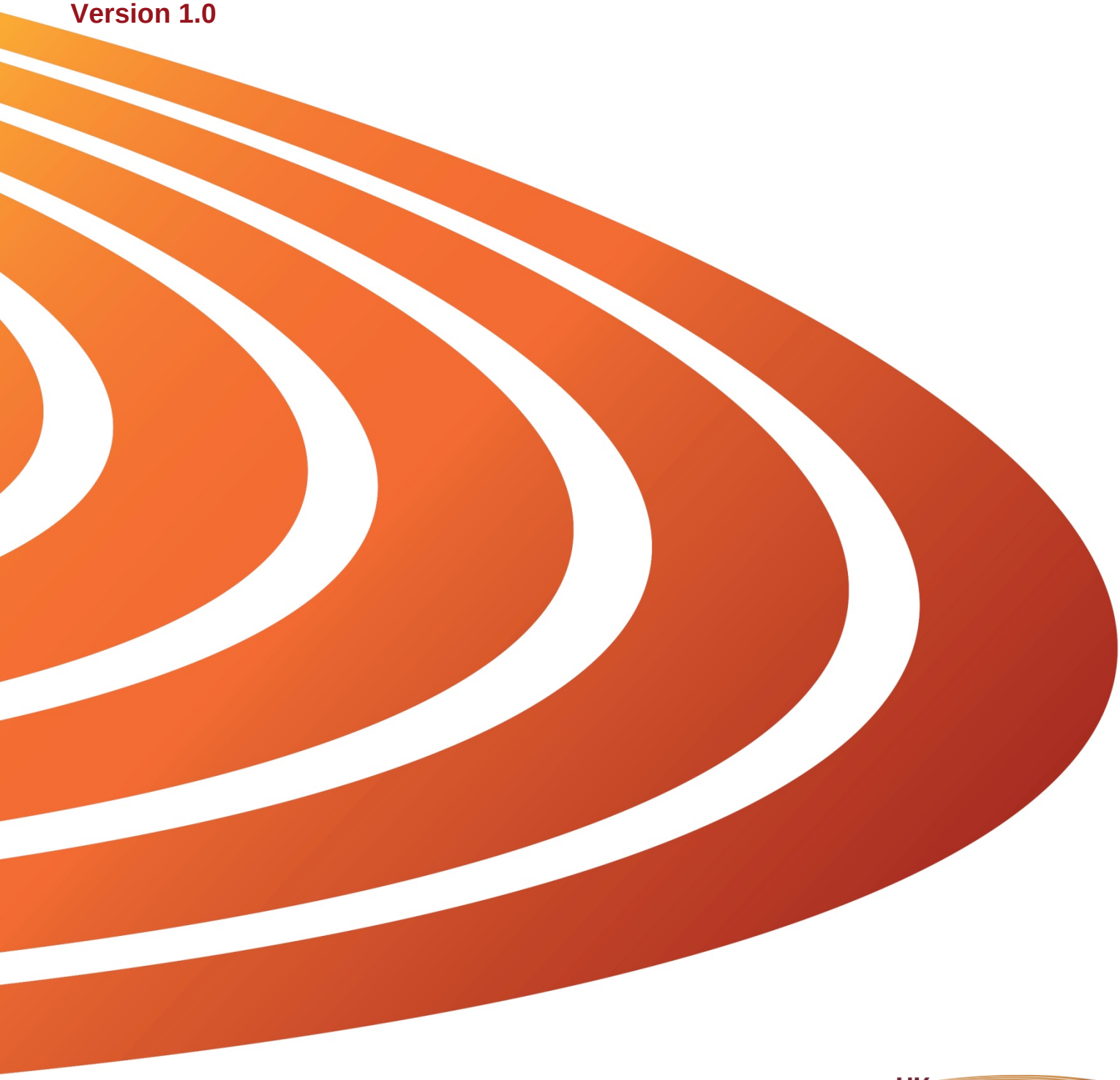
Low Carbon London
Project Progress Report
June 2013

Restricted & Confidential
Version 1.0



UTILITY INDUSTRY ACHIEVEMENT AWARDS 2012

UTILITY OF THE YEAR

UK Power Networks
Delivering your energy

Contents

1. Executive Summary

The Low Carbon London (LCL) project is funded through Tier 2 of Ofgem's Low Carbon Network Fund. It commenced in January 2011 and is due to complete in December 2014. This is the fifth in the series of six-monthly project progress reports submitted to Ofgem and covers the period January-June 2013.

During this reporting period the project has made good progress both in finalising the remaining recruitment of trial participants and initiating the core trial operations phase. In parallel with these activities, the project has also reconfigured the scope of the project in line with the amendments submitted to Ofgem in the light of material changes in circumstances beyond the project's control and approved by Ofgem in late December 2012.

On 21 December 2012 Ofgem approved a formal set of amendments to the project, submitted in the light of material changes in circumstances beyond the project's control, which had arisen since it was originally approved and funded on 17 December 2010. These amendments, coupled with an increased contribution to the project by UK Power Networks and project partners of £2m, has allowed the project to continue delivering value for money for customers as well as returning £3.5m of project funds back to customers. This money will be returned to customers in the current financial year 2013-14.

The requested amendments concerned three areas of the project: heat pumps, the specific geographic areas of London in which the project's trials were to be carried out, and the tool used to report the carbon impact of the trials. Following approval form Ofgem, the project completed detailed re-configuration work to ensure realignment with the revised scope.

Whilst our work to instrument the network in three engineering instrumentation zones (EIZs) is delivering later than planned, we have work underway with contractors for the installation of the final measurement devices. As we set out in the material change request, the EIZs have been chosen to provide a measurement baseline for how the network is currently running, rather than a one-for-one overlap with the location of trial participants. As such, we have been able to separate the timeline of the participant-based trials and the EIZs without impacting the final learning from the project.

The residential dynamic time of use tariff trial commenced on 4 January 2013. In total, the project has installed 5,815 smart meters in EDF Energy customer homes, with 1,121 of those participating in the dynamic time of use tariff trial, who receive price signals on a day-ahead basis. In the first four months of the trial, 72 separate price signals have been communicated to the trial participants, comprising 37 "low" and 35 "high" price signals. Each participant on the dynamic time of use trial receives a monthly energy usage feedback report as well as energy saving tips via the smart meter in-home display. The dynamic time of use tariff trial will continue to operate for the remainder of 2013.

As part of the agreed set of amendments to the project approved in December 2012, active recruitment of heat pump trial participants was ceased: however, a small number of heat pump trial participants have been engaged on trials through their own initiation of contact with the project. Additional suitable and appropriate data from external sources will augment this trial's pool of available data for analysis.

The project continues to face some reluctance to participate in trials from the industrial and commercial (I&C) sector, driven by the same consistently-reported reasons from potential participants of difficulties in committing without prior transparency of the business case, which will be an output from the trials and a wariness caused by a lack of technical understanding of what some of the I&C the trials will involve. In addition, the short-term nature of the engagements, necessitated by the time-bound duration of the trials, further hinders willingness to engage. However, these challenges are being actively mitigated and the project expects to meet in full all its obligations to

provide rich learning from its portfolio of trials and deliver all the specified learning points previously targeted.

The project operated a contained winter demand response trial with a total of 2MW of demand, sourced from standby diesel generation against a sub-station for which we currently have a derogation agreed with Ofgem, called for on four occasions, all successful, from November 2012 through to the end of April 2013. A further, more expansive, demand response trial will start in June 2013, with a clear requirement placed on demand aggregators to identify and put forward an increased ratio of building turn-down sourced demand to be made available to the trial. Currently this trial has enrolled over 17.35 MW of available demand across standby diesel, combined heat and power (CHP) generation as well as significant building turn-down.

The active network management (ANM) trial has made steady progress in the recruitment of industrial and commercial (I&C) trial participants. Most participants initially elect to join the monitoring-only trial. However the project is also finalising two fully-active ANM trials to be deployed on significant photo-voltaic (PV) installations. In addition, the project has developed an innovative approach to the trials using the installed ANM technology to trigger demand response with the project's demand aggregators and I&C clients. This trial is planned to start in summer 2013 (as a subset of the demand response trial) with a current forecast demand of 15.95 MW being available for use by the trial through the two participating demand aggregators. In the interests of learning, we have accepted two generators into this trial from outside the London Power Networks plc licence area, on the basis that they are able to respond in less than three minutes and therefore allow us to verify the reliability of fast-response calls.

Two further pioneering ANM trials have been developed to influence Electric Vehicle (EV) charging. The first is in conjunction with Pod Point, the EV charging network operator and the ANM technology supplier, Smarter Grid Solutions, to use active network management technology to underpin an EV DSR charging trial. This trial will start in July 2013 and is forecast to include over 50 EV charging posts. The second is in conjunction with the charge post network installed within London Underground car parks utilising ANM technology to modify maximum charging load on the network where multiple fast chargers (22kW) have been installed.

The EV charging monitoring trial now has 79 residential EVs enrolled onto the project and 63 commercial EVs and data being collected from the charging posts associated with those vehicles. In addition, the data from a total of 1,073 public EV charging posts situated across London is also being collected and analysed as part of this trial.

The fully tested and configured IT solution was deployed into UK Power Networks' production IT environment at the end of February 2013, encompassing all required network topology data, smart meter consumption data, all meta-data and survey data collated from trial participants. The full system features 25 separate secure data interfaces to allow routine automated collection of data from the project's various trials. In addition to the 5,815 residential smart meters installed as part of the dynamic time of use tariff trials, the project has also installed a total of 127 EDMI smart meters to provide voltage data across the range of heat pump, PV and EV charging post trials.

The involvement of British Gas as an additional energy supplier in the project has recently been approved, which provides access to data from a further 806 smart meters with the potential for up to a further 10,000 smart meter customers from British Gas, all in the London Power Networks plc area. The British Gas customers are not participating in the dynamic time of use trial but provide useful statistical control and demand profiling data volumes.

The project was not scheduled to deliver any successful delivery reward criteria (SDRC) during this reporting period.

Summary of key risks

Risk	Category / Owner	Impact/ Probability	Mitigation
Demand response – unable to recruit sufficient demand of the required type (*previously identified risk*).	Recruitment/ DNO	high/high	1. Business proposition shaped to position against National Grid STOR proposition. 2. Additional aggregators brought in to fill gaps.
Insufficient levels of distributed generation available (*previously identified risk*).	Recruitment/ DNO	high/high	1. Detailed market research undertaken with prospective participants. 2. Incentives offered to participate. 3. Innovative ANM solutions developed to expand potential trial participants.
Data security – requirements on 3rd party access to personal data (*previously identified risk*).	Other/ DNO	high/high	1. Undertake data privacy impact assessment. 2. Establish data privacy governance framework. 3. Establish data privacy steering group. 4. Monitor all data access regularly to ensure compliance
EIZ exit point instrumentation may not all be in place by the end of Q2 2013 *(new risk not previously identified in original or amended full submissions)*	Other/ DNO	medium/ high	1. Potential sites identified in all three EIZ. 2. Prices obtained for installation from Skanska to determine how many can be budgeted. 3. Prices obtained for feeder pillars and three phase meters, orders to be placed once Skanska price known. 4. Installations sites to be selected and prioritised.

1.1 Learning outcomes

1.2.1 Learning outcomes delivered this period

In this reporting period the project has focused on completing trial recruitment, finalising the installation of trial instrumentation and formally commencing all trials and the specific learning points delivered this period reflect these activities. The recruitment and initial operation of the dynamic ToU tariff trial has delivered rich learning, which was presented at the external learning dissemination event held in London in April 2013.

1.2.2 Overall approach to capturing and disseminating learning

The project has operated a comprehensive learning capture framework from the inception of the project, with each project workstream maintaining a learning log, with monthly reports made against learning points delivered that month. A central learning dissemination team has been established to ensure consistency of articulation and presentation of learning.

1.2.3 External learning dissemination activities

The project held an external learning event in April 2013 at the Institution of Engineering and Technology in London to disseminate learning emanating from the recruitment and early operation of the smart meter and dynamic time of use tariff trials. The event was well attended, with representation from Ofgem, DECC, all DNOs, consumer organisations and energy consultancies. The project's website contains all presentation content as well as additional information about Low Carbon London.

1.2.4 Internal learning dissemination activities

The project has appointed business champions located in the operational business, to assist in the dissemination of learning within UK Power Networks. Regular presentations are given to all departments and single-topic internal learning events are held that bring together all the relevant UK Power Networks departments associated with a specific topic, e.g. demand response.

2. Project manager's report

2.1 Project overview

The project's remaining delivery timetable is illustrated in Figure 3 below. Trial operations and empirical data gathering will continue for the rest of 2013 and into 2014. Interim analysis will continue and will start to inform the creation of the final reports. The final reports emanating from the learning lab based in Imperial College are scheduled for delivery by the end of June 2014, with the portfolio of DNO reports completed by the end of 2014.

With reference to the overall project timetable set out in Figure 1 below, LCL is carrying out one of the largest Smart Meter roll-outs within the Low Carbon Network Fund (LCNF) project portfolio ('Smart Metering – Main rollout'). Currently 2,868 participants with Smart Meters have also returned detailed surveys, which will enable the project to provide a robust update to the assumptions which DNOs make about domestic energy usage, and their linkage to demographic.

An additional and substantial subset of participants with smart meters are also participating in trials of a dynamic time-of-use tariff designed to assist both the DNO and the system operator and/or suppliers managing imbalance in a future, more volatile wholesale market.

The project is monitoring EV usage and charging patterns which will allow an update to previous (and widely cited) work carried out by the Energy Networks Association (ENA) and Imperial College on the potential future impact of EV charging on DNOs' networks.

The project is examining both participatory regulation of EV charging through static time-of-use tariffs led by our supplier EDF Energy, and 'invisible to the consumer' regulation of on-street charge posts in co-operation with Charging Network Operators (CNOs).

To round out the project's data collection on potential stressors to the network, it is monitoring a small number of heat pumps and small-scale embedded generation (typically photovoltaic cells). We recognise and documented in the change request that the project is contributing to but not leading the work in this area across the LCNF portfolio.

The project is working both with generators ('Distributed Generation Trials (ANM)') and industrial and commercial customers ('I&C Demand Response Trials') to validate the extent to which generators and large customers can provide support to the network in periods of high demand and thereby potentially defray capital investment or accommodate delays and inter-dependencies in large capital projects.

Finally, and similar to the activities to update the baseline understanding of residential energy usage, the project is updating the baseline understanding of the current performance of the network at the Low voltage (LV) and 11kV/LV boundaries ('Smart Metering – Engineering Zone Trials').

The status of each area contributing to these outputs is expanded upon in Section 2.2.

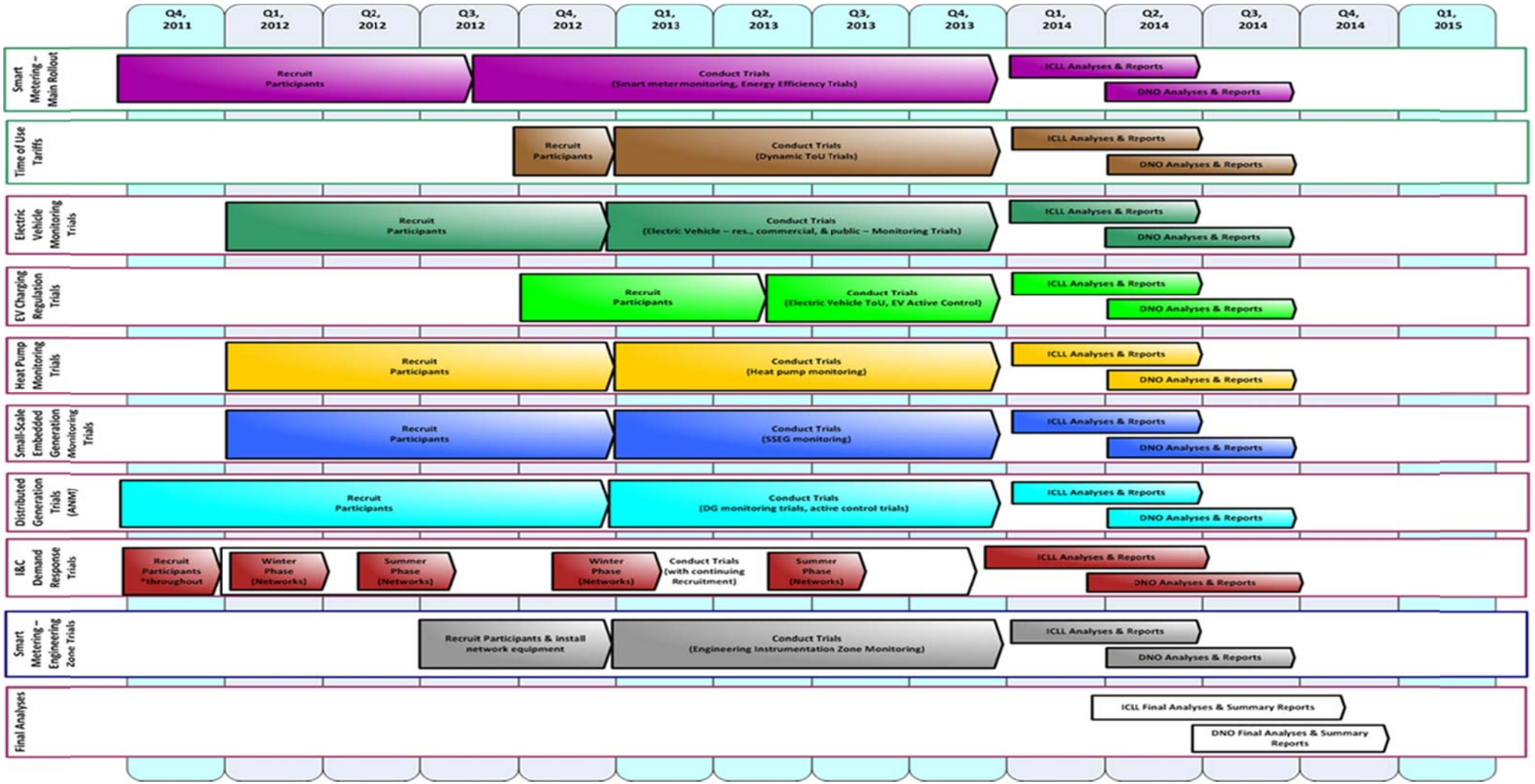
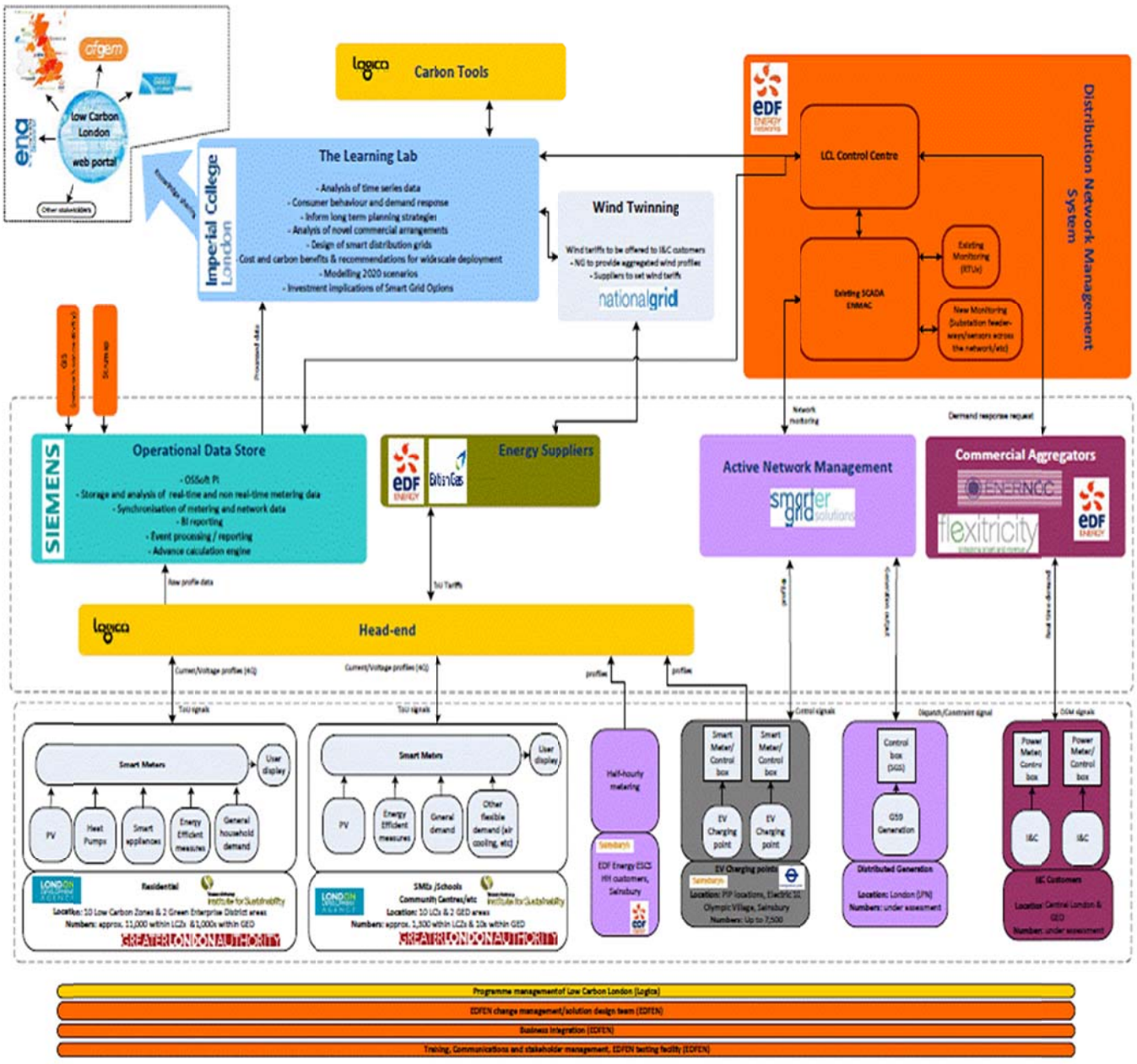


Figure 1 – project timetable

Data is collected in two secure databases, one capturing data on the trial participants, the participant management system (PMS) and the other, the Operational Data Store (ODS) captures all transactional data generated from the project's trials. The ODS also holds relevant network topology and technical configuration and meta-data. All transactional data is collected on an automated basis through secure file transfer interfaces. The ODS currently has 25 separate data collection interfaces, enabling data from residential smart meters, RTUs, EV charging posts as well as instrumentation equipment monitoring PV and heat pump installations.

Despite the various challenges faced to date during the project, it is still fully aligned to the original high-level solution described in Figure 2 below, which details the major solution components and partner roles in the overall project.



2.2 Project workstream updates

2.2.1 Wind twinning – residential demand response

The project's ground-breaking dynamic ToU tariff trial, marketed by EDF Energy as "Economy Alert", started in January 2013 with 1,121 EDF Energy customers participating in the 12 month trial (January-December 2013). The demographic profile achieved through the final stages of recruitment for the smart meter trial reached the target profile across most individual demographic groups at the lowest level of granularity.

The tariff is based on three separate tariff rates of "low", "medium" and "high". Trial interventions are initiated by sending day-in-advance pricing signals to participants via their smart meter in-home display and via text message if they have supplied a mobile telephone number. Participants then have the opportunity to adjust their electricity consumption behaviour in response to the price signals. Consumption behaviour is monitored via the half-hourly profile meter readings captured in the smart meter.

Figure 3 below illustrates the pricing signals to the smart meter in-home display and the SMS messages received by trial participants.

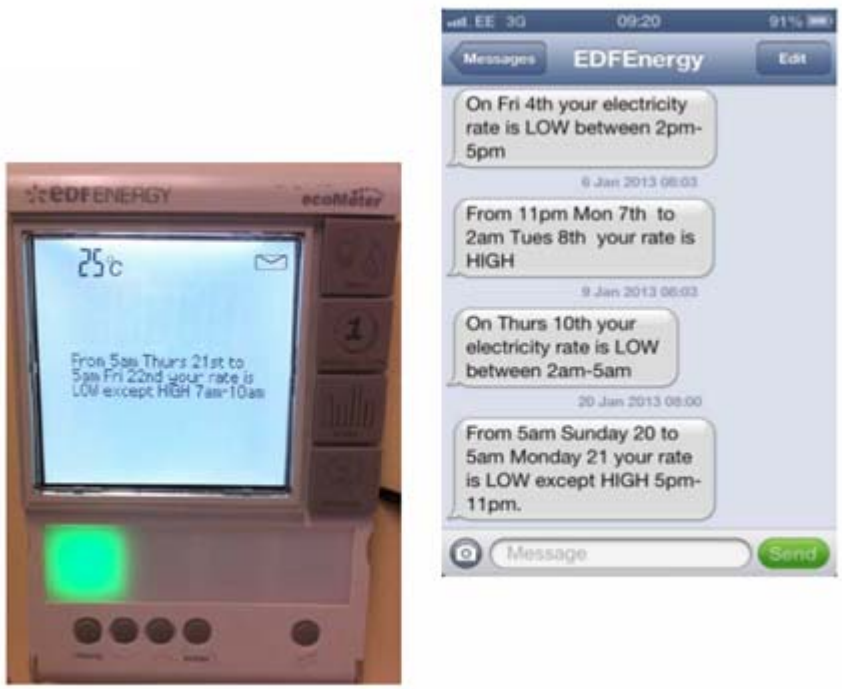


Figure 3 – example of ToU messaging

Interventions for the Economy Alert ToU tariff started on 4 January 2013 and to date there have been no adverse reactions to the trial. Early indications show that trial participants are responding to interventions, though the extensive analysis of the data will be completed further into the trial period. In early March trial participants started receiving a personal monthly energy usage information letter

showing their energy consumption across the various tariffs, and a comparison against previous months' consumptions whilst on the trial. A sample of this letter is contained in Appendix 1.

In total, there have been 72 separate price interventions and the monthly breakdown is set out in Table 1 below.

Month	Low price signals	High price signals
January	9	7
February	8	9
March	10	8
April	6	5
May	4	6

Table 1 – dynamic ToU tariff signals

Early analysis of data collected is detecting a distinct and consistent difference in overall energy use from the group of trial participants on the dynamic ToU trial when compared to the control group, who are not on the ToU trial. The data will continue to be collected and detailed analysis will be undertaken at subsequent stages during the trial to evaluate any seasonal effects, as well as at the end of the trial. Figure 4 below illustrates the consistent marked difference in peak demand by the ToU group of participants compared to the control (i.e. non-ToU) group.

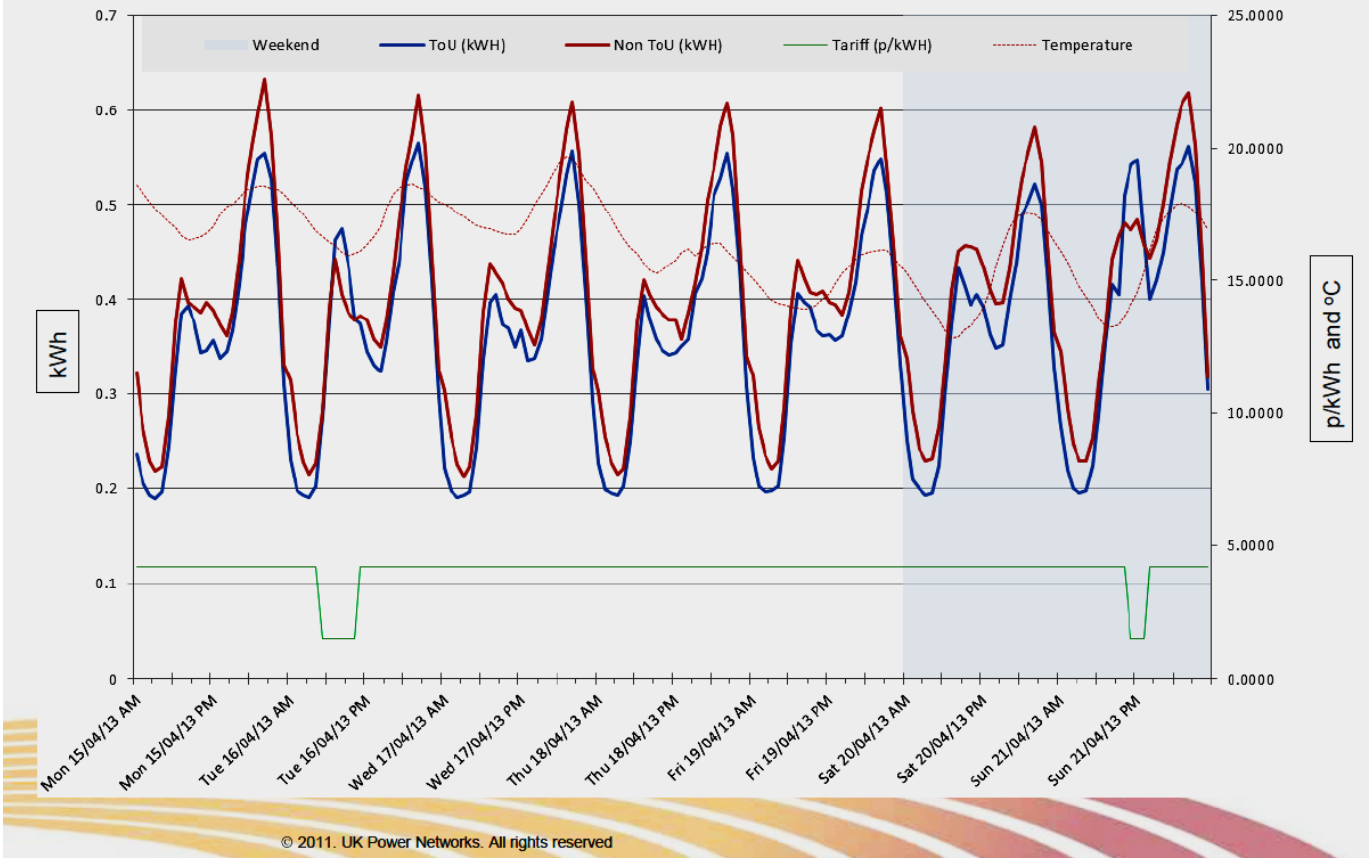


Figure 4 – early data analysis from ToU trials

A major external learning dissemination event was held in April 2013 to share learning from the recruitment of participants to the ToU trial as well as early emerging trends from the empirical consumption data collected.

2.2.2 Wind twining – I&C demand response

The project is working closely with National Grid and all other DNO to discuss the potential for tri-partite agreements between DNO, aggregators and National Grid allowing the efficient and effective utilisation of common demand response resources, managing the conflicts and synergies within a practical framework. In March 2013 UK Power Networks hosted the fourth Demand Side Response (DSR) Network Forum at the Siemens Crystal in London. At that meeting it was decided by the attendees of the forum to formalise the DSR Network Forum by applying to become a recognised ENA working group.

The joint National Grid and DNO Demand Side Response (DSR) Network Forum is now defining "asset sharing", focusing on what assets can be shared and what assets need to be shared. This forum has representatives from all DNOs and National Grid and will help assist in the development of the potential shared service model/framework and provide the basis for any further discussion with other relevant parties on the issues. The project works actively to participate in this forum and strive towards a mutually agreeable outcome for all parties.

2.2.3 Enabling and integrating distributed generation

The main activities during this reporting period have focused on four key areas:

a) Continuing installation of Active Network Management (ANM) equipment for customers signed up to the trial;
b) Continued recruitment of active trial participants;
c) Development of the new and innovative proof of concept trial to use ANM to enable I&C demand response; and
d) Activation of ANM monitoring trials.

Installations and commissioning works have been completed in 12 sites, where generation data is being collected via ANM. There are four more sites that have been surveyed where monitoring equipment is scheduled to be installed and commissioned in the next few weeks. Three opportunities for Active ANM facilitating generation connection or solving network constraints have been identified and are expected to be developed over the next 6-8 weeks.

The equipment required for the ANM enabling demand response trial has been set-up. Two demand response aggregators have been recruited, Flexitricity and KiWi Power, providing generation and turndown load. The ANM-Flexitricity solution has been successfully tested and went live 3 June 2013. The ANM-KiWi solution is being set-up and is also expected to go live by the end of June 2013. Recruitment continues and one opportunity for direct ANM triggering demand response (i.e. without an aggregator) has been identified and it is expected to go live later this year.

The ANM triggering EV trials are being defined with POD Point and Siemens. They are expected to be set-up in the upcoming months and go live in September.

The visualisation of LCL DG participants within PowerOn has been agreed and the ENMAC system symbols have been issued to UK Power Networks' Operations, Control Systems and Automation teams for production. The factory acceptance tests associated with the upgrade works on the supervisory, control and data acquisition (SCADA) system T5000 remote telemetry unit, which will enable the data and control signals to be issued through the SCADA system, were accepted in early

January. This upgrade will be reviewed by UK Power Networks Operational Telecoms department before being implemented within trial area substations.

The PI system (which is a real time, time stamped database) within the active network management system was successfully linked with the operational data store and passed through the appropriate system acceptance testing. One of the active network management system cores has been successfully commissioned and is transmitting data into the ODS. The replacement of the remote telemetry units at the trial substations are in progress in preparation for the summer demand response trials.

The project has developed a hybrid trial that utilises ANM technology to enable demand response. This trial is of particular interest to the DNO as it allows for reliable automated demand response facilities with a high degree of control and transparency over the technical and commercial characteristics of the service. Figure 5 below illustrates the overall ANM enabling demand response trial.

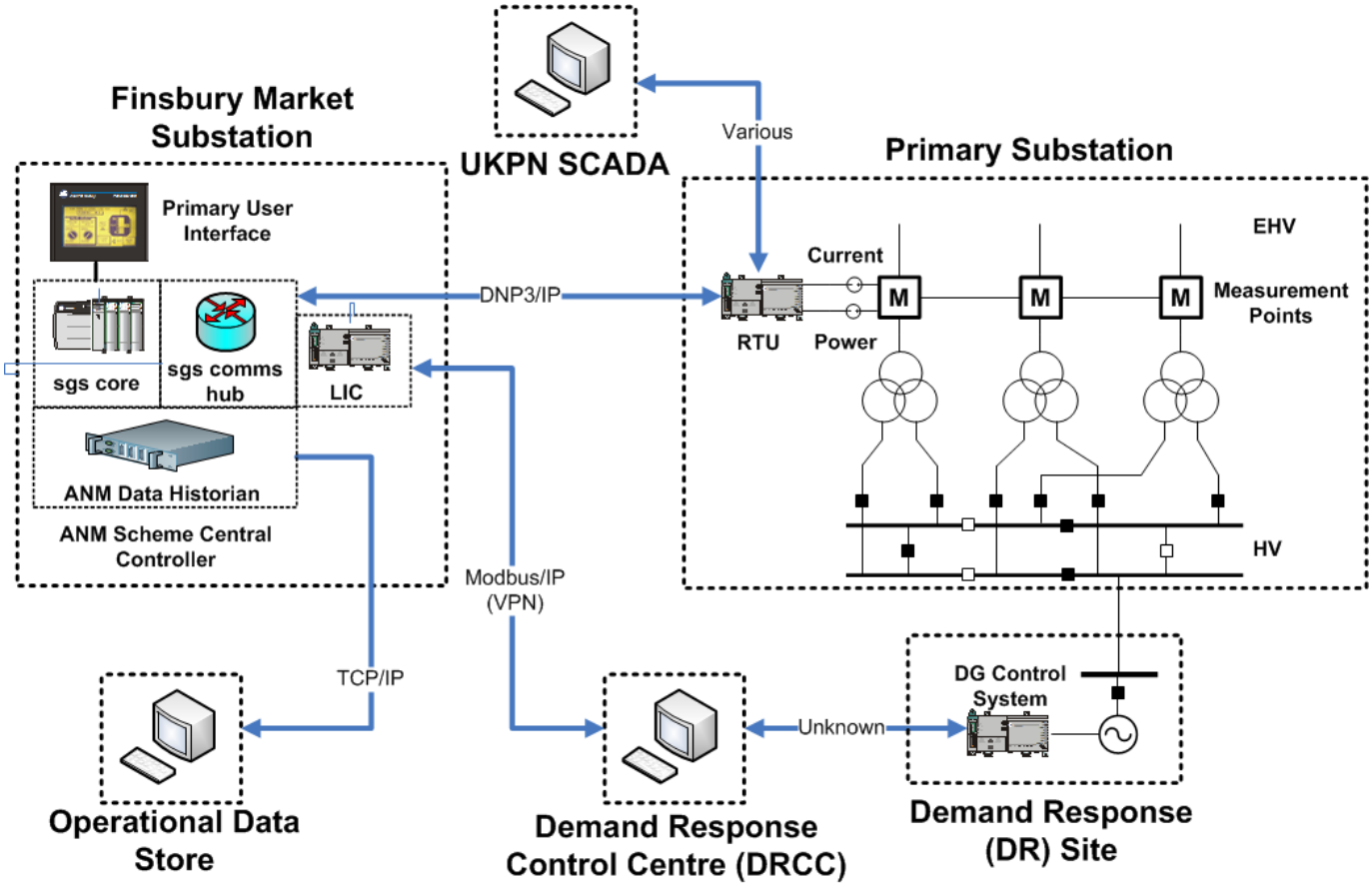


Figure 5 – ANM enabling demand response

2.2.3 Enabling the electrification of heat and transport

2.2.3.1 Heat pumps

As part of the approved changes to the project in December 2012, active recruitment of heat pump trial participants has ceased. To date there are three heat pumps enrolled in the project and there are a small number of additional participant applications in progress where the project has been approached directly by heat pump owners with a desire to participate in the trials. The project is in negotiations with other external bodies to supplement this data with suitable and appropriate data from other heat pump trials (this approach was also agreed as part of the formal project amendment in December 2012).

The heat pump installations are directly instrumented with an in-line EDMI MK7b smart meter device that is capable of measuring voltage and power quality. This device is deployed without an in-home display and the trial participant has no direct engagement or communication with the smart meter. Data is collected through a remote meter data collection service transmitted by SIM-card and transferred to the project's ODS database. The heat-pump trial is a monitoring-only trial with no active trial interventions.

2.2.3.2 Electric vehicles and charge posts

The project has had considerable success this reporting period in the further development and operation of its EV trials. 1,073 public EV charge posts are now actively monitored and data collected on a routine basis. 54 residential EV owners and 63 commercial EV owners have enrolled onto the trial (the 54 residential participant numbers exclude an additional 25 participants from the Nissan LEAF EV leasing scheme set out below, who have also enrolled – see below). As with heat pumps, the instrumentation is provided via an EDMI MK7b smart meter capable of measuring and reporting voltage characteristics, but again no in-home display is deployed. Data is similarly collected via remote SIM-card data transmissions into a central meter data system and then transmitted via a secure file transfer mechanism to the project's ODS database.

The location of the EV charge posts being monitored throughout London are depicted in Figure 6 below.

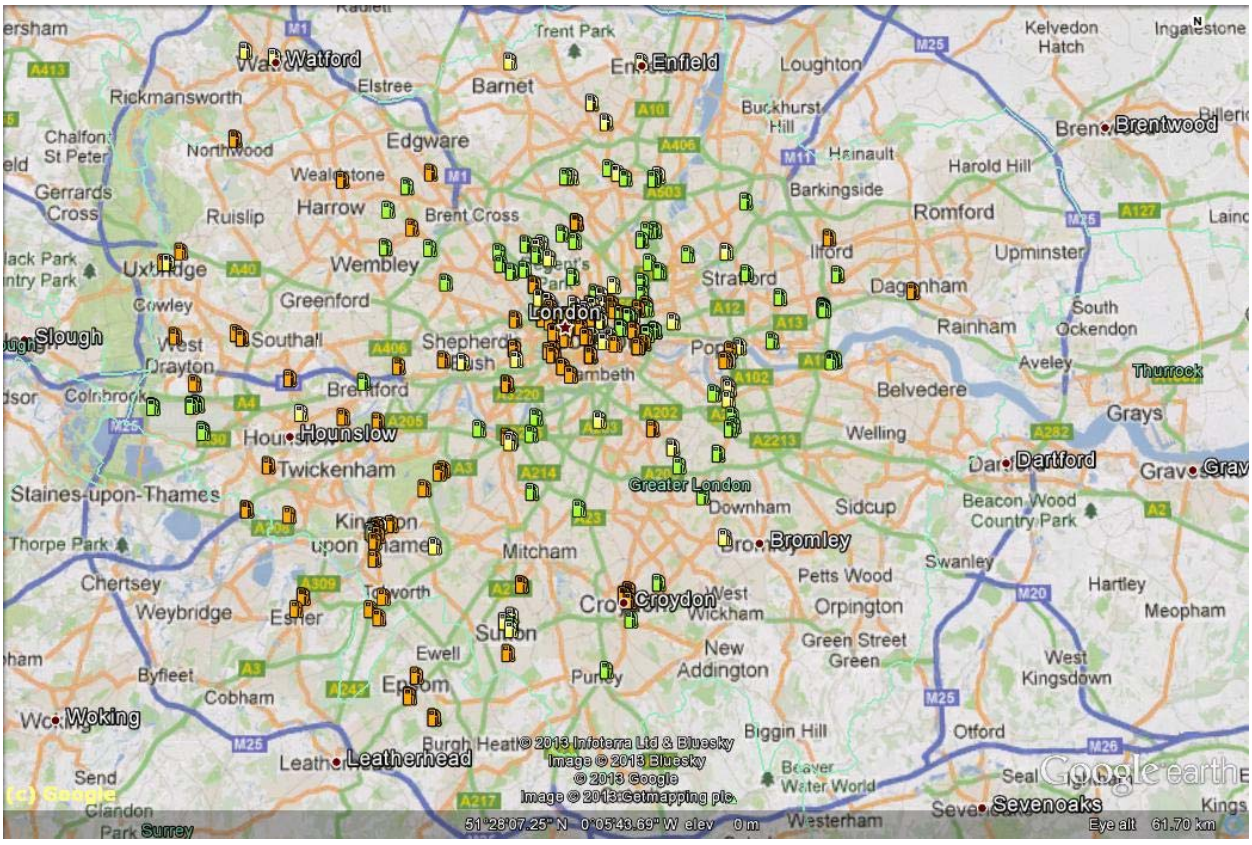


Figure 6 – EV charge post locations

The project has recently launched a high-profile residential EV leasing scheme to encourage the take-up of EVs enrolled onto the project's trial. 25 Nissan LEAFs are involved in the scheme which will run for 12 months. The Central Transport Studies department within Imperial College have been

engaged to analyse travel patterns of the EV owners involved in the trial. The handover of the first batch of Nissan LEAFs was completed in mid-May 2013, captured in Figure 7 below.

Figure 7 – EV trial - Nissan LEAF handover

The majority of the EV charging posts involved in the project's trial, both public and private are enrolled in monitoring trials, however, the project has also devised two separate trials for managing EV charging demand.

A) The project has established an EV charging trial based on a static time of use tariff, with 10 participants who are EDF Energy customers and EV owners, using the EDF Energy "Eco 20:20" tariff.
B) The project has also recently developed an innovative EV demand response trial, with one EV charge post operator, which utilises ANM technology and the CNO control systems to exploit DSR opportunities that will be imperceptible to the EV owner. It is currently planned to enrol up to 14 charging posts into this EV DSR trial which will run until 2014.

In addition, access has been obtained to historical public EV charge post data, which is currently being validated prior to loading onto the ODS for analysis. The project has also collaborated with the Scottish and Southern Electric (SSE) vehicle-to-grid (V2G) project with an Ofgem Innovation Funding Incentive (IFI) submission. The project also intends to hold an EV focus group in the second half of 2013 to bring together EV owners and share early insights into the data collected so far.

Figure 8 below illustrates the use of ANM technology to enable EV ToU charging.

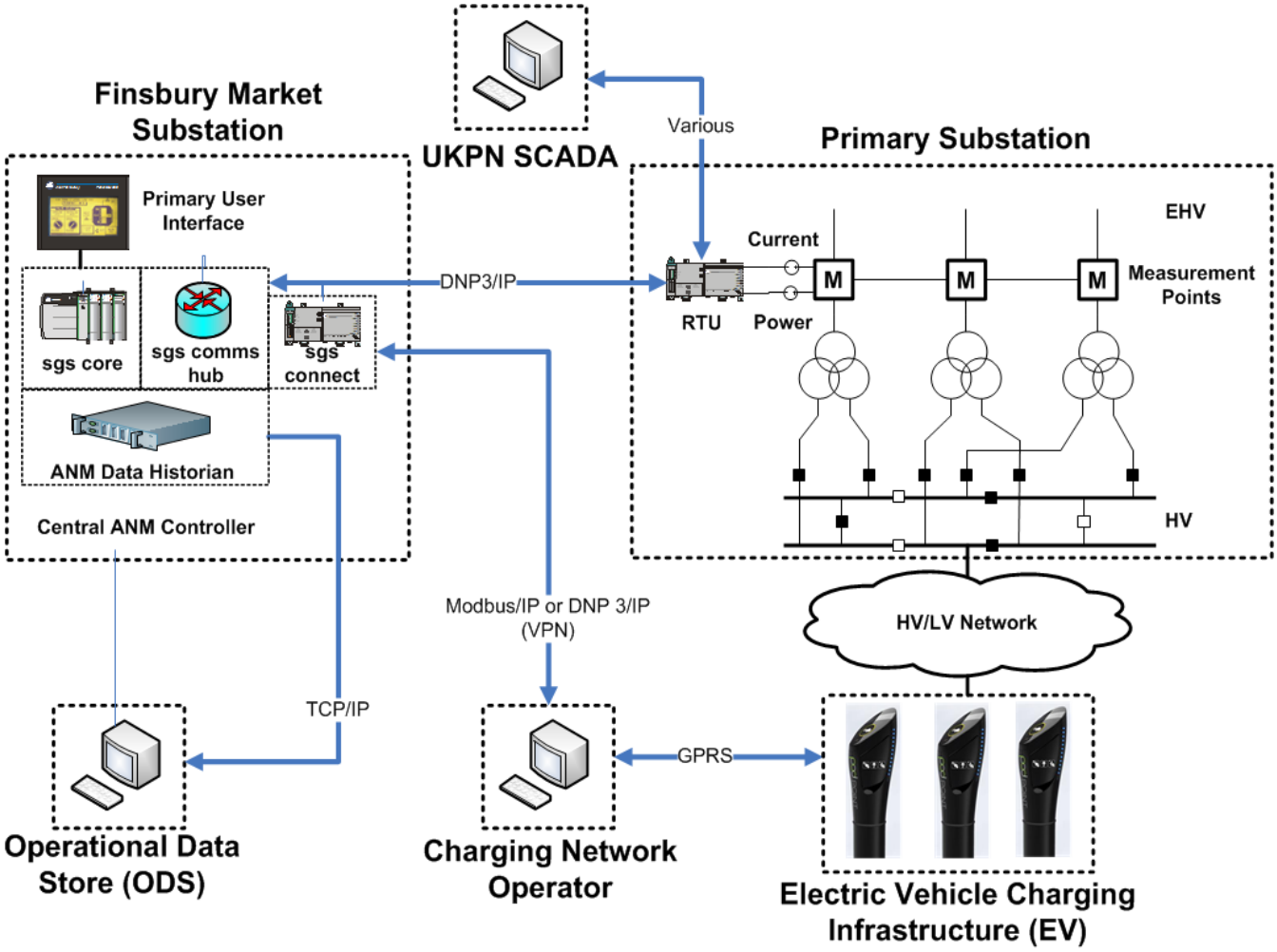


Figure 8 – ANM enabling demand response

2.2.3.3 Distributed energy resources (PV)

As part of the formal project changes approved in December 2012, it was agreed to increase the prominence of distributed energy resources within the project, in particular that of photo-voltaic (PV) installations. The project has been working with a number of notable PV installation companies across London and the south east to enrol appropriate PV installations onto the project's trial. A number of community-based PV schemes (e.g. Brixton Energy's installations at Elmore House, Styles Gardens and Roupell Park) have been recruited and a further five additional commercial PV installations are in the process of being enrolled on the project in conjunction with the major PV installation organisation, Southern Solar.

EDF Energy has been able to propose a further 10 customers with PV installations to participate in this trial who are already participating in the smart meter trial. The PV trial is a monitoring-only trial with no active interventions and monitoring instrumentation is delivered via an EDMI MK7b smart meter with no in-home display deployed. In total, the project currently has recruited 10 PV installations, totalling approximately 40 kW of generation onto the trial.

2.2.4 Using smart meters to facilitate smart grids

The project completed its smart meter recruitment and installation early in this reporting period. A pool of 9,140 EDF Energy customers were initially enrolled which subsequently resulted in a total of

5,815 successful smart meter installations being completed – the difference being those customers whose residence was unsuitable for the installation of a smart meter (e.g. for reasons of poor SIM-card reception), or where an installation appointment was unable to be finalised with the customer. Smart Meter recruitment and installations with EDF Energy have ceased but the project is negotiating with British Gas to gather data for up to 10,000 additional smart meters in the London Power Networks plc area. These customers are additional to the existing 806 British Gas customers enrolled onto the project and are expected to be enrolled onto the project in June/July 1013.

EDF Energy met all the Acorn group sample demographic targets, with the exception of two Acorn sub-categories, “Affluent Greys” and “Blue Collar Roots” (both slightly under target). Imperial College have confirmed this level of recruitment is statistically valid. By the end of December 2012 the total number of participants available for ToU trial recruitment was 5,605, representing an attrition rate of 4%. The most significant reason for customers leaving the smart meter trial was due to change of energy supplier.

Figure 9 below depicts the geographic spread of smart meters.

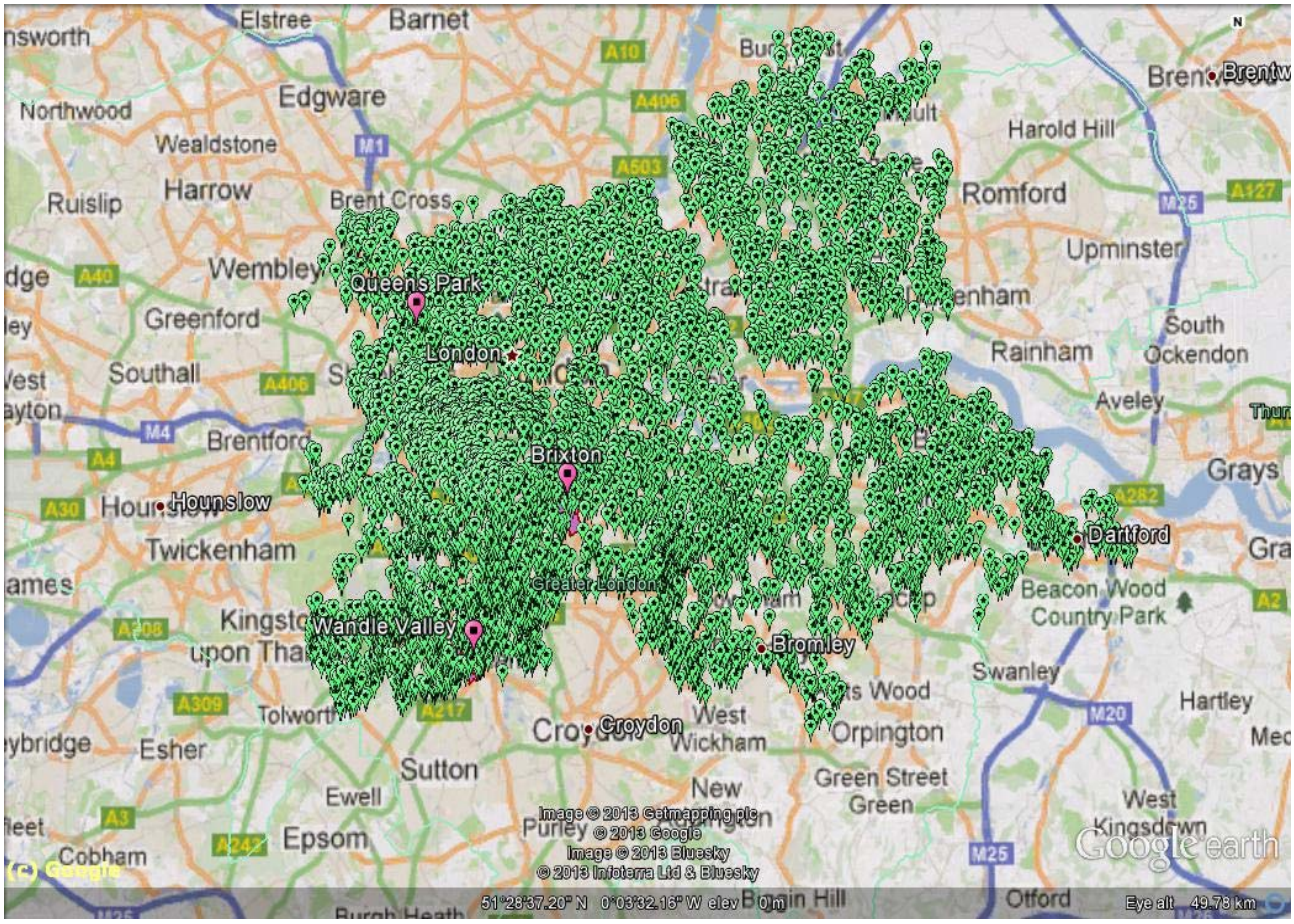


Figure 9 – smart meter geographic spread

In addition to providing the control group comparator for the dynamic ToU tariff trial, the base of collated smart meter data now provides useful measurement data for delivery of the DNO smart metering network planning and design programme reports.

2.2.5 Demand side management

The demand side management trials are divided into four main categories:

a) Residential and SME response to energy efficiency measures (discussed in 2.2.5.1 below);
b) Residential and SME responses to ToU tariffs (discussed and embraced within 2.2.1 'Wind twinning – residential demand response' above);
c) Demand side management of I&C customers (discussed in 2.2.5.2 below); and
d) Demand side management of I&C customers - conflicts and synergies (discussed in 2.2.2 above).

2.2.5.1 Residential and SME response to energy efficiency measures

A comprehensive energy survey was conducted as part of the smart meter recruitment exercise. A total of 2,868 energy surveys have been returned to date and work is continuing to encourage those participants yet to complete the survey to do so. The survey covered a wide range of topic areas including household and property information, lighting and appliance data, attitudes to low carbon energy, understanding of make-up and accuracy of energy bills and location and use of the smart meter in-home display.

A key objective of this trial is to gain a better understanding of demand profiles for different customer groups with and without efficiency measures as well as loading of the distribution network; the survey data will perform a central role in informing that understanding.

2.2.5.2 Demand side management of I&C customers

The project has developed a comprehensive I&C demand response trial framework, encompassing both diversity of demand and diversity of response times. Diversity of demand is articulated through a range of different demand types, e.g. diesel backup generators, combined heat & power (CHP), building load, fuel cells and batteries.

Three distinct response winds have also been defined that represent the key scenarios that occur on an operational basis within a DNO;

a) "immediate" DR – post fault; response provided within three minutes of fault occurrence;
b) "medium" DR – pre fault; keeping substation load below firm capacity. 30 minute notice; and
c) "long" (short / advanced notice) – planned outage for maintenance or construction projects, with up to three days' notice and in some instances more.

The project has also communicated a portfolio of 13 constrained substations to aggregators where demand should be sourced from.

Across the three partner aggregators, the project has been able to contract the following:

- Aggregator "A" – 1.3 MW (diesel, Farjeon);
  Aggregator "B" – 2 MW (diesel, Ebury Bridge); and
  Aggregator "C" – 1 MW (building Turndown, Bankside C), 2.4 MW (diesel, Bankside C) and 6 MW (diesel, Silvertown/SSE operating as an IDNO – only available for tri-partite trials).

The project operated a contained winter demand response trial which ran until the end of February 2013. The project has met significant challenges in its drive to reach a diversity of demand (building turndown, aggregated demand, CHP, diesel, etc.) for participation in the demand response trials and the trial was restricted to four calls against 2 MW of demand, all of which were 100% successful. Consistent feedback from project partner aggregators is that potential trial participants are reluctant to engage on short-duration trials.

The project has mitigated this risk by inviting additional aggregators to participate in the summer 2013 trial, with opportunities identified for specific demand types. At the time of writing, the call for additional aggregator involvement has been met positively by the market-place and the summer 2013 demand response trial is currently forecast to be initiated involving over 17.35 MW of demand, with the required diversity of demand contracted into the trial. A significant portion (15.95 MW) is to be triggered, where possible, by real time Network signals via the ANM system. In the interests of learning, we have accepted two generators into this trial from outside the London Power Networks plc licence area, on the basis that they are able to respond in less than three minutes and therefore allow us to verify the reliability of "immediate" calls.

The project continues to provide operational support to UK Power Networks via its demand response facility, e.g. UK Power Networks experienced some network constraints in April with networks related to two central London substations. LCL was able to provide DSR services on two different occasions (2 MW of demand on both occasions, one for three days duration and one for two days), to help alleviate some of the real-life stresses on the network.

Sites for the ANM triggering DR trial have been put forward by two aggregators. This trial is discussed in more detail in section 2.2.3 above. Demand response is being examined in great detail as an alternative to or solution for deferral of network reinforcement. LCL attended a DNO consultation meeting to discuss the accommodation of DSR in a revision to ER P2/6 and also attended DECC's consultation meeting on demand reduction. Learning from these events has been incorporated into UK Power Networks' smart network strategy.

2.2.6 New distribution network planning and operational tools

LCL has designed, built, tested and is now operating a comprehensive set of measurement and analysis tools that underpin the project's various trials and provides the functionality to undertake the detailed analysis from the empirical data gathered during the trials. The IT solution is centred on two databases, the ODS, which is a premise and network topology database, and the PMS, which holds detail of trial participants as well as energy survey data. Both databases have significant meta-data describers, defining the key components of the trials and the ODS collects transactional data on a daily basis from various metering feeds. All data is transferred through secure file transfer protocols.

During this reporting period the IT solution went through a major upgrade, known as release 2, to deploy various changes into the production IT environment. The instrumentation of substations through enhanced RTUs has also been implemented during this period. The level of data granularity the project is operating at, in particular in respect of LV network topology data within the EIZs, has highlighted a number of data cleansing opportunities which have been systematically addressed as they have arisen. In addition, the root cause analysis and learning has been fed back into the operational business to avoid further recurrences.

The smart metering head-end system interface has been operating from 2012 and this reporting period has seen all historic smart meter data successfully loaded onto the production ODS environment. All energy survey data obtained to date has also been loaded into the PMS database and efforts are continuing to encourage remaining trial participants yet to complete a survey to do so. Additional secure file transfer connections have been implemented for additional data feeds from:

- British Gas – for additional smart meter data;
- EDMI smart meters – for EV, PV and expected pot-end monitoring data in the EIZs; and
- Additional aggregator data.

A detailed review was held to ensure that the current carbon impact report structure and algorithms were still aligned with the real empirical data obtained from the demand response trials to date and the remaining trials planned – no changes to the software logic or carbon calculation algorithms have been identified to date. Figure 10 below illustrates the current IT architecture and components.

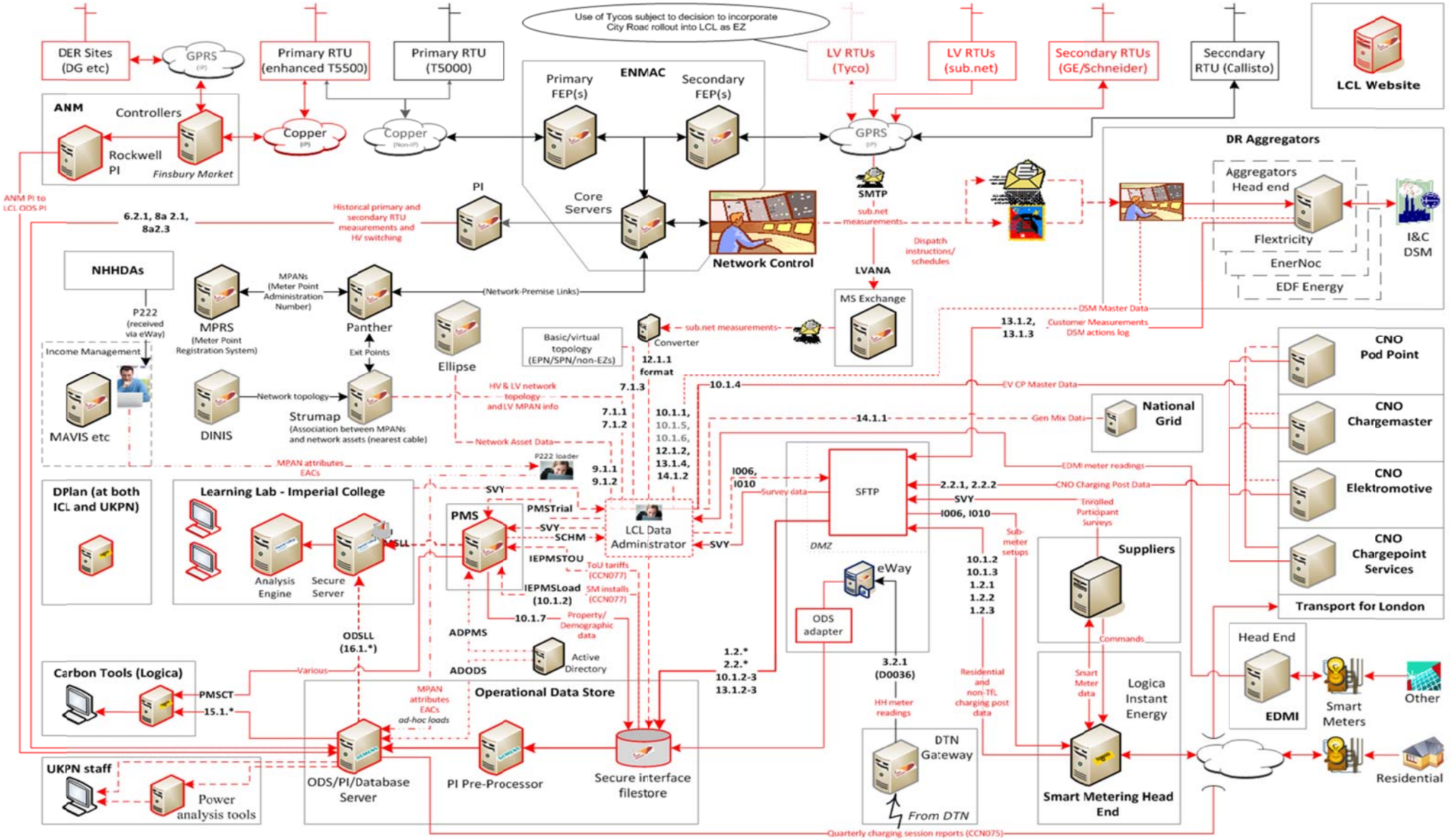


Figure 10 – high level IT architecture

2.2.7 Low Carbon London learning lab

The LCL learning lab continues to function as a high-profile educational hub both for analysis within the project itself and the various external parties who have expressed interest in understanding more about the project. During this period the lab has hosted various international visits from other utilities and academic institutions.

Imperial College provided some early analysis from the dynamic ToU tariff trial, which was presented at the external learning dissemination event held in April, as well as performing some initial data interrogations of the transactional data now being collected and stored within the ODS. The IT infrastructure located at Imperial College has been upgraded to facilitate the intense analysis and increased numbers of users as the learning lab reports are produced in the next 12 months. Going forward, the learning lab will take a stronger role as it moves into its reporting and final learning dissemination phases.

2.2.8 The development of new network design and operation practices

The project continues to work closely with the rest of the company to develop the learning emanating from the project and the opportunities arising to create new network design and operation procedures. Particular emphasis has been placed on demand response trials and the project has worked closely with appropriate operational departments within the company. In addition, the proposed configurations for DNO operational systems have been produced and reviewed with the control centre, based on the trials and outputs of the ANM distributed generation trials.

A UK Power Networks process for transferring technologies and learning into the business from innovation projects such as LCL is being supported by input from the programme team – trial results for demand response are being used to pilot this process. The development of UK Power Networks' RIIO-ED1 business plan submission has been activity contributed to by the LCL team, specifically the Innovation Strategy section of the plan, which will include all relevant elements of the programme achievements and activities.

A focus of both this reporting period and increasingly the next reporting period will be the structure of final reports, taking account of early results coming out of the trials and other material being generated by the other LCNF projects.

2.2.9 Engineering Instrumentation Zones

The three EIZs that have been created provide an opportunity to update our understanding of how the network is currently running to a much higher level of granularity than is required to support our existing business operations. They represent defined geographic areas that have intense levels of instrumentation deployed across the distribution network to enable end-to-end impact analysis. Work is being finalised to deploy the final components of this framework, with over 130 voltage measurement devices being installed within the three EIZs, to support the project's trials.

The three EIZs underpin the move from the original 10 Low Carbon Zones to a London-wide geography and enable the same or in most cases, a greater level of learning, to be obtained from the project's trials.

2.3 Outlook for next reporting period

The key activities for the project for the next reporting period are focused around the following activities:

1. Summer 2013 demand response trial, with additional aggregators participating to address demand gaps against the desired profile.
2. Continued operation and December 2013 closedown of the dynamic ToU tariff trial.
3. Conclusion of the work to deploy all LV instrumentation within the three EIZs.
4. Continued operation of all the project's monitoring trials.

5. Focus group session with EV owners and trial participants.
6. Activation of the "ANM-enabling demand response trial".
7. Activation of the EV ToU trial.

Although this programme of work contains some highly innovative trials, at this stage the project is confident that they will all be successfully executed as planned. The inclusion of additional aggregators to address gaps in demand addresses a previous area of risk that is now satisfactorily mitigated.

3. Consistency with full submission

The project is working to the amended full submission that was amended by the change request approved by Ofgem in December 2012. Following approval of the change request by Ofgem the project undertook detailed configuration reviews to ensure all aspects of the project were consistent with the amended full submission. This work was completed in January 2013 and continues to be monitored on a regular basis through the workings of the project's solution design authority and change management process.

3.1 Amendment request

The project submitted a formal amendment request to Ofgem in response to material changes in circumstances beyond the project's control that have arisen since the project was originally approved and funded. The project requested amendments in three areas of the project, heat pumps, geographical trial locations and the carbon impact reporting tool.

The process leading up to the decision on the proposed amendments included a detailed independent review of the proposed changes by TNEI, a consultancy appointed by Ofgem, (and who had assessed the project during the original LCN Fund competition in 2010), as well as the project seeking the views of all other GB DNOs as to the impact the requested amendments may have on the learning the project can achieve. As a further assurance, the project's academic partner, Imperial College London, confirmed that it would continue to deliver the benefits outlined in its original submission.

3.1.1 Heat pumps

The very low incidence of heat pumps in London initiated the proposal to cease active recruitment of residential as well as I&C participants for the heat pumps trial. The project has observed low demand for heat pumps in London, in all likelihood precipitated by a variety of reasons ranging from the delay in the Renewable Heat Incentive through to the underlying geology of London and lack of available ground space or peripheral boundary space of typical London housing stock, lending them to be unsuitable as heat pump installations. However, the project has demonstrated that by supplementing its own data with suitable data from other heat pump trials, it will still be able to deliver analysis and findings applicable at a GB level of analysis.

The change request was for the project cease the active recruitment of further heat pump trial participants due to the high recruitment costs, although any potential participants who approached the project themselves would continue to be involved if deemed suitable.

3.1.2 Geographic locations

The project originally intended to focus its activities within the Mayor of London's 10 low carbon zones (LCZs). These were geographic areas established to trial carbon-saving techniques and to promote environmental sustainability. However, the zones were discontinued in May 2012 by the Greater London Authority. In response to this, the project proposed to now expand the geographic area for its trial to be London-wide, whilst at the same time establishing three distinct

zones of intense instrumentation within areas of clustered low carbon technologies, the engineering instrumentation zones (EIZs).

The expansion of the trial areas to be London-wide would enable the project to utilise a more representative and balanced demographic profile that would allow for improved extrapolation to a GB level of analysis. The establishment of three EIZs, within which there will be significantly higher levels of monitoring and instrumentation than was previously envisaged for the 10 LCZs, and their location in areas of clusters of low carbon technologies, will enable richer data gathering and analysis whilst still delivering the same range of learning as anticipated from the 10 LCZs.

3.1.3 Carbon impact analysis and reporting tool

The project originally intended to utilise an "off the shelf" software product to measure and report the carbon impacts of the trials. It was recognised that the software would require some modification to meet the project's precise needs and these changes had been technically and commercially agreed with the then owners of the software. However, in late 2011 the software was acquired by new owners who were unable to commit to the previous agreements without a significant increase in price, which was considered to no longer represent good value for money for customers. In response to this, the project contracted Logica (now known as CGI), to develop a bespoke measurement and reporting tool that was designed with the project's requirements factored in from the start. This approach ensured that the learning based on the carbon impacts would be delivered by the project.

3.1.4 Costs and timescales

Within the change request, the project also submitted proposals to extend the timescales of the project by an additional six months, to reflect the delays absorbed by the project caused by the lack of a SMETS compliant smart meter and the slow recruitment of participants in certain trials. The project will now complete its work by the end of December 2014. The additional six months extension is to allow specific DNO reporting to complete. The original reporting timeframes for reports to be produced by Imperial College, i.e. June 2014, remain unchanged from the original submission.

The approved amendments resulted in both project cost reductions and more efficient ways of delivering the revised scope and components of the project, which in turn further reduced project costs by £1.5m. UK Power Networks has also increased its contribution to the project by £2.0m, resulted in an overall total cost reduction of £3.5m, which will be returned to customers in the financial year 2013/14.

3.2 Configuration management

LCL is a complex project with many interdependent component parts within its overall solution. The efficient routine management of this architecture and configuration has necessitated the development and maintenance of a number of configuration management tools that enable the project to flex and change whilst retaining its internal coherence and consistency as well as ensuring its compliance to the full amended project submission at all times.

These tools underpin the change management process and facilitate quick, accurate and consistent assessment of the impact of any proposed change on the various component parts of the project solution.

Figure 11 below describes the high-level configuration management framework.

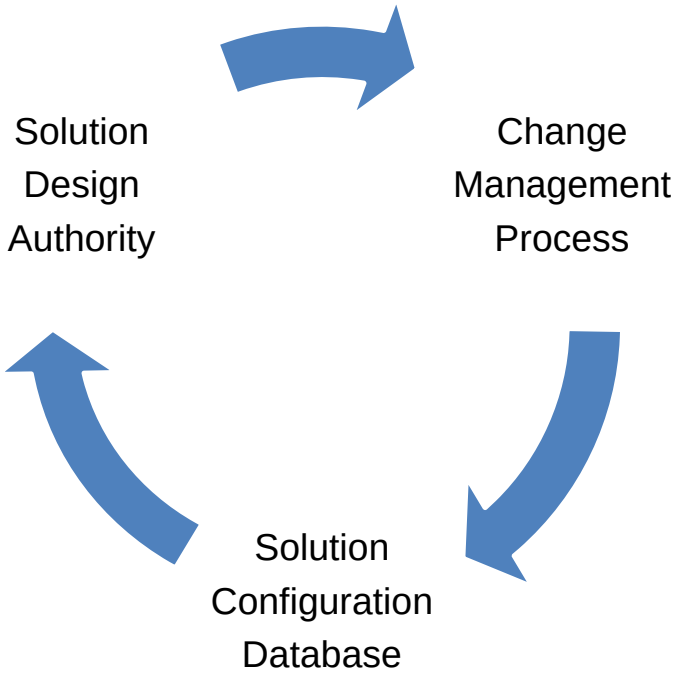


Figure 11 – configuration management framework

4. Risk management

LCL identified a number of key risks to the delivery of the project as part of its original full submission. The subsequent amendment request and revised full submission identified further key risks that had arisen since the original full submission. All these risks are detailed below, together with additional current key risks the project is mitigating.

The project maintains a comprehensive risk register and regularly reviews all risks as part of the routine project management framework. Risk status is reported in both weekly and monthly cycles, with the status of key risks reported to the project steering group on a regular basis.

4.1 Key project risks

Risk	Category / Owner	Impact/ Probability	Mitigation
INDUSTRIAL & COMMERCIAL			
Demand response – unable to recruit sufficient demand of the required type (*previously identified in original full submission*).	Recruitment / DNO	High / Medium	1. Business proposition shaped to compete with National Grid STOR. 2. Additional aggregators brought in to fill gaps.
DISTRIBUTED GENERATION			
Insufficient levels of distributed generation available (*previously identified in original full submission)*.	Recruitment / DNO	High / High	1. Detailed market research undertaken with prospective participants. 2. Incentives offered to participate. 3. Innovative ANM solutions developed to expand potential trial participants.

Risk	Category / Owner	Impact/ Probability	Mitigation
SMART METERS			
May not be sufficient energy efficiency measures in place in the smart meter locations *(previously identified in original full submission)*	Recruitment/ / DNO	Medium / Medium	1. Develop detailed energy survey to determine exact measures in place with trial participants. 2. Supplement with external data and known trends.
Installation issues relating to the installation of smart meters: a) site accessibility b) functionality c) data confidentiality *(previously identified in original full submission)*	Recruitment / DNO	Medium / High	**Closed** – Smart Meter installs complete. See data security risk below for mitigations with respect to data confidentiality.
Take up of ToU tariffs may be low *(previously identified in original full submission)*	Recruitment / DNO	Medium / High	1. Provide incentives to participate and operate a safety net to ensure no customer is worse off when compared to what they would have paid on their current tariff.
Poor SIM-card reception is smart meters *(identified in amended full submission)*	Recruitment / DNO	Medium / High	1. Use roaming SIM-cards to maximise telecommunications provider coverage
Mayor's Low carbon Zones represent a skewed demographic London, inhibiting potential extrapolation of findings to London and GB-wide levels of analysis (identified in amended full submission)	Recruitment / DNO	High / High	**Closed** – Imperial College confirm that the Smart Meter roll-out has met its demographic targets. More detail is provided in Section 2.2.4.
Unavailability of a SMETS-2 meter (*previously identified risk in amended full submission*)	Procurement / DNO	High / High	**Closed** – Smart Metering installs complete, and used the technical work-arounds discussed in previous 6-monthly reports.
ELECTRIC VEHICLES			
Insufficient numbers of electric vehicles *(previously identified in original full submission)*	Recruitment / DNO	High / High	1. Offer incentives (e.g. free EV charging post) and discounted EV leasing schemes to attract participants.
The project is unable to add monitoring software to electric vehicle charging posts or control the use of the posts *(previously identified in original full submission).*	Installation / DNO	Medium / Medium	1. Residential EV charging posts are being instrumented with smart meters in-line with the dedicated EV charging post spur. 2. Intense instrumentation was undertaken of the public EV charging posts used at the Olympic Park during the 2012 Olympics and Paralympics.
The majority of charging posts are privately owned and cannot be monitored *(previously identified in original full submission).*	Other / DNO	Medium / Medium	**Closed** – The project has gained access to sufficient charge post data, as set out in Section 2.2.3.2. Ongoing monitoring takes place to ensure data continues to flow into the database (ODS) from these.

PROJECT			
Data security – requirements on 3rd party access to personal data (*previously identified risk in amended full submission*).	Other / DNO	High / High	1. Undertake data privacy impact assessment. 2. Establish data privacy governance framework. 3. Establish data privacy steering group. 4. Monitor all data access regularly to ensure compliance 5. Work with partners' IT Security teams to ensure required data security measures are enacted and fit for purpose
EIZ exit point instrumentation will all be in place by the end of Q2 2013 *(new risk not previously identified in original or amended full submissions)*	Other / DNO	Medium / High	1. Potential sites identified in all three EIZ. 2. Prices obtained for installation from Skanska to determine how many can be budgeted. 3. Prices obtained for feeder pillars and three phase meters, orders to be placed once Skanska price known. 4. Installations sites to be selected and prioritised.
Installation of measurement equipment in LV substations may require derogations (*previously identified in original full submission).*	Installation / DNO	Medium / Low	1. No derogations required to date, nor expected in the future.
The collaborative nature of the project may lead to an infringement of the Competition Act (*previously identified in original full submission).*	Other / DNO	High / Low	1. The project works closely with UK Power Networks procurement to ensure no potential infringements 2. The project issued a formal invitation for expressions of interest to the demand response market-place when considering additional aggregators.
A partner may withdraw from the project (*previously identified in original full submission).*	Other / DNO	High / Low	1. All delivery partners have signed collaboration agreements, enabling partners signatures are being finalised. 2. No partner has withdrawn to date and none are expected to withdraw. 3. All partners represented on monthly project steering group and quarterly project partners meeting with UK Power Networks Chief Executive Officer to ensure engagement and pro-active management of any emerging issues.

4.2 Risk controls assurance

The project assures the effectiveness of the controls in place to manage risks through two key processes. Regular risk management workshops are held, as a minimum on a quarterly basis, where the existing risks held on the risk register are all individually review in detail. In addition, any new risks identified are proposed and reviewed at the workshop, for inclusion on the register, together with an owner and initial impact/probability assessment. The owner of the risk subsequently undertakes a full impact assessment and detailed mitigation, updating the risk register accordingly.

On a more regular basis, the status of existing risks is updated on a monthly basis through the reporting framework together. This is supplemented by a weekly review of key risks as part of the weekly project review meeting.

The effectiveness of the risk controls in place is managed through the Project Management Office providing an oversight analysis of risk status, highlighting those risks where the mitigation is not improving the risk status over time (i.e. ineffective mitigation). In addition, key risks are reported to

the bi-monthly project steering group, where steering group members are encouraged to actively challenge the effectiveness of risk controls in place.

Learning from risk mitigation activities is captured as part of the project's workstreams learning logs.

5. Successful delivery reward criteria (SDRC)

There were no SDRC scheduled for delivery during this reporting period. As part the work to reconfigure the project in the amended full submission and updated project direction, the delivery dates for some of remaining SDRC were rescheduled to reflect the new project completion date of December 2014, as well as to correctly sequence some of the final reports that build on other final reports.

The remaining SDRC for the project are all focused on the project's portfolio of final reports. The reports are primarily informed by analysis of the empirical data currently being captured through the project's various trials and work is well underway on the detailed work to scope the individual reports as well as an orchestration framework to ensure cross-report integrity during report production.

Appendix 2 details the complete list of SDRC and the status of each one.

In summary, the project's remaining SDRC are all on track to be delivered on time and the project does not foresee any significant challenges that will not be successfully mitigated through its risk management framework and process.

6. Learning outcomes

LCL is often branded as a "learning journey" and the pioneering and ground-breaking nature of many of its trials and activities provides rich learning, both from the approaches taken to the challenges faced as well as from the analysis and conclusions that will be contained within the final reports.

6.1 Use case learning points

The project continues to operate from the Use Cases submitted as part of the full submission and updated as part of the change request in 2012. The complexity of the project's solution required a sophisticated configuration management framework to be in place from the start to ensure that the overall integrity of the solution and its underlying architecture is maintained as the detailed solution has developed and moved into the trial operation and execution phases.

6.2 Learning capture and dissemination

The project has adopted a systematic and process-driven approach to identifying, capturing and disseminating learning. Each project workstream maintains a learning log and learning points captured as part of the activities of each project workstream are reported and reviewed on a monthly basis. Figure 12 below describes the overall learning dissemination framework.

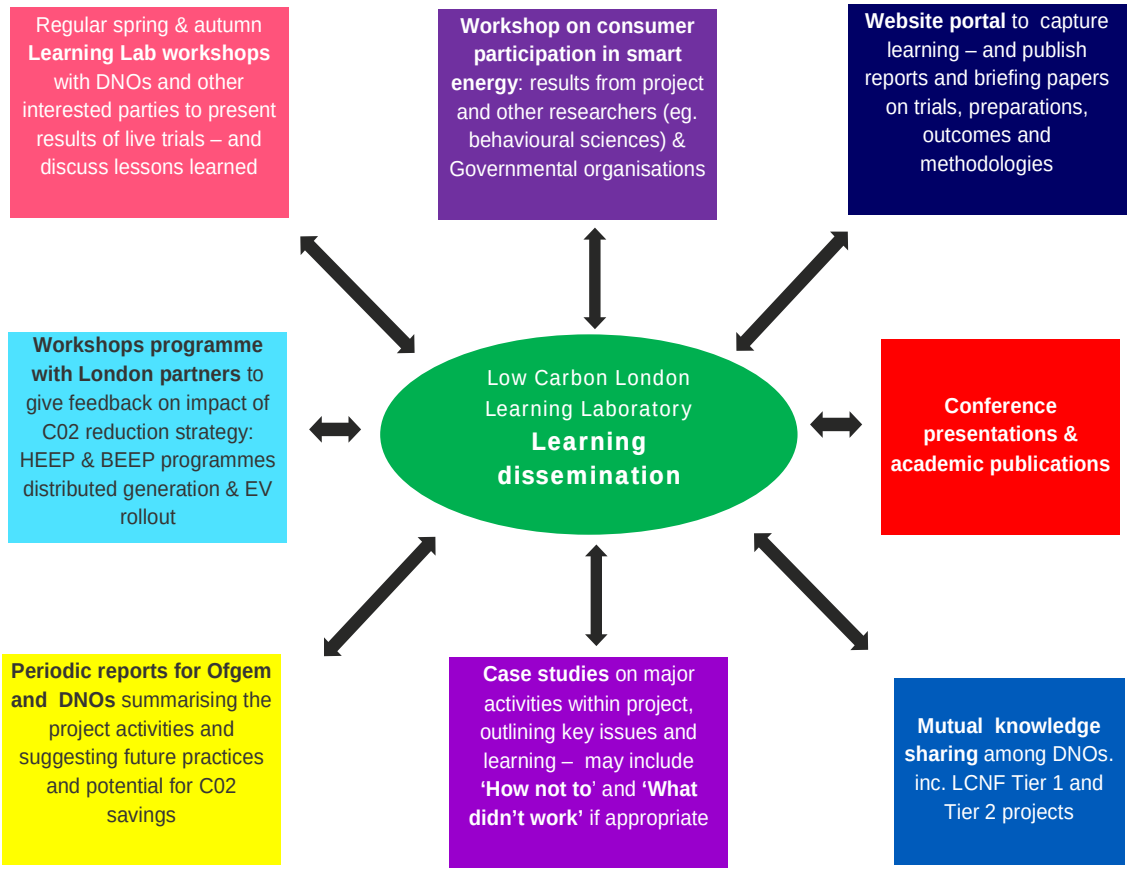


Figure 12 – learning dissemination framework

6.3 LCL Learning Lab

The project has established a dedicated learning zone within Imperial College, known as the learning lab. This facility is widely used to analyse data gathered, present the project to interested parties and going forward will be the centre of learning dissemination of a technical nature. The facilities have been designed and installed to provide effective presentation, visualisation and learning dissemination of complex technical finings and analysis.

As the project moves into its reporting and dissemination phase, the learning lab will function as a high-profile and prestigious centre for learning emanating from the project. In particular, it is intended to use the facility to disseminate learning to other DNOs, academic institutions and to meet the significant interest already expressed from other BG and international interested parties.

6.4 External learning dissemination this period

The main external learning dissemination this period has centred on learning gathered during the recruitment and initial operation of the dynamic ToU tariff trial. A formal learning dissemination event was held in April at the Institution of Engineering and Technology (IET) in London. UK Power Networks gave an initial summary of the project and what the benefits and challenges will be for a DNO. EDF Energy presented on their learning from the trial recruitment in terms of the customer journey, refusal reasons, insights and feedback. The final presentations came from Imperial College who gave an initial insight in to how they will be approaching the analysis of data to produce their findings. The event was well attended with over 75 delegates from the industry. Figure 13 shows the event.

Figure 13 – time of use learning dissemination

6.5 Internal learning dissemination

Internal learning dissemination into UK Power Networks is conducted through a number of channels. Every month a technical engineering forum, the Engineering Governance Group, convenes to allow the project team to interact with operational business personnel to update them on project progress and to discuss emerging learning. The project has also liaised with the network planning change committee to explore opportunities to align emerging thinking from the project with opportunities that arise within the routine business change projects managed by the DNO. The project has also established a network of business champions within the operational business to provide a focal point for two-way communication with the project as well as nurturing project ambassadors within the wider UK Power Networks business.

On major topics, the project has held dedicated learning dissemination events to bring together a cross-section of business representatives to discuss emerging learning and how these opportunities can be taken forward into routine business operations. In addition, the project regularly presents at departmental meetings across the business to ensure that the project progress and learning opportunities are well understood across the DNO.

7.Business case update

The business case benefits as defined in the original bid submission still apply. The principle direct benefit is based on infrastructure reinforcement savings derived from the deployment of I&C demand response. The project has already delivered the forecast savings through its use of demand response within its trials.

Indirect 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 covering a wide range of issues drawn from the practical experience gained to date within the project, 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 of the trials are being analysed and reported through the custom-built carbon tool.

8.Progress against budget

This section is contained in the confidential annexe.

9. Bank account

This section is contained in the confidential annexe.

10. Intellectual property rights (IPR)

The project maintains a register of prospective candidates that may contain foreground IPR. The register is reviewed on a quarterly basis. The project copyrights potential artefacts to protect IPR emerging from the project. The IPR register will be refined in the latter stages of the project as part of the project closedown and decommissioning phase in late 2014.

The current list of prospective candidates is included in the confidential annexe.

11. Other

There are no other items to report.

10. 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 fifth 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  ……

Date 20 June 2013 ……

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

Appendix 1 – Monthly letters to smart meter and ToU trial customers

March 2013
Telephone: 0800 015 8787*

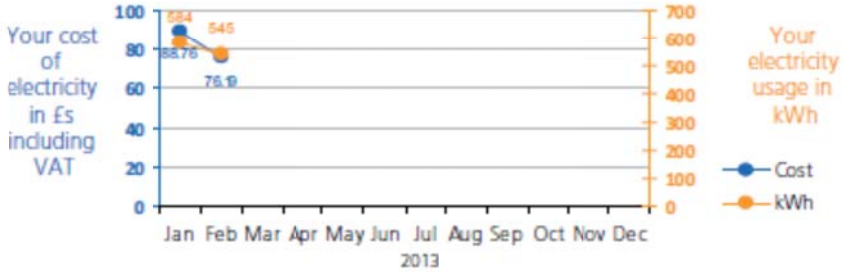
Dear

Your monthly report is ready

Thanks for taking part in the Low Carbon London (LCL) Smart Meter trial. Here's your monthly report that includes information on how much electricity you've used over January and February and what this has cost you. It's not a bill; it's just a simple representation of your energy use to help you understand it better and make small changes to help you save money.

Your energy at a glance

The graphic below shows that in January you used 584 kilowatt hours (kWh) of electricity at a cost of £88.76^. Whilst, in February you used 545 kWh of electricity at a cost of £76.19.



If you'd like to speak to us about the LCL Smart Meter trial or you have any questions about your monthly report, call us free on 0800 015 8787*.

Yours sincerely

Steve Hayfield
Customer Services Director

*Calls may be monitored and recorded as part of our customer care programme. Calls to 0800 numbers are free from BT landlines, other network operators' chargers may vary.
^All costs include VAT. Please note that your monthly report is a representation of your electricity use based on the information your Smart Meter sends to us. In the event of any discrepancies between your bill and the monthly report, your bill will take precedence.

NonTOU / 1

EDF Energy
Freepost RRYZ-BRTT-CBJS, Osprey House, Osprey Road, Exeter EX2 7WN
edfenergy.com

March 2013
Telephone: 0800 015 8787*

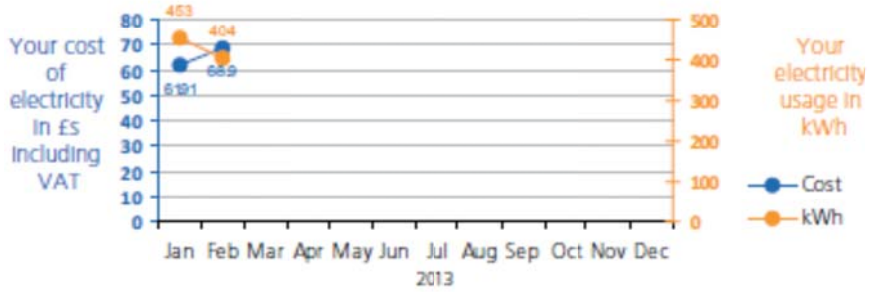
Dear

Your monthly report is ready

Thanks for taking part in the Low Carbon London (LCL) Smart Meter trial. Here's your monthly report that includes information on how much electricity you've used over January and February and what this has cost you. It's not a bill; it's just a simple representation of your energy use to help you understand it better and make small changes to help you save money.

Your energy at a glance

The graphic below shows that in January you used 453 kilowatt hours (kWh) of electricity at a cost of £61.91^. Whilst, in February you used 404 kWh of electricity at a cost of £68.90.



As you are on the Economy Alert tariff, please turn over to see what proportion of your monthly electricity use and its cost was in each of the tariff's rates: Low, Normal and High.

If you'd like to speak to us about the LCL Smart Meter trial or you have any questions about your monthly report, call us free on 0800 015 8787*.

Yours sincerely

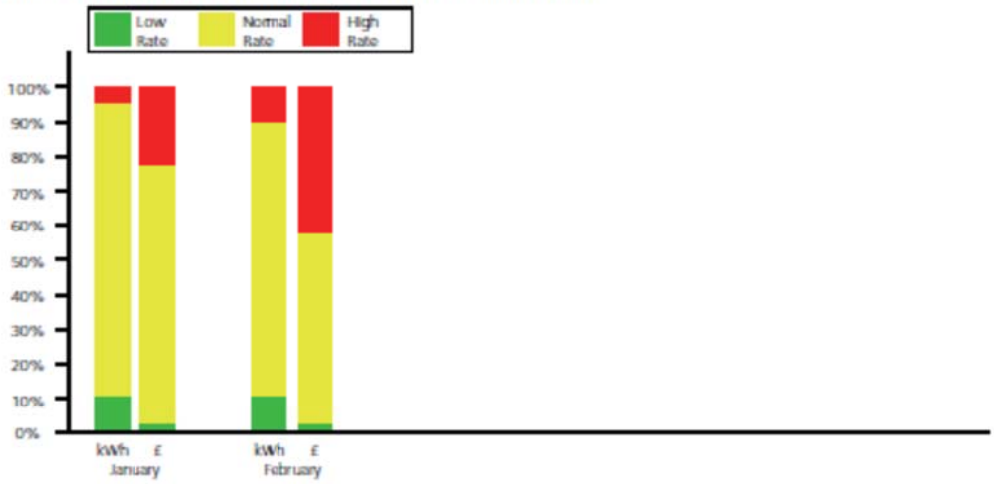
Steve Hayfield
Customer Services Director

*Calls may be monitored and recorded as part of our customer care programme. Calls to 0800 numbers are free from BT landlines, other network operators' chargers may vary.
^All costs include VAT. Please note that your monthly report is a representation of your electricity use based on the information your Smart Meter sends to us. In the event of any discrepancies between your bill and the monthly report, your bill will take precedence.

TOU / 1

EDF Energy
Freepost RRYZ-BRTT-CBJS, Osprey House, Osprey Road, Exeter EX2 7WN
edfenergy.com

The graphs below show how much (as a percentage) the Low, Normal and High rates contributed to your total electricity use (kWh) and cost (£) for each month.



The times that the three unit rates apply on the Economy Alert tariff vary from month to month. Below are the percentages of hours, which were available to you at each of the three unit rates in a given month:

	January	February	March	April	May	June
Low rate	11	13				
Normal rate	85	80				
High rate	4	7				

Please remember to look out for the tariff price alerts on your home energy monitor as well as your mobile phone, if you've requested to receive them via SMS. You'll also need to tell us if you change your mobile phone number so we can update our records and continue sending alerts to your phone.

Appendix 2 Successful delivery reward criteria

Successful Delivery Reward criterion	Evidence
Build Phase: • Preparation of solution implementation complete: Logica smart metering Head End solution and Learning Laboratory commissioned (Appendix 2, Use Case U07.1 and U07.2) • Preparation for c.5000 smart meter roll out complete, including address selection, acceptance surveys, privacy and security measures (working with GLA and Consumer Focus) Complete Q3, 2011	Evidence - Outputs and Learning • Demonstration of the Learning Laboratory facilities at Imperial College with documented schedule of trials o Clear visibility of scope of work packages o Clear alignment to Use Cases o Clear identification of project deliverables • Results of customer smart meter acceptance surveys o Overall quantification of acceptance o Identification of key concerns o Actions to improve level of acceptance • Documented Privacy and Security strategy o Overall risk assessment o Identification of pinch points o Scope for risk mitigation through data aggregation o Risk minimisation plan • Statistical analysis of smart meter trial sample size o To ensure statistical validity for extrapolation o Ensure samples sufficient to address variables (e.g. method of home heating / socio-economic consumer groupings / etc.) • Demonstration of initial functionality of Head End o Ability to (two-way) communicate with smart meters

Successful Delivery Reward criterion	Evidence
	o Data volume capability proven
Build Phase: • 1st stage of solution implementation complete: Operational Data Store and interface to Logica head end commissioned, smart meter installation underway and ”carbon impact tools” delivered Trial Phase: • Implementation of initial trials based on data from the initial smart meters and half hourly industrial & commercial (I&C) customer meters with analysed results Complete Q2, 2012	Evidence - Outputs and Learning: • Functioning Operational Date Store and head end accessing/processing smart meter information • Multipartite Demand side management (DSM) contracts between Aggregators, I&C customers, and EDF Energy Networks (documented contract implementation) • Initial CO2 impact assessments
Build Phase: • Final stage of solution implementation complete: Operational Data Store and interface to Logica head end commissioned, smart meter installation completed Completed Q4, 2012	Evidence - Outputs and Learning: • Functioning Operational Date Store and head end accessing/processing smart meter information o Proven capability to process data from head end, undertake event processing to identify key data, aggregate and map data to network nodes
Trial Phase: Conclusion of “Using Smart Meters and Substation Sensors to Facilitate Smart Grids” trials: • Understanding customer behaviour and potential network impact (Appendix 2, Use Case U04.1) • Use of smart meter information to support distribution network planning and design (Appendix 2, Use Case U04.2) • Use of smart meter data to support network operations (Appendix 2, Use	Evidence - Learning: • Assimilation of network voltage and load profiles from smart meter data (up to 6,500 smart meters) to validate ADMD assumptions and determine critical design criteria as a guide to the more efficient planning of LV networks (for example with regard to thermal limits, losses, power quality and voltage optimisation) Evidence - Outputs: Learning Lab reports (Q2, 2014): • 1-1 Accessibility and validity of smart meter data

Successful Delivery Reward criterion	Evidence
Case U04.3) Complete Q3, 2014	• 2-1 Network state estimation and optimal sensor placement • 2-2 Accessibility and validity of substation sensor data DNO learning reports (Q3, 2014): • DNO learning report on the use of smart meter information for network planning and operation
Conclusion of "Enabling and Integrating Distributed Generation" trials: • Facilitating connections to LV and HV distribution networks (Appendix 2, Use Case U02.1) • Active management of DG to address security of supply concerns and postpone network reinforcement (Appendix 2, Use Case U02.2) • Exploring the impact of LV, G83 connected generation Complete Q3, 2014	Evidence - Learning: • Proven capability of technical and commercial dispatch / curtailment of generation (est. 5 Active Network Management Schemes) with beneficial impact on network utilisation, voltage, load factor and/or fault level • Validation of ER P2/6 / ETR130 assumptions including Tm and F factors for specific generation technologies and applications • Guidance on successful approaches to, and value of, managing SSEG connections in order to preserve network operation and power quality while best enabling their connection Evidence - Outputs: Learning Lab Reports (Q2, 2014): • 3-1 Impact of LV connected DER on power quality • 4-2 Impact of LV DERs on network utilisation • 7-1 Opportunities for DG in the distribution network DNO learning reports (Q3, 2014): • DNO learning report for facilitating DG connections • DNO learning report for DG addressing security of supply and network reinforcement requirements

Successful Delivery Reward criterion	Evidence
Conclusion of "Enabling Electrification of Heat and Transport" trials: • Exploring impact of electric vehicle charging (Appendix 2, Use Case U03.1) Exploring the impact of heat pump demand (Appendix 2, Use Case U03.2) Complete Q3, 2014	Evidence - Learning: • Evidence of real changes in load patterns due to: () o Heat pumps o Electric Vehicles o Micro-generation • Guidance on successful approaches to, and value of, smart optimisation of EV charging to minimise peak demand and losses impact (maximising load factor) and to minimise need for reinforcement (maximising utilisation) Evidence - Outputs: Learning Lab Reports (Q2, 2014): • 3-1 Impact of LV connected DER on power quality • 5-1 Impact of opportunities for wide-scale electric vehicle deployment • 4-2 Impact of LV DERs on network utilisation DNO learning reports (Q3, 2014): • DNO learning report on the impact of EV and HP loads on network demand profiles • DNO learning report on opportunities for smart optimisation of new heat & transport loads
Conclusion of "Residential and SME Demand Side Management" trials: • Energy efficiency programmes and technologies (Appendix 2, Use Case U05.1.a) • Consumer behaviour demand response and responsiveness to TOU tariffs" trials (Appendix 2, Use Case U05.1.b)	Evidence - Learning: • Quantified impact of DSM and energy efficiency measures in terms of reduced peak demand • Effectiveness of TOU tariffs and analysis of price elasticity and hence necessary level of tariff incentive to deliver effective response Evidence - Outputs:

Successful Delivery Reward criterion	Evidence
Complete Q3, 2014	Learning Lab Reports (Q2, 2014): • 6-1 Residential consumer attitudes to time varying pricing • 6-2 Residential consumer responsiveness to time varying pricing6-4 Smart appliances for residential demand response • 4-1 Impact of energy efficient appliances on network utilisation DNO learning reports (Q3, 2014): • DNO learning report on network impacts of energy efficiency at scale • DNO guide to residential DR for outage management and as an alternative to network reinforcement
Conclusion of "I&C Demand Side Management" trials: • Demand side management with I&C customers (Appendix 2, Use Case U05.2) • Demand side management conflicts and synergies (Appendix 2, Use Case U05.3) Complete Q3, 2014	Evidence - Learning: • Real examples of DSM contracts with I&C customers covering highly utilised networks with clear benefits of peak demand shifting capability under unplanned outage conditions • Quantification of risk and benefit of using I&C DSM as an alternative to network reinforcement - as a guide to more efficient planning for network security and as an input to an expanded version of ETR 130 (for example deriving equivalent F and Tm factors) Visibility of synergies (and/or method of resolving conflicts) between NG and EDF Energy Networks requirements for responsive demand Evidence - Outputs: Learning Lab Reports (Q2, 2014): • 7-1 Distributed generation and demand response services for the smart distribution network DNO learning reports (Q3, 2014): • DNO guide to I&C DR for outage

Successful Delivery Reward criterion	Evidence
	management and as an alternative to network reinforcement • Conflicts and synergies of DR • DNO impacts of supply-following DR report
Conclusion of "Wind Twinning" trials: • Wind twinning through ToU tariffs with suppliers (Appendix 2, Use Case U01.1) • Wind twinning through responsive demand contracts with commercial aggregators (Appendix 2, Use Case U01.2) Complete Q3, 2014	Evidence - Learning: • Identification of scope for manipulating demand (through commercial incentivisation) to follow wind output • Assessment of potential for: o optimisation of system level real time demand to minimise CO2 emissions; o reducing cost of system residual balancing; o minimising requirement for generation plant margin; and o minimising price volatility Evidence - Outputs: Learning Lab Reports (Q2,2014): • 7-1 Distributed generation and demand response services for the smart distribution network DNO learning reports (Q3, 2014): • DNO impacts of supply-following DR report
Conclusion of final analyses: • New network design and operational practices (Appendix 2, Use Case U08) • New network planning and operational tools (Appendix 2, Use Case U06) Complete Q4, 2014	Evidence – Learning: • Consolidation of outputs from all trials as a comprehensive guide to the future smart management of distribution networks with high penetrations of DERs and low carbon applications, including the applicability of commercial contracts and incentives to encourage smart management of demand and generation • Quantified overall CO2 savings and

Successful Delivery Reward criterion	Evidence
	LCTP contributions Evidence - Outputs: Learning Lab Reports (Q4, 2014): • 11-1 Design of smart distribution networks • 11-2 Resilience performance of smart distribution networks • 12-1 Novel commercial arrangements and the smart distribution network • 14-2 Carbon impact of smart distribution networks • 14-3 Overall summary report DNO learning reports (Q4, 2014): • DNO design and operations learning report • DNO tools and systems learning report • Final Report - DNO Guide to Future Smart Management of Distribution Networks