I²EV (My Electric Avenue)

5th Project Six Monthly Progress Report

Project Number	SSET205
DNO	Southern Electric Power Distribution Ltd
Project Lead	EA Technology
Reporting Period	December 2014 – June 2015

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The 'My Electric Avenue' project is the public identity for the Low Carbon Network (LCN) Fund Tier 2 project "I²EV". The formal title "I²EV" is used for contractual and Ofgem reporting purpose.

Project leads

Project partners

LCN Fund Low Carbon Networks

My Electric Avenue has received support from Ofgem through the Low Carbon Networks (LCN) Fund.

Version History

Date	Version	Author/s	Notes	Reference documents
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Executive summary

This report details progress of the project towards the deliverables in the reporting period December 2014 – June 2015. The project has made good progress towards planned learning over this reporting period, managing analysis and outputs generated by academic suppliers, establishing and building further functionality in the My Electric Avenue database and beginning early drafting for Successful Delivery Reward Criteria (SDRC) reports. Furthermore, significant learning has been generated in the use of Power Line Communications (PLC), particularly as My Electric Avenue is at present the largest trial using PLC in the UK.[1]

The final Monitor Controller installation in Lyndhurst was completed in January 2015, followed by installation of independent current monitors across all clusters by early February 2015. Thresholds have been updated where necessary to maintain a consistent level of curtailment across seasons.

Further development and functionality has been built into the project database, allowing all analysis to be conducted on collected data stored on EA Technology's servers, reducing reliance on third party data platforms for detailed analysis. Manual checks have been completed on data collected over the winter period (October 2014– January 2015), and automated weekly checks have been set up to flag and prevent missing data.

The project has had the opportunity to engage with residents outside of one of the Technical clusters, to host repeaters to boost signal; power quality monitoring has also been installed in one property with PV panels. These actions have been taken in response to falling Intelligent Control Box (ICB) communications from March – May 2015, and to support investigations. The project has undertaken in depth analysis on the possible causes, to identify and prioritise possible mitigation.

Progress has continued on schedule against the University of Manchester's modelling deliverables, with the fourth recently provided in May and the last deliverable due in August 2015.

De Montfort University has progressed in line with their research plan, with all qualitative research completed (i.e. interviews and focus groups) with the last online survey recently disseminated in June. Final analysis is anticipated in July and their final report in October 2015. Initial work on the structure of SDRC 9.6 has already begun.

Progress on SDRCs is excellent, with work on SDRCs due later in the project already started where possible (i.e. SDRCs 9.8.1 and 9.3.1). High level planning and content has been shared with Scottish and Southern Electricity Power Distribution (SSEPD) for early review and comment. SDRC 9.7.1 has recently been submitted for review to SSEPD in line with agreed timescales.

Risks

Recruitment Risks

No applicable risks.

Procurement Risks

No applicable risks.

Installation Risks

No applicable risks.

[1] Other projects which have used PLC are 'Isles of Scilly Smart Grid' and 'Smart Hooky' both led by Western Power Distribution, and 'Embedded Communications for Distribution Networks' led by Scottish and Southern Electricity Distribution. However My Electric Avenue surpasses each of these on the basis of participant numbers and PLC links.

Other risks

A number of risks have been closed during the period since the previous progress report with the key risks detailed in Section 3.

Installation of the Lyndhurst cabinet was delayed in the previous reporting period due to delays in finalising the relevant method statements. This has now been installed and data monitoring is underway.

Since the last reporting period Esprit curtailment has been fully implemented in all Technical trial clusters, therefore the previous risk to planned research has been removed. Social research conducted by De Montfort University has progressed in line with adapted plans. Furthermore, additional opportunities for their qualitative research have been introduced allowing a comparison of pre and post Esprit control.

A Monitor Controller software roll-out in December identified an error in the software which resulted in phase currents being excluded from data reports. Therefore independent phase current monitors were installed in all but three clusters by the end of January 2015; the remaining cluster installations (Your Homes Newcastle, Wylam and Lyndhurst) were completed by mid-February.

The main ongoing risks are related to the ongoing Power Line Carrier (PLC) communications with ICBs, and the delay in a decision on project's Change Request. Secondary ongoing risks are related to the reliance on Carwings data (as a result of ICB data loss), and reliance on a third party data platform for daily troubleshooting.

PLC communications continues to represent a risk to the project, but has generated additional unanticipated learning, as it represents the largest PLC project to date in the UK. PLC reliability has shown a downward trend in some clusters, with communication fluctuating in March, April and May. In this reporting period the team have begun detailed investigations to learn more about the causes of the PLC communication loss and possible mitigations. For more information, see Section 5.2.

Equally, the decision awaiting on the project's Change Request poses a continued risk, which to a large extent cannot be mitigated internally within the project team. If agreed, the Change Request would allow funds which are currently fixed to one task to be transferred across to other tasks, whilst still delivering the project within the overall agreed budget. The project is still able to deliver the project within the limitations set, however opportunities to maximise learning will be restricted as and when the tasks reach the current limit; despite funds being available in other tasks.

In addition to the loss of data from ICBs experienced, there is also evidence that Carwings data collected (charging and trip data) may also be incomplete. Charge events and trip data is only logged when participants provide their permission for it to be recorded, and have signal in their vehicle at the time when the vehicle is set up to automatically upload the data. This means that, even if permission is granted, if vehicles are out of range at that particular time, data from that week may not be uploaded and may be overwritten by newly recorded data.

The project has moved to a more reliable system of downloading data from the equipment on site. However whilst this data is more reliable for analysis, it delays availability of this data within the project's servers by one week. Therefore for day-to-day troubleshooting the project relies on an online platform which is hosted by a third party provider.

Learning Section

Summary

The key project learning outcomes are:

- The flat profile of a commercial network creates a challenge when implementing controlled charging via Esprit. Therefore, Esprit requires further work to be accepted by customers in a commercial network;
- There is an early indication that Esprit is largely accepted by domestic customers. This will be further explored and discussed in SDRC 9.6 planned for later in 2015;
- Distance is a widely recognised barrier to PLC. However, the project has learned in this reporting period that network jointing and low carbon technology (power quality) also play an important role in reliability of PLC communications.
- Esprit has been operational throughout the reporting period, with over 17,000 switching events recorded, of which 2,226 affected electric vehicle (EV) charging. This has led to curtailment of approximately 5% of total charging time for Technical trial participants. Analysis of Esprit's functionality and the headroom provided is on track for delivery in the next reporting period.
- Analysis conducted on voltage variance has identified the limits of this type of curtailment, i.e. when five or more EVs are switched off simultaneously with control cycle times of 60 seconds or less, the limits on voltage step change in ENA ER P28 are breached. However, power quality limitations can be maintained when up to five EVs are simultaneously switched using a minimum cycling time of 120 seconds.

To date, the project has collected 94,000 hours of charging data from Social trial participants and 20,000 hours charging data from Technical trial participants. Across both trials, participants have driven 2.7 million kilometres and therefore saved, in total, £200,000 on fuel costs and 200 tonnes of CO_2[2].

Approach to learning capture and dissemination

The My Electric Avenue team continues to develop a bank of learning in a central learning log. The project is active in sharing learning across both electricity distribution and automotive industry events. Learning capture and dissemination is also supported by the project website, which is under review specifically to re-focus as a learning tool and disseminate learning outcomes.

External dissemination activities

Learning continues to be shared via project presentations, press releases, newsletters, social media and the project's Top Ten Tips series. To date several 'Top Tips' have been produced based on the information captured and two more have been added to the series in this reporting period. The project has also hosted its first two webinars in this period.

Internal dissemination activities

Internal dissemination has been shared via team meetings, internal social networking platforms and LinkedIn groups. Progress has also been presented to the new Managing Director of Networks, ensuring that senior management within SSEPD are kept informed and up to date of the great work to date, and potential for future learning to transition into BAU.

[2] These calculations are based on collected data from the trial (using Carwings data and network data where possible), with HMRC rates and estimates of CO_2 created by an average new car provided by Society of Motor Manufacturers and Traders. Accessed here: http://www.smmt.co.uk/co2report/

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1 Project manager's report

The My Electric Avenue Project has progressed against planned outputs, but also delivered additional learning to better understand technical challenges, highlighted since the previous Project Progress Report. The key achievements from this reporting period are:

- Completed and submitted SDRC 9.7.1 for review and onward submission to Ofgem;
- Completion of all Monitor Controller installations including the remaining installation at Lyndhurst;
- Full implementation of curtailment and switching in ICBs across all clusters;
- Further developments on the project database completed, including weekly automated checks on network and vehicle data;
- Detailed investigations underway to explore the causes of PLC communication challenges; including analysis on the impact of low carbon technologies on the feeder, joints and distance from the substation;
- Work on other SDRCs (due later in 2015) have begun where possible, providing high level planned outlines and content to SSEPD for review, and agreed timescales for submission to Ofgem;
- Planning for decommissioning has begun, with updates to the project question and answer website section, decommissioning documentation drafted and schedules agreed with project partners;
- A number of risks / issues identified in the previous progress report have been closed

1.1 Technical trial progress (installation and operation)

1.1.1 Equipment installations

In total, ten clusters have a Monitor Controller (MC) installed as part of the Technical trials. The last installation at Lyndhurst was completed on 19th January 2015, the slightly longer timescale being due to development of a specific risk assessment and method statement required for deploying the equipment on an overhead line (OHL) network.

Analysis has been undertaken to once again update the phase current limits set on each MC for the summer period. To date nine MCs have been updated with the new limits, the last remaining, Your Homes Newcastle remains to be updated.

The latest software update has been fully tested at a control 'cluster' set up on EA Technology premises, and has been upgraded in three clusters; Your Home Newcastle, Lyndhurst and South Shields 1.

Independent phase current monitors have been installed in all clusters following an earlier software upgrade. Following roll-out it was discovered that the latest version of software had a bug which caused the phase current data to be excluded from the data transferred from the MC. The additional phase current monitors were installed by January, with the exception of Wylam, Your Homes Newcastle and Lyndhurst which were completed in February. The data collected by the independent monitors is transferred using the MC via an additional, previously unused port on the unit.

1.1.2 ICBs

In this reporting period, two ICBs have been removed from domestic properties due to participants moving home in Whiteley and Wylam. No further issues have been identified with the ICBs.

1.1.3 PLC Communication

Communications with ICBs has continued to be intermittent and variable across all clusters. Until April 2015 all clusters showed consistent communication with 44% of ICBs. In March and April, the level of

communication across four clusters dropped. Although two of these clusters have improved following intervention in May and June, three other clusters have shown a similar downward trend since May. The team have investigated possible causes on site and intervened where possible, through software upgrades and hardware resets. Further investigations have been conducted to understand the causes of the change in communications. Initial results suggest that the following factors influence PLC reliability:

- Distance
- Cable joints
- Signal paths
- Photovoltaic (PV) Generation
- Load and EV charging

See Section 5.2 for further detail on the analysis and learning gained to date. It should be noted that network monitoring is unaffected by PLC reliability and that, to date, no networks have been observed exceeding their thermal capacity.

1.1.4 Esprit performance to date

The project has developed an 'add-on' to the central database which allows the team to search for evidence of 'switching'. This has been used specifically for decisions relating to updating phase current thresholds for this reporting period (see Section 1.1.6).

1.1.5 Data monitoring

The project's central database has been completed, verified and additional features have been added in this reporting period. Supporting documentation has also been produced, describing the added functionality, decisions made and verification completed to date.

The latest additions include a weekly automatic check of data based on defined parameters set by the project team. These checks are carried out on:

- ICB current and voltage
- ICB number of reports (indicating communication in the period)
- Phase current
- Phase current reports (indicating communications in the period)
- Switch state

The weekly automated checks are being used to flag up potential problems with the trial data collections and where further investigations for PLC communication are required. A further addition automatically identifies switching using parameters which can be adapted allowing the team to search within a defined period of time in all clusters or a single cluster.

Prior to development of the weekly automated checks, the project undertook a manual check of the data collected over the winter period (October 2014 – January 2015) and identified a number of small, and more significant gaps in data collected for four clusters[3]. These were formally addressed and investigated with the third party data provider. The checks also highlighted a need for cross-checking

[3] Phase currents from 10 days in Wylam; 29 days in SS1; 25 days in South Gosforth were not logged. The cause was agreed with Nortech Management Ltd as a result of an upgrade made in their software which impacted the Monitor Controller on site. An additional 4 days' worth of phase current data was not logged in Chiswick, but the cause of this was agreed to be an issue with the Monitor controller on site, rather than remote software upgrades.

ICB serial numbers and participant IDs, which was completed in January, ensuring that all data collected was correctly allocated.

Manual checks were also undertaken on participant and cluster metadata stored in the database (i.e. installed phase allocation, date installed, cable threshold, winter and summer cyclic rating etc.).

A network data dashboard has been completed and verified since the last reporting period, efficiently providing a high level view across all clusters, providing a tool for monthly network reports.

1.1.6 Network operation

Thresholds have been updated again during this reporting period in line with monitored phase currents noted through April and May. Updated thresholds help to maintain a consistent level of curtailment across the trial period, mainly curtailing EV charging between 1800 and 2200 each day.

It is likely that the latest upgrades to the thresholds will be in place until the equipment is decommissioned in autumn 2015.

1.1.7 Retrieving data from the Nissan LEAFs

The project is receiving Carwings data for all participants currently in the trials with the exception of three social trial participants. The data for these is inaccessible due to an issue with data collection experienced by Carwings as highlighted in our last report.

The project has developed a Carwings automated data dashboard. This provides a high level overview of the number of trips, charges and odometer readings, and allows a more detailed view per participant. It also provides an editable set of parameters which can identify and highlight unusual data. Weekly automated checks have been built into the project database to check for suspected missing or unusual data.

Following completion of the dashboard the project identified unusual data, for example trip distance mismatched against charge, which suggests missing data. The project contacted the relevant participants by email and phone to clarify the data received and to remind them to enable data collection from their vehicles.

Based on feedback provided by these participants, the project has established that data retrieval from the vehicles is largely dependent upon sufficient phone signal during the pre-set time at which the vehicle attempts to upload data. When there is little or no phone signal available at the particular time when the vehicle attempts an upload, the data is either partially uploaded, or not uploaded at all. The data logger in the vehicle is set up to overwrite the recorded data once the upload ‘time’ has passed. Therefore if data is not uploaded, it is then overwritten with newly recorded data.

1.2 Social Research progress (Technical and Social trial)

1.2.1 Social surveys

To date, the total numbers of participants, including 'additional drivers' taking part in surveys are:

- Technical Participants - 99[4]
- Social Participants – 109

A level of attrition is anticipated at this stage in the trial, and the project has experienced a small number of Technical trial participants moving home. As testament to the level of engagement with participants and their commitment to the project, some of these participants are still willing to participate in trial surveys and feedback. Therefore a third group has been defined of those withdrawing from the Technical trials, of which there are 14[5] participants at the time of writing.

Table 1-1: Response rate to trial surveys

Planned surveys	Technical trial Survey Response (%)	Social trial Survey response (%)
Pre-trial survey	100%	100%[6]
Second survey	100%	94%
Third survey	94%	93%
Fourth survey	90%	N/A
Fifth survey	58%	63%

There are more Technical and Social trial surveys being undertaken than there are vehicles; in some cases second drivers have volunteered to provide input to the project, further increasing the learning to be gained. Response rates to surveys (Table 1-1) have been extremely positive with over 90% responding to surveys. It should be noted that the final survey was sent to Technical and Social trial participants on 2nd June, therefore the response rate from both groups after just one week (at the time of writing 8th June 2015) is excellent.

De Montfort University contact participants who do not respond to surveys by email three times, before escalating to EA Technology who then contact them by phone. To date, seven participants have responded to reminders, once escalated to EA Technology to complete surveys.

De Montfort University have completed all face-to-face individual interviews and focus groups with the following carried out in this reporting period:

- Chiswick (January 2015)
- Whiteley (February 2015)
- Marlow (February 2015)
- South Gosforth (March 2015)
- Your Homes Newcastle (March 2015)
- South Shields 1 and 2 (April 2015)
- Lyndhurst (May 2015)

[4] This includes 96 currently on the trial, and a further three additional drivers. Two more participants have dropped out of the Technical trials since the last reporting period (from Wylam and Whiteley).

[5] This includes Slough Borough Cluster (10), and those withdrawn from Your Home Newcastle (1), South Gosforth (1), Wylam (1) and Whiteley (1). This group does not include the additional drop-out from Whiteley who did not receive a pre-trial survey.

[6] Surveys were not sent to Social trial participants who received their vehicles before the pre-trial survey (six in total).

Early analysis has been conducted on the social survey responses collected to date by De Montfort University and shared in project presentations and webinars (see Section 5.4.2).

1.3 Technical trial attrition

Naturally, the project expects a level of attrition as real life events such as job changes or house moves are outside the control of the project. However, in proportion to the number of participants recruited, attrition still remains relatively low (Table 1-2).

Table 1-2 : Technical trial clusters submitted to Ofgem and attrition to date

Cluster	Submitted Cluster size	Date Established	Current Cluster Size	Date of alteration	Reason
Chiswick	8	27/09/2013	8		
South Gosforth	10	27/09/2013	9	12/08/2014	Moved home
Wylam	10	27/09/2013	9	01/04/2015	Unable to access charger[7]
Marlow	9	30/09/2013	9		
South Shields	11	14/10/2013	11		
Chineham	10	11/11/2013	10		
Whiteley	11	13/11/2013	9	11/07/2014 15/03/2015	Moved home Moved home
South Shields 2	12	20/02/2014	12		
Lyndhurst	7	04/03/2014	7		
Total domestic recruited	88		Total domestic attrition		4
Your Homes Newcastle	13	06/02/2014	12	09/10/2014	Moved jobs
Slough Borough Council	10	05/03/2014	10	21/07/2014	Office relocation
Total Workplace recruited	23		Total Workplace attrition		11

To date, of the 111 participants originally recruited, four domestic Technical trial participants and one commercial Technical trial participant have withdrawn from the trial, as a result of changing jobs and/ or moving home. In this reporting period alone, two Technical trial participants (Wylam and Whiteley) have withdrawn from the Technical trial.

In addition to this, in the last Project Progress Report, we reported that the 10 participants in the Slough Borough Council Cluster were to be reallocated to the Social trials, after the project learned of significant office relocations affecting this group. Therefore, in total 15 participants have withdrawn from the

[7] This participant had the charging point and ICB installed at a property he rented. His former tenants were happy for him to charge at that property but did not renew their contract, the new tenants did not accept the same agreement.

Technical trial. The project will not seek to replace these, and all participants continue to be subject to normal withdrawal penalties.

However, the majority of these are still willing to participate in surveys and provide feedback on their experiences. Therefore four of these former Technical trial participants, who have experienced curtailed charging have been allocated to a new group. Those previously in the Slough Borough Cluster have been allocated to the Social trials as they have not experienced curtailed charging.

One additional Technical trial participant has notified the project of her intention to move home, but to date has not yet formally withdrawn from the trial.

Further fluctuation in cluster composition between now and decommissioning is expected as participants' personal circumstances may change over time; these changes are not within the control of the project.

1.4 Social Trial Attrition

The last Project Progress Report highlighted the project's successful achievement of the Social trial recruitment targets (110 recruited). Due to the number of remaining vehicles still available to the project, social trial recruitment continued until the end of December 2014. In this later recruitment drive, a further nine participants were recruited, bringing the total to 119 Social trial participants[8].

To date, two Social trial participants have withdrawn from the project. Both have had incidents in their vehicles and have subsequently withdrawn from the trial. A third participant has also had an incident in their vehicle but has decided to replace the vehicle with a new LEAF and remains on the Social trial.

It should be noted that those participants who have withdrawn from the trial and the vehicle lease contract, will be excluded with regards to the socio-economic analysis conducted by De Montfort University. Those who have provided express permission that they are content to continue providing responses to surveys and still continue to use their LEAF will be included in analysis, to enable as much learning to be gained as possible from the project.

1.5 Key issues

1.5.1 ICB communications

Updates to the MC software were carried out in December 2014 and January 2015. These updates reduced communication traffic between the MC and ICB, with the aim of maintaining a stable PLC network whilst still enacting curtailment.

Communication with ICBs improved following software updates, before falling in April 2015. Therefore reliability of communications represents a significant and ongoing issue in the project, as evidence of Esprit operation is reliant upon communication between the MC and ICBs.

Detailed analysis has been undertaken to understand the cause of the dip in communications, exploring the impact of network cable jointing, distance to the substation, low carbon technologies installed on the feeder, and power quality issues. Ongoing and historical data provided by the ICBs (following reinstallation in summer 2014) have been used to support the analysis. To date, the analysis has not found a clear causal link between the ICBs with reduced communication reliability. As a result, further investigation is underway to review the possibility of hardware or software changes influencing the change in performance.

More recent investigations have focused on controlled comparisons between MC software versions. The project has two different versions of the software running in South Shields 1 and 2, as these

[8] Including 10 Slough Borough Council participants who could no longer participate in Technical trials.

networks are similar and represent a more meaningful testing ground than a laboratory setting at EA Technology premises. The results of this investigation have not yet been finalised.

In addition, the project has installed a power quality monitor in a Technical trial participant's home which has been identified as having photovoltaic panels installed (flagged in the social research survey). This additional monitoring will allow the project to gather further learning as to the potential impact this low carbon technology might be having on PLC communication.

It is acknowledged that for clusters where communication with ICBs is intermittent there is a danger of data loss. However, the project has confirmed with the University of Manchester that the loss of data will not affect their planned analysis and outputs.

It is also emphasised that supportive information on charging is being collected by the Nissan Carwings system for the majority of participating vehicles.

1.5.2 Change request

The project has submitted a Change Request and is awaiting a decision by Ofgem. The Change Request would allow funds which are currently fixed to one task to be transferred across to other tasks, whilst still delivering the project within the overall agreed budget. This change comes as a result of earlier unanticipated requirements for additional efforts (i.e. recruitment for the trials) based on changes made to the original bid-submission. The project is still able to deliver the project within the limitations set, however opportunities to maximise learning will be restricted as and when the tasks reach the current limit; despite funds being available in other tasks.

2 Consistency with full submission

The project is consistent with the full submission and we remain confident that the project will deliver on the intended learning outcomes.

2.1 Change request

The first version of the Change Request was submitted to Ofgem in September 2013. Following successful recruitment, and installation, the formal re-submission of a later version was submitted to Ofgem on 26th September 2014. Further requests for detailed information and clarifications have been sought by Ofgem and provided by EA Technology in this reporting period. The latest round of information was provided by EA Technology on 5th June

The project team has been advised that a response is anticipated imminently.

3 Risk & Issue Management

A risk register was developed for the project at the bid stage. This document has since been adopted by the delivery team as a key management tool for the project, and expanded to reflect changes in risks or mitigation as they occur.

In this section of the progress report, we focus on those of key significance to the project. A full risk register is provided in Appendix A. Both the significant open and closed risks within this reporting period are listed below in Table 3-1.

Table 3-1: Snapshot of key risks: summary and status

	Risk summary	Status
3.1	**Social Research**	**Closed**
3.1.**1**	Data collection and analysis	Closed
3.2	**Equipment issues**	**Closed**
3.2.1	Operation of control functionality	Closed
3.2.2	iHost data Collection – Phase currents	Closed
3.3	**Communications**	**Open**
3.3.1	Data collection – ICBs	Open
3.4.	**Change Request**	**Open**
3.4.1	Acceptance of Project Change Request	Open
3.5	**Vehicle data**	**Open**
3.5.1	Carwings data collection	Open

3.1 Social Research

3.1.1 Data Collection and analysis

Delays to deployment of the technology have resulted in adaptations to the planned approach for collection of data relating to the social elements of the project. Specifically, interviews and focus groups to ascertain the impact of the Esprit technology on the use of the vehicles after a period of constrained charging have been affected.

However, the project has used the delays to provide pre, and post Esprit feedback via interviews and focus groups. All clusters have taken part in face-to-face research, with two clusters providing experiences before Esprit curtailment, and eight providing feedback after Esprit curtailment was activated. This provides De Montfort University an opportunity for comparing the feedback to draw out further learning, in addition to that originally planned. Therefore this risk can be closed.

3.2 Equipment Issues

3.2.1 Operation of control functionality

A new version of MC software was implemented in SEPD clusters on 22nd December 2014, and on 21st January 2015 in Northern Powergrid clusters. This update reduced the amount of communication traffic between the MC and ICBs which resulted in improved communications with ICBs across all clusters. This therefore enabled Esprit to operate as intended, therefore closing this risk. A recent related risk is detailed in Section 3.3.1.

3.2.2 iHost data Collection – Phase currents

The software version updated in all clusters in December (SEPD clusters) and in January (Northern Powergrid clusters) introduced an additional glitch in the system, which resulted in the phase currents being excluded from the data package sent via the MC back to the online platform and onwards into the project database.

Therefore the project procured and installed independent phase current monitors in all but three clusters by the end of January 2015. The last remaining three clusters, Wylam, Your Homes Newcastle and Lyndhurst required different equipment to connect to the network. These cluster installations were completed a short time later, once this equipment was procured, in February 2015. The project is now receiving phase current readings across all clusters. Additionally, the project has received confirmation from University of Manchester that the loss of data experienced will not impact their deliverables towards project outputs and learning.

Therefore this risk can also be considered closed.

3.3 Communications

3.3.1 Data Collection – ICBs

As reported in the last Project Progress Report, this risk remains open until the communications are confirmed to be functional. Further complications affecting PLC communication have been identified in this reporting period.

Further investigation is underway to understand which of these complicating factors can be mitigated. In the interim, the loss of ICB data has impacted the amount of data available for analysis.

In addition to the data loss experienced across the phase currents, the University of Manchester have also confirmed that the loss of ICB data will not affect their deliverables, as these are based on modelling supported by monitored data.

3.4 Change Request

3.4.1 Acceptance of Project Change request

The project is awaiting the outcome of a Change Request which will seek to allow transfer of funds across tasks, whilst still delivering the project within the original total budget allowed.

Until this change is accepted, there is a risk that task budgets will reach the limits currently set in place. Should this occur some tasks will be heavily impacted. Under the current constraints options for maximising learning will be limited when the budget cap is reached. This may mean that opportunities are missed, as funds available in one task cannot be transferred to another.

3.5 Vehicle data

3.5.1 Carwings data collection

The project has conducted weekly checks on Carwings data and further investigation has established a further complication in collecting this data. The vehicles are pre-set to automatically upload data at set times, following the upload, the recorded data is then overwritten with newly recorded data. This means that should a vehicle be unable to upload at the specific moment it tries to transfer data, the upload may not complete, or even start (data could be lost).

The project has anecdotal evidence of this occurring in a minority of cases, but as the project does not receive notification from Carwings when the upload has failed it is difficult to report to what extent this impacts data collection.

4 Successful delivery reward criteria (SDRC)

4.1 SDRC Overview

The below table details the status of each SDRC outlined in the Project Direction document; additional information regarding completed and in-progress SDRCs is given below.

Please note that all SDRCs that are currently flagged as 'Not Started' were not planned on being underway at this point in the project and so should be considered as on-schedule.

Table 4-1: SDRC Overview

SDRC		Due	Description	Status
9.1	9.1.1	28/02/2013	The provision of a report outlining key areas of learning in the identified areas, with recommendations. The reports will be written such that they can be published in the public domain for an audience of: DNOs, Ofgem or other interested third parties who may wish to lead a LCN Fund project in collaboration with a DNO.	Complete
9.2	9.2.1	30/04/2013	Make available the initial contract template used between SEPD and EA Technology together with supporting guidance of the thinking behind key clauses. This will be made available to Ofgem and other DNOs as a starting point for use in future projects.	Complete
	9.2.2	31/10/2015	Review of the contract put in place between SEPD and EA Technology. A review of the initial contract developed in 9.2.1 focussing on what worked well, what didn't work well, and what should be done differently in the future.	In progress
	9.2.3	31/12/2015	An updated contract template taking into account learning from SDRC 9.2.2.	Not started
9.3	9.3.1	31/10/2015	Report detailing processes established and utilised throughout the project including templates of any forms (e.g. work orders for SSEC staff) and records of meetings/regular communications created as part of the process. This will include an evaluation of the collaboration between SSEPD and Northern Powergrid with a 3rd party interface.	In progress

SDRC		Due	Description	Status
	9.3.2	31/10/2015	A framework to enable update suggestions to SSEPD policies and/or procedures, identified during the course of the project will be provided, (e.g. A procedure detailing the necessary steps when considering a customer's request for an EV charging point).	Not started
	9.3.3	31/10/2015	An assessment from the participating DNO of the level of effort expended on Project Management of the I²EV task by the staff involved in comparison to previous innovation projects.	Not started
9.4	9.4.1	31/07/2013	The provision of 6 monthly independent reviews of the project and technology with specific inclusion of improvements and adaptations to working practices incorporated by the project team following the previous independent review. a) Produce six monthly reports (highlighting strengths and improvement areas) to be tabled at steering group meetings. b) Produce response to six monthly report, detailing improvements planned by Project Steering Group, because of the review.	Complete
		31/01/2014		Complete
		31/07/2014		Complete
		31/01/2015		Complete
		31/07/2015		In Progress
		31/12/2015		Not started
9.5	9.5.0	28/02/2013	Customer engagement: Submission of customer engagement plan and data protection strategy for Authority approval (1 Feb 2013).	Complete
	9.5.1	30/09/2013	Sign up of 3 cluster groups.	Complete
		31/12/2013	Sign up of 5 cluster groups.	Complete
		31/03/2014	Sign up of 100 customers in at least 7 cluster groups.	Complete
		31/08/2014	Sign up of 10 cluster groups.	Complete
	9.5.2	31/08/2014	All cluster funding allocated due to successful establishment of clusters.	Complete
	9.5.3	31/08/2014	Social trials: Minimum of 100 EV drivers signed up to have their driving habits recorded (month 18 following CEP, August 2014). a) Reports presented to the monthly project meetings to capture and log progress in signing up customers to the EV trials. b) Six monthly reports to steering group on trial engagement progress.	Complete
9.6	9.6.1	31/10/2015	A report documenting the finding from the socio-economic analysis on public reaction to the technology.	In Progress
9.7	9.7.1	30/06/2015	Documentation describing: a) Views of the OEM community of the impact (if any) that cycling of EVs (or HPs) may have on their product(s) and end of life b) Recommendations of suitable cycle times for EVs (and possibly Heat Pumps) for demand-side response c) Evidence of whether this solution would be feasible or not combining learning from SDRC 9.5 and SDRC 9.6.	Complete
9.8	9.8.1	31/11/2015	Modelling to understand additional headroom available / other network benefits from using the Technology. a) The models will assess the percentage of thermal and voltage headroom estimates produced.	In Progress

SDRC		Due	Description	Status
			b) The project will deliver an updated Solution template(s) specific to the Technology, and any updated EV charging profiles for use in the GB Smart Grid Forum modelling.	
	9.8.2	31/11/2015	Potential cost savings and carbon emission savings using DECC published carbon intensity figures. If technology is unsuccessful, reasons why will be stated.	In Progress

5 Learning Outcomes

5.1 Commercial

5.1.1 Invoicing requirements

DNOs typically lead on LCN funded projects and as such there is usually no need to adapt the invoicing process (including cost allocation) as it is already aligned with Ofgem's requirements.

EA Technology's internal invoicing system was not initially set up to produce reporting to meet Ofgem's requirements. Therefore there was an unanticipated need to introduce retrospective reporting at a higher level of detail than was originally anticipated. This has introduced some inefficiencies which could have been avoided if addressed at project set-up.

5.1.2 Domestic Customer's acceptance of Esprit

The project continues to collect customer feedback through emails and phone calls regarding their experiences on the project. In this reporting period early indications of customers' acceptance of Esprit are emerging now that curtailment has been active for some time.

Following Esprit activation, the project received five phone calls and emails reporting suspected faults on charging points. As customers had been charging as normal before Esprit was enacted, the general initial response to a curtailment was an assumption that it must be a fault. The project responded both individually and en mass using monthly participant bulletins to reassure participants that a level of curtailment was to be expected. A small proportion of Technical trial domestic participants (five) contacted the project team to report significant curtailment between December and February, and were inconvenienced by this. However the majority of domestic customers have not contacted the project to complain about the level of curtailment they have experienced over the trials.

The project has also received reports from three participants (out of 84 domestic participants participating) who have tried to over-ride the Esprit system by resetting their ICBs (switching the ICB off/back on again at the consumer unit) in an attempt to override the curtailment. This provides evidence that should customers be provided the means of overriding the system, they will attempt to do so.

5.1.3 Workplace Customers' acceptance of Esprit

The impact of the cycle times within the trial has (to date) been more severe on the commercial cluster than on the domestic clusters. This is due to the difference in load profile. Each of the domestic clusters has a 'peaky' load profile, which provides scope for charging to be shifted to off-peak hours if required. The commercial cluster has a 'flat' load profile. Therefore there are fewer opportunities to shift the charging to an 'off-peak' time as participants work set hours in the day.

Due to the combination of the current threshold level in place and 'flat' load profile, Esprit tended to switch between 'Curtail' and 'Reforming' Mode during the working day (imposing curtailment over four-

five hours). Therefore participants reported that the charging points switched off, but did not switch back on (they did not return to 'normal' mode for several hours).

The project was contacted 15 times by the commercial cluster participants between the 19th January 2015 and 4th March 2015. One participant, with a daily commute of 60 miles was unable to reach home after a limited charge through the day.

The project took the decision to raise the current threshold on 5th March, to reduce frequency of curtailment on this cluster. Following requests for feedback, two participants have noted that, with the exception of one instance, their experience of charging has improved. The learning generated from the experience at Your Homes Newcastle is invaluable. The nature of the 'flat' rather than 'peaky' load profile monitored in the commercial cluster has presented a significant challenge to acceptance of Esprit within commercial networks.

5.2 Technical

5.2.1 Technology function – ICB Communication

The data communicated by ICBs is reliant upon a working PLC network, and as such the project has conducted additional analysis outside of the main project scope, to provide further understanding of how PLC can be used with a technology like Esprit.

The project has carried out investigations on the effectiveness and reliability of PLC in real-life scenarios (on real LV networks) in addition to laboratory settings. My Electric Avenue is believed to be the largest innovation project using PLC in the UK, and therefore provide invaluable learning of this technology on a large scale.

Several factors have been shown to affect PLC reliability including: distance between ICB and monitor controller, presence of cable joints, presence of low carbon technology (specifically EV charging and PV panels during daylight hours), number of signal paths available between the ICB and monitor controller, and other loads on the network. The analysis is ongoing and will be published in a separate report. However, the following interim results show the evidence for the influence of the following factors.

5.2.1.1 Distance between ICBs and Monitor Controllers

Analysis of reliability of PLC has shown a statistically significant correlation between communication reliability and the distance between the substation and the ICB. However, there are a number of other factors which also influence communication reliability; these have been investigated and are summarised below. Figure 5-1 shows an example of this result, each ICB's communication reliability is plotted against the distance between that ICB and associated substation.

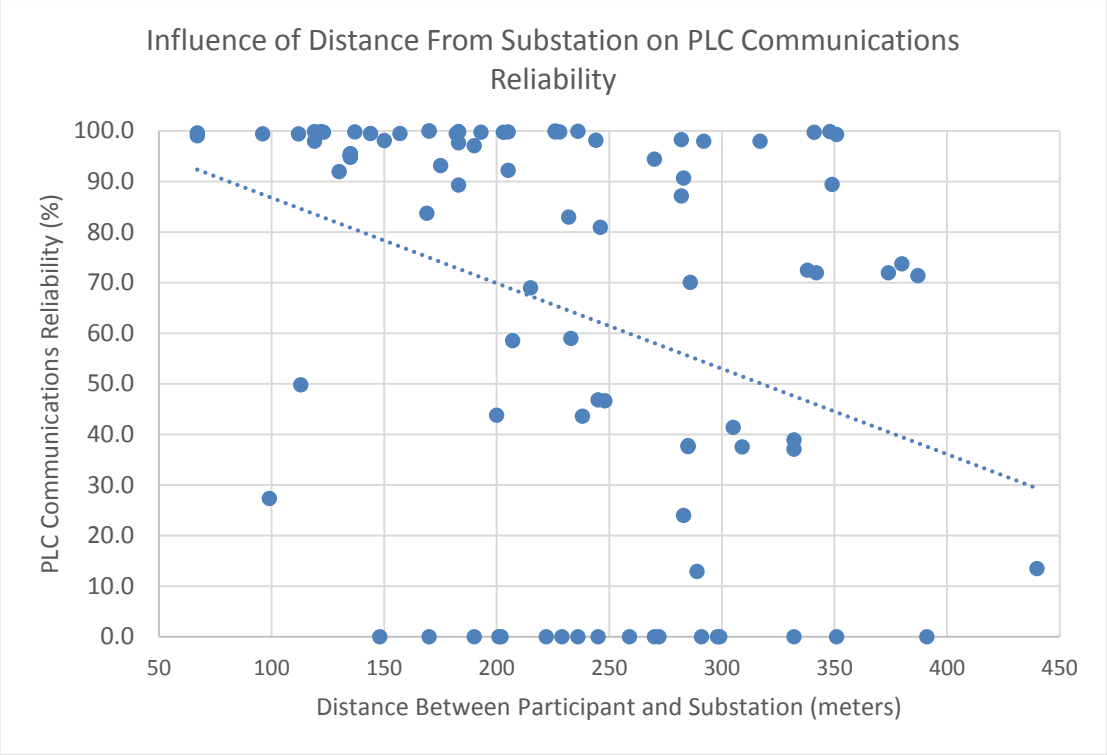

Figure 5-1 - Results for communications reliability as a function of distance between ICB and substation

5.2.1.2 Presence of Cable Joints

The presence of cable joints on the distribution network appears to influence the reliability of PLC. However, this factor is not consistent across the clusters. For example, the South Shields 1 cluster can be split into three segments grouping customers according to their location on the network, shown in Figure 5-2. Figure 5-3 shows the communications reliability for participants in the South Shields 1 cluster, indicating the segment to which they are connected. The participants on Segment 2 are all connected via a spur from the main feeder, which is believed to cause PLC to fail for all participants connected to it.

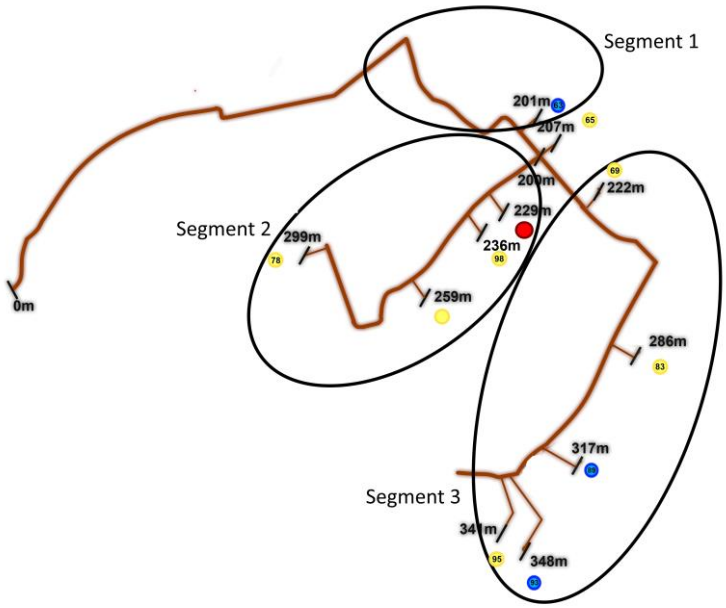

Figure 5-2 – Network Map of South Shields 1 Cluster Showing the Segments Identified

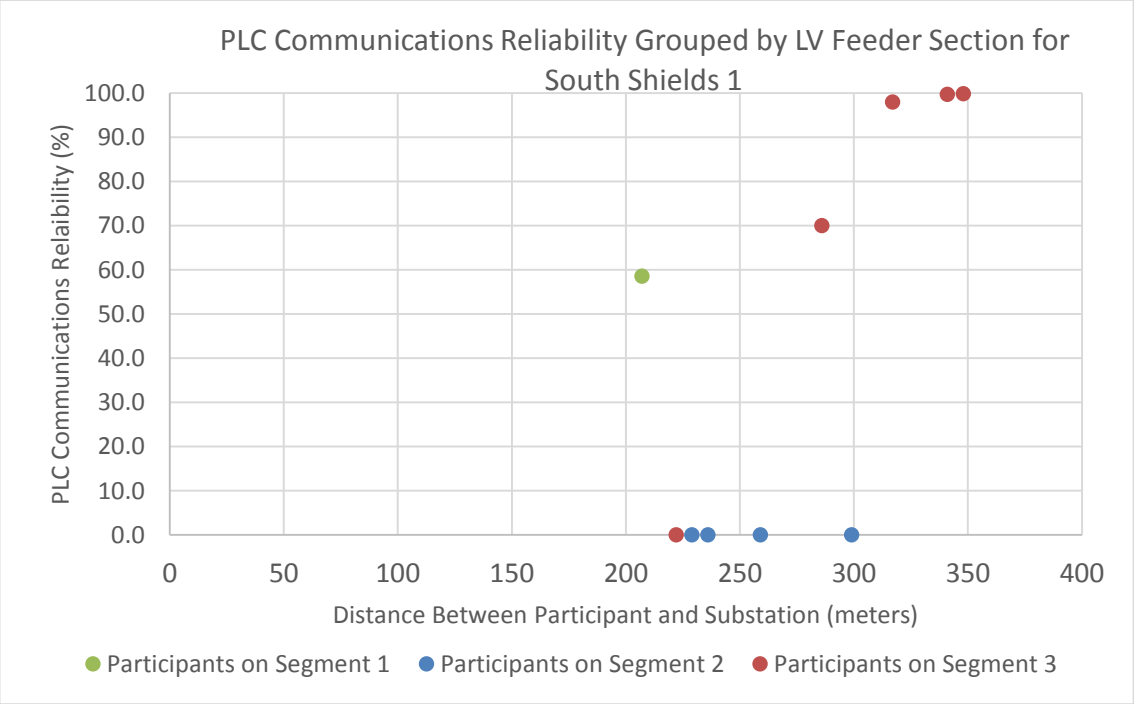

Figure 5-3 – Communications Reliability Related to Cable Joints

5.2.1.3 Number of Available Signal Paths

The project is using repeaters to increase communication range, but also ICBs are able to repeat communications for participants further away from a monitor controller. The system supplier has indicated that increased number of signal paths (i.e. routes between different repeaters and the monitor controller) should increase communication reliability.

Figure 5-4 shows an example of this analysis and supports the suggestion; the average communication reliability (green line) is shown for ICBs with different numbers of available signal paths. Where an increased number of signal paths are available (with maximum distance of 210 metres) the average communications reliability tends to increase (the first blue bar of the chart shows that there are 90 ICBs with only one available signal path and this achieves 65% PLC reliability, whilst the 36 ICBs with three available signal paths achieve 80% PLC reliability). However, as with the other elements of this analysis, the results include significant variability (i.e. the PLC reliability dropping to 50% when there are 5 available signal paths) due to the number of factors which appear to influence the communications reliability.

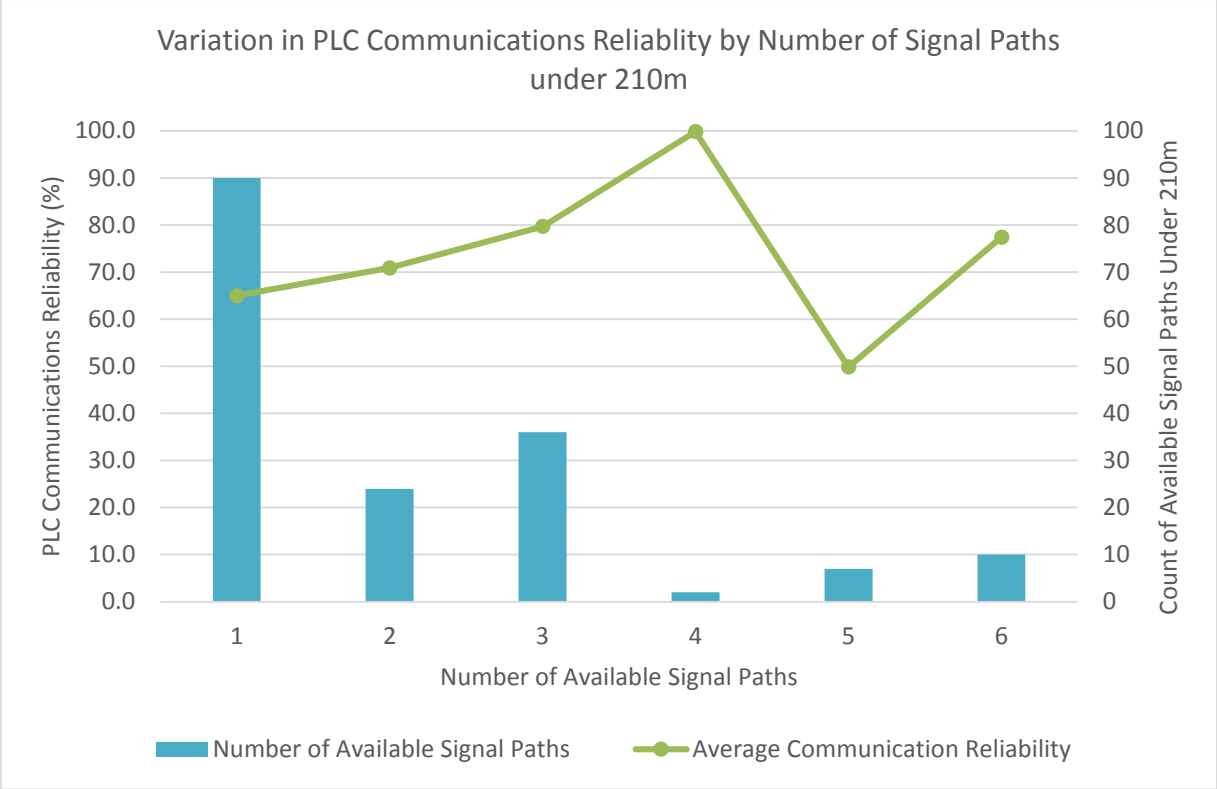

Figure 5-4 – Communications Reliability Related to Number of Available Signal Paths

5.2.1.4 Presence of PV Generation

There has been anecdotal evidence of noise sources reducing the reliability of PLC throughout the Technical trials, with participant CRG07 particularly impacted. Figure 5-5 shows the communications reliability for participant CRG07 over a seven day period, with the timing of sunrise and sunset also shown. The graph indicates that the communications reliability is good at night, but very low during daylight hours. Power quality monitoring is being deployed to further investigate noise caused by the PV generation with particular focus on whether the generation is compliant with the various regulations on emitted noise.

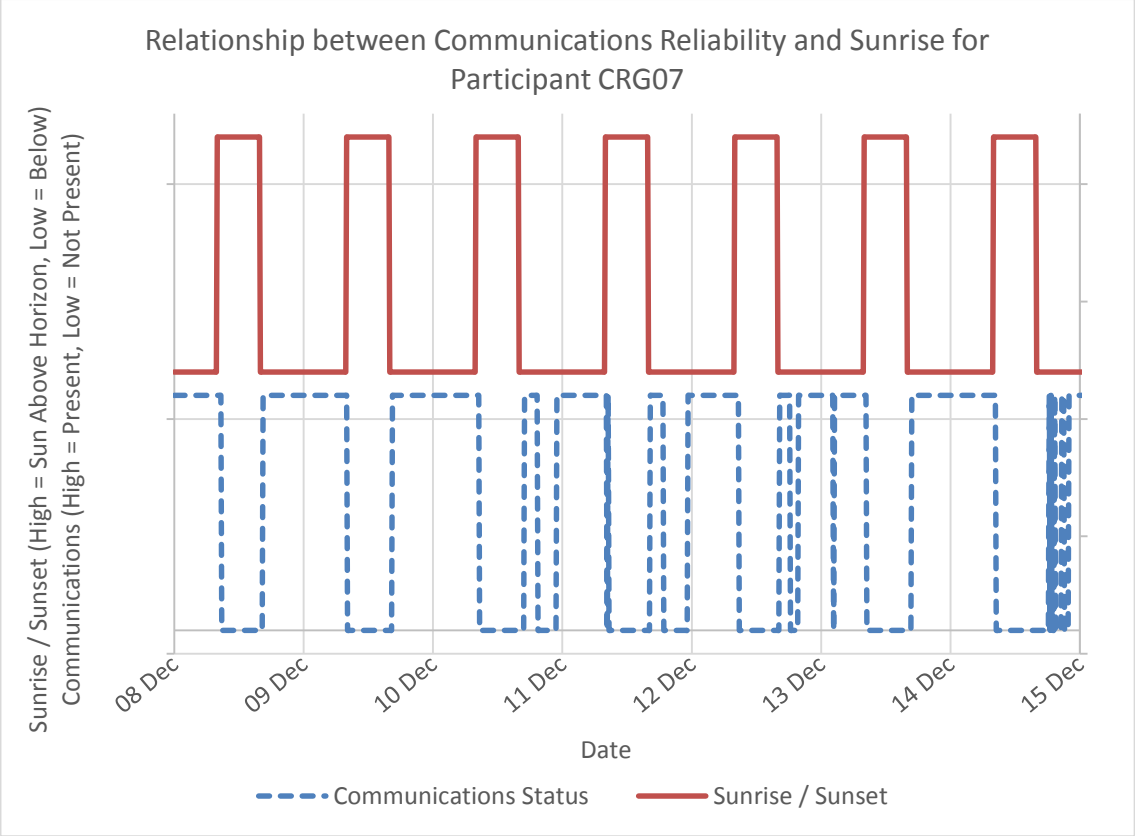

Figure 5-5 – Communications Reliability Related to Participant's PV Generation

5.2.1.5 Other factors under investigation

Two other factors, which may influence PLC reliability, are under investigation. These factors are:

- EV charging producing sufficient noise to interfere with PLC. One example of this type of interference has been found and is under further investigation;
- Load on the LV network, this factor is under further investigation.

5.2.2 Technology function – Network performance and Esprit control

The following figures provide a summary of the My Electric Avenue project operation to date. Since January 2014:

- Esprit has operated to curtail over 17,000 times;
- 51 participants have had their EV charging curtailed at total of 2,226 times;
- Curtailment has operated for approximately 5.2% of the total recorded charging time;
- Esprit has recorded data for over 20,000 hours of EV charging by technical trial participants;
- Social Trial participants have charged their EVs for over 94,000 hours;
- Social and Technical trial participants have driven their EVs more than 2.7 million kilometers (enough to drive to the moon seven times)

The vast majority of curtailment has taken place in the six months from January 2015. The amount of curtailment experienced by each participant has been variable depending on the load on the connected LV feeder, the communications reliability with the ICB and the usage of the EV. One example of switching affecting two EVs is shown below in Figure 5-6. Switching of two EVs is shown, in response to phase

current variations around the phase limit (note the 10 minute resolution of EV charge current prevents exact matching to the phase current data, sampled at 1 minute resolution).

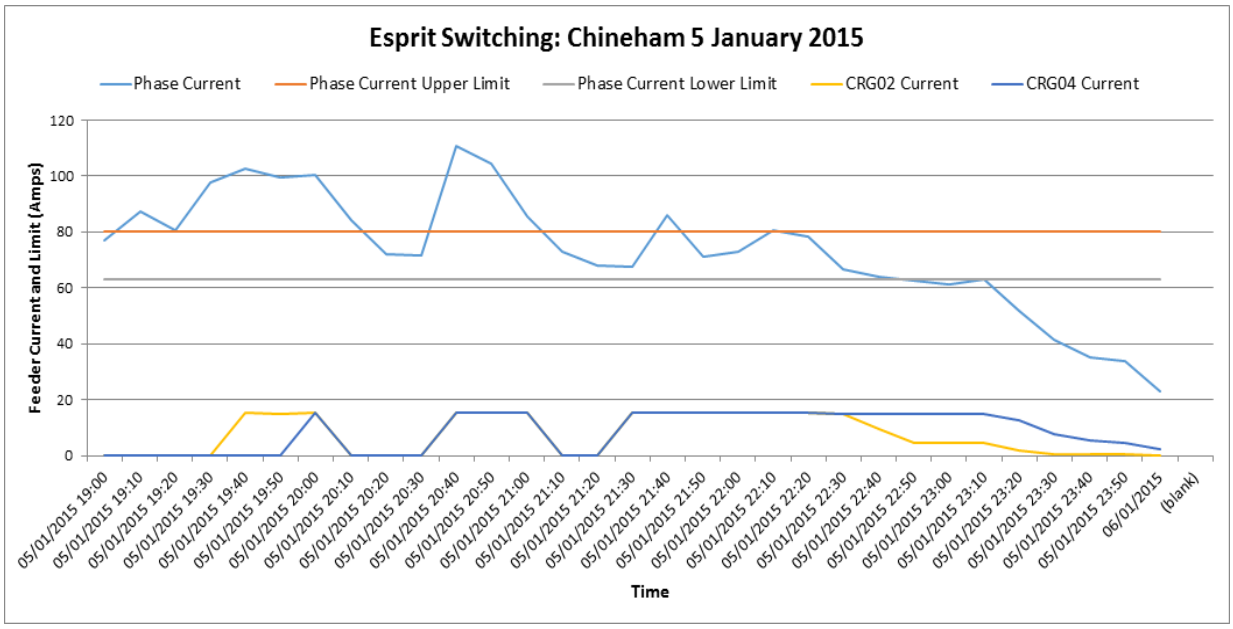

Figure 5-6 – Example of Curtailment from Chineham in January 2015. Two participants are curtailed in response to phase current exceeding the Esprit threshold.

Two relevant work areas have begun and are scheduled for completion in the June – December 2015 period:

- Review of Esprit performance against its specification to evaluate the technology's efficacy in practical trials;
- Headroom released by Esprit will be calculated and published as part of SDRC 9.8, based on the work packages being delivered by the University of Manchester

5.2.3 Voltage variations as a consequence of EV charging

A detailed analysis of voltage variations and flicker severity, as a result of simultaneous EV curtailment, has been conducted. Power quality measurements for the charging of an individual EV have been combined with modelled results for a "worst case" assessment. The worst case scenario involved modelling the cycling of curtailment of five EVs on the Chiswick cluster, which was adjudged to be the cluster most susceptible to power quality problems due to the location of the EV chargers.

Measurements at a customer home showed that charging an individual EV did not appreciably increase the severity of Flicker on the connected LV feeder; this was true even where the EV was disconnected midway through a charge cycle, causing a step-change in demand.

Network modelling was conducted, based on the Chiswick cluster, for five EVs being switched in turn at regular intervals. Cycling intervals of 60s, 120s, 300s, 600s and 900s were used in the modelling. Figure 5-7 shows at each cycling interval one (more) EV is switched on, so that at the start of the 5th cycling interval, all five EVs are charging. At the end of the 5th cycling interval, all five EVs are switched off again. The resulting voltage variation, at the two distances on the feeder (387m and 122m), is shown in Figure 5-8.

The analysis showed that when five or more EVs are switched simultaneously, with control cycle times of 60 seconds or less, the limits on voltage step change in ENA ER P28 are breached. This leads to the recommendation that P28 power quality limitations can be maintained when up to five EVs are simultaneously switched off using a minimum cycling interval of 120 seconds.

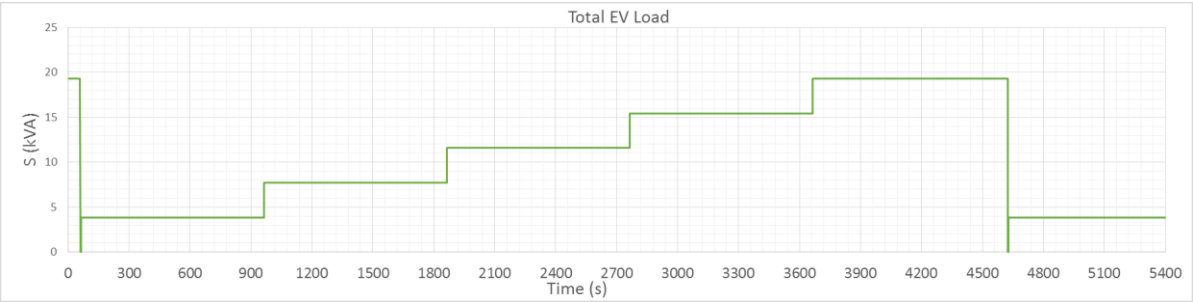

Figure 5-7 – Combined EV load profile used during Flicker analysis.

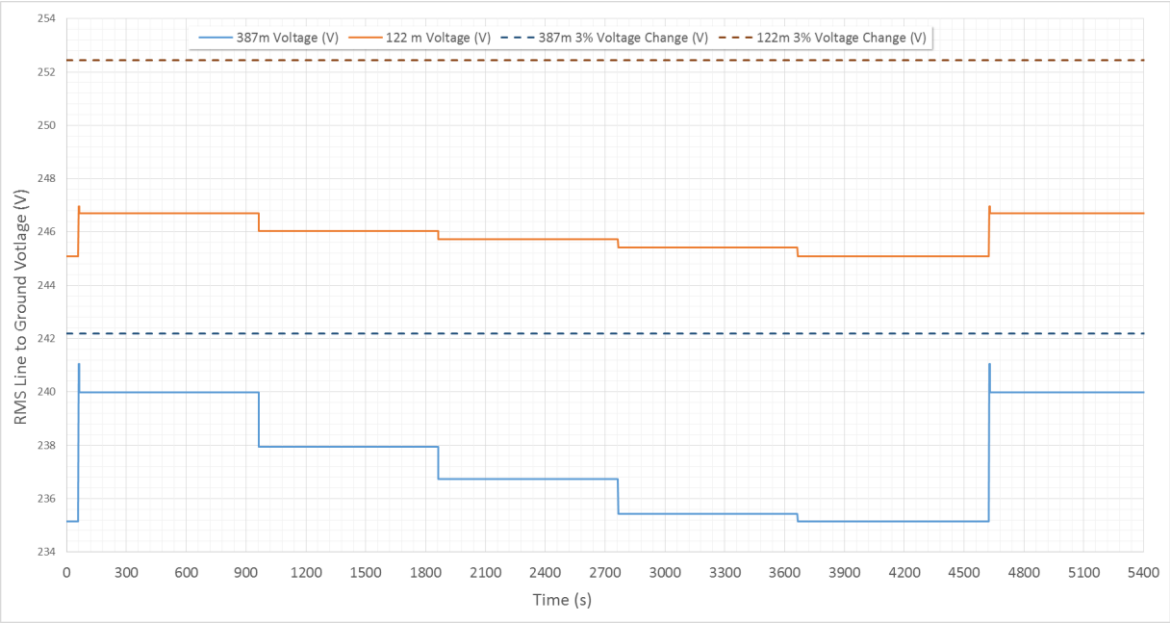

Figure 5-8 – Voltage change resulting from cycling of 5 EVs, at two points on the Chiswick feeder

5.2.4 Customer Engagement

The key learning points regarding customer engagement for this period relate to Task 4 activities, in particular the unanticipated curtailment experienced at Your Homes Newcastle and decommissioning planning:

- Frequent communication is still required with participants, to;
  - Instruct participants not to reset their ICBs as a method of overriding curtailment
  - Provide assurance that curtailment is 'normal' under Esprit conditions
  - Seek feedback following perceived excessive curtailment
  - Remind participants to respond to surveys and requests for interviews
  - Outline after-trial options for leasing
  - Provide provisional dates for decommissioning
- When a project requires several skillsets spanning across different industries (e.g. trouble shooting charging point defects), partners who specialise in this area can be hugely beneficial;
  - Zero Carbon Futures is highly experienced in communicating directly with customers on a daily basis, and resolving issues with charging points. Where defects in charging point software have been identified, Zero Carbon Futures has been invaluable in managing repair/replacement work and maintaining customer relationships
- Customers continue to use various means (different telephone numbers, email addresses etc.) for reporting faults, despite relevant contact numbers provided in monthly participant bulletins.

5.3 An overview of the Project's approach to capturing the learning and disseminating

Learning continues to be captured in a learning log that is kept updated on an ongoing basis. The project has ensured dissemination of documentation, reports and key deliverables through a variety of mediums in addition to the requisite process for submitting documents to Ofgem:

- Newsletters;
- Attendance and presentations at specific industry events;
- Social media;
- Project website; www.myelectricavenue.info – hosting more information – Top Ten Tips series, presentations, etc.
- Webinars

A review of the project website is currently underway, to tailor the structure and information towards sharing learning both via webpages and downloads.

5.4 The main activities towards third parties which have been undertaken in order to disseminate externally the project learning

5.4.1 SSEPD – External Dissemination

SSEPD have promoted the project, and related webinars via their corporate twitter account and LinkedIn page.

In addition on 29th May 2015 SSEPD was invited to present on its LCNF project portfolio to techUK members in London. techUK represents more than 850 companies involved in IT, Telecommunications and Electronics, which make up about half of all tech sector jobs in the UK. It aims to help its members grow by developing markets, relationships and networks whilst reducing business costs and risks. As a result they were extremely keen to review overviews and progress updates on our projects due to the depth and breadth of learning to date yielded by the portfolio across various areas of IT, communications and electronics, and help members appreciate the developments the electricity DNOs are making in helping the UK move towards a low carbon economy. Covering the project's objectives, approach, methodology and learning to date generated significant interest in both the collection of data, use of technology, network and customer types, partner mix, and issues experienced, helping techUK members both understand the project and also how their businesses could potentially assist DNOs/be part of the supply chain in the future.

5.4.2 EA Technology – External Dissemination

Learning Dissemination Activities

The project has continued to add to the 'Top Ten Tips' series with a further two documents:

1. Top Ten Tips for data monitoring
2. Top Ten Tips for database management

Both documents were publicised via the project newsletter and are accessible on the project website, along with the previous Top Ten Tips series.[9]

My Electric Avenue has also continued to engage stakeholders directly through attendance and presentations at industry events. In particular, the project has made significant progress in engaging with the automotive sector, a key requirement to ensure that the future of EVs involves partnership working between DNOs, automotive and charging equipment manufacturers:

- Society of Motor Manufacturers and Traders (SMMT) EV Group Meeting 12th March: Presentation;
- Low Carbon Vehicle Partnership (LowCVP) Parliamentary Reception 9th March: Attendance;
- All Energy: Presentation;
- Institute of Mechanical Engineers 'Knowledge sharing seminars' 19th May: Presentation

Marketing Activities

Following completion of all recruitment targets, My Electric Avenue dissemination is now solely focused on capturing and sharing learning from the project.

External dissemination continues to follow a planned schedule. Newsletters and social media activity are appropriately timed with attendance at industry events, to publicise project related webinars, maximising opportunities to boost attendance and share learning with a wider audience.

More recently social media has also been used to support data gathering for SDRC 9.7.1, publicising a project survey requesting views and opinions on the impact of curtailed charging on EVs and EV charging points.

A record of the planned dissemination, which has been carried out in this reporting period, is shown below.

[9] http://myelectricavenue.info/project-learning

Table 5-1: External Dissemination

Date	Method	Number
Newsletters		
26th January 2015	Newsletter issue 6	775 recipients, and mailing list via myelectricavenue.info (225)
15th April 2015	Newsletter issue 7[10]	574 recipients, and mailing list via myelectricavenue.info
Social Media		
	Twitter	@MyElectricAve #Allenergy #lowcvp
Press Releases		
15th April 2015	Press release	Green Car Guide
17th March 2015	Press release	Green Car Guide, Nissan GB Newsroom
3rd February 2015	Press release	Green Car Guide, Nissan GB Newsroom

To date (19th May 2015) 30 news items covering the My Electric Avenue project have been published via industry titles, worldwide, since January 2015. 200 items of press coverage have been captured since commencement of the project.

Publicity for the project and trials has been further supported by the commission and production of three press releases, and videos by Nissan between January 2015 and March 2015. All videos are available to view via the project website[11].

Further to planned press releases and newsletters, My Electric Avenue has also shared project news through a combination of emails, LinkedIn, and Twitter. The My Electric Avenue group on LinkedIn has 127 members; project following on Twitter has gained further interest since the last reporting period now with 314 tweets, 938 followers and 667 following. Learning from the project has also been shared to support development of Work Stream 7 – DS2030 project, following teleconferences with PB Power in March.

My Electric Avenue has also taken on board lessons learned from other LCNF projects, holding webinars as an additional tool for sharing initial results and learning as they become available. To date, the project has hosted two webinars, covering:

- Early results and findings 1 year on, 24th February: evidence of Esprit switching EV charging, progress against network modelling, and charging behavior analysis conducted by University of Manchester and lastly progress against planned social research conducted by De Montfort University;
- Network modelling and analysis, 27th May: implementation aspects of Esprit-inspired control algorithms, the corresponding benefits, and the potential impacts on EV users.

To date the webinars have been well received with 40 attendees, including design and planning engineers, innovation and low carbon engineers and technical managers from Scottish and Southern Energy Power Distribution, Northern Powergrid, Electricity North West, Western Power Distribution, UK Power Networks, and SP Energy Networks in addition to representation from Energy Savings Trust.

[10] This newsletter publicised our latest addition to the project's Top 10 Tips series uploaded to the website.

[11] www.myelectricavenue.info

To further maximise the learning from these webinars, presentations were uploaded to the project website after the session and emailed directly to those who expressed an interest, but were unable to attend.

Planned attendance at upcoming events includes:

- Cholmondeley Pageant of Power 12th June: Presentation
- CIRED 23rd International Conference and Exhibition 17th June: Poster presentation;
- LowCVP Annual Conference, 24th June: Panel discussion
- BEAMA Electric Vehicle Infrastructure Project (BEVIP) 25th June: Presentation
- Cenex LCV 2015 9th-11th September: Presentation;
- Low Carbon Networks and Innovation (LCNI) Conference 24th November: Exhibition and Presentation

The University of Manchester have also submitted a paper to Innovative Smart Grid Technologies (ISGT-LA) 2015 Conference and are awaiting review.

De Montfort University are planning to begin analysis of the quantitative and qualitative research they have undertaken to date. As such the project anticipates De Montfort University to identify relevant conferences to present at within the next reporting period.

5.5 Internal dissemination activities

5.5.1 SSEPD

Internal dissemination within SSEPD has been primarily to other members of the Future Networks team during monthly Team Brief updates.

The team was also given an excellent opportunity to present the project's objectives, approach, methodology and learning to date to the new Managing Director of Networks, ensuring that senior management within SSEPD are kept informed and up to date of the great work to date and potential for future learning to transition into BAU.

5.5.2 EA Technology

In the latest reporting period, EA Technology has disseminated progress and key learning internally through the company's internal social network and LinkedIn groups.

6 Business case update

The project team remain confident that the project learning will be achieved and there is no anticipated change to the overall cost.

7 Progress against budget

It should be noted that the expenditure progress detailed below remains in comparison against the budget detailed in version 1.10 of the Project Direction, issued in December 2012. The Change Request (see section 2.1) seeks to update the budget, changing the distribution of funding across budget categories and tasks to mitigate:

1. The impact of transcription errors in the budget as originally submitted; and
2. The need to re-plan project activities to meet additional conditions imposed through the Project Direction.

As the Change Request is not yet accepted, the original budget remains valid for the current reporting purposes and consequently this report shows considerable variation from that budget in some areas.

7.1 Current project expenditure

The project expenditure to date, (data extracted to end of April 2015), is detailed in Table 7-1 and Table 7-2. It can be seen that to date, expenditure is below that forecast in the project bid submission; this is driven primarily by the funding restrictions enforced through the Project Direction preventing full implementation of technical trials.

Table 7-3 shows the current Forecast Cost At Completion for the project.

Table 7-1: Current expenditure against project category

	Total Planned Expenditure (£k) (Project Direction v1.10)	Current Expenditure (April 2015) (£k)	Utilised % of Planned Expenditure at April 2015
Labour	222.25	124.656	56%
Equipment	484.71	350.443	72%
Contractors	3,120.44	2,426.562	78%
IT	3.27	2.20	67%
Travel & Expenses	107.43	0	0%
Payments to users	311.76	279.12	90%
Contingency	400.40	238.64	60%
Decommissioning	26.29	2.156	8%
Other	72.88	0	0%
Total	**4,749.43**	**3,299.06**	**69%**

7.1.1 Variances in excess of 5%

There are three elements of the project that have experienced variation in the forecast costs at completion; these have been raised in previous Project Progress Reports and are covered in greater detail in the initial and subsequent Change Request to the Project Direction submissions. For clarification, there is no change to the overall forecast cost at completion (FCAC) of the project.

Contractors – Task 02 – Customer Engagement

This task has exceeded the budget allowed for in the Project Submission (and subsequently the Project Direction) as a consequence of changes to customer recruitment plan originally proposed. These changes are a consequence of the additional clauses introduced through the Project Direction that would not have been achievable without significantly adapting the recruitment strategy.

The original project plan was to recruit in a staged manner, recruiting customers and deploying equipment utilising publicity from earlier clusters to assist in the recruitment of subsequent ones. The condition introduced by the Project Direction, to recruit the entire project's clusters prior to deploying any equipment, required the interaction with a wide range of potential clusters in parallel in order to achieve the necessary target.

This revised strategy successfully achieved the additional targets introduced by Ofgem, but with a significant increase in customer engagement effort and cost.

Contractors – Task 04_1 – Cluster Establishment

This task has exceeded the budget allowed for in the Project Submission (and subsequently the Project Direction) as a consequence of changes to customer recruitment plan originally proposed.

The need to cultivate significantly more clusters than would eventually be utilised, or were anticipated during the bid stage, required a high level of expenditure to investigate the potential networks and provide associated information to the cluster champions to aid in recruitment. As with Task 2, the need to undertake this work on significantly more clusters than had been planned has contributed to the increased costs.

Payments to Users – Task 04_1 – Cluster Establishment

This task has exceeded the budget allowed for within the Project Direction due to the transcription error that occurred during the bid submission process; this has been explained in details as part of the Change Request process.

The project has not spent more than had been allowed for within the Ofgem Category 'Payments to Users' as the transcription error erroneously allocated budget against the Project Contingency task in addition to Cluster Establishment.

Additional comments

It is noted that EA Technology are in the unique position of being 'Equipment Provider' and 'Engineering Consultant' within the project, with some staff members operating in both areas over the duration of the endeavour.

Table 7-2: Cumulative Project Expenditure – April 2014

Task ID	Ofgem Categories / Project Tasks	Original PD	Current Expenditure	% Expenditure of Budget
	Labour	**£ 222.25**	**132.79**	**60%**
00	Novel Commercial Arrangement	£ 19.92	3.49	18%
02	Customer engagement	£ 1.27	0.01	1%
04_2	Install technology and charging points	£ 37.44	12.41	33%
04_1	Establishment of Customer / Cluster trials	£ -	8.10	N/A
05	Monitoring the trials	£ 16.06	1.10	7%
06	Trial participant interviews	£ 1.28	0.02	2%
09	Project recommendations and implementation	£ 6.73	0	
10	Dissemination	£ 30.48	3.81	12%
11	Programme Management	£ 109.07	103.62	95%
	Equipment	**£ 484.71**	**256.50**	**53%**
04_2	Install technology and charging points	£ 484.71	256.50	53%
	Contractors	**£ 3,120.44**	**2511.02**	**80%**
00	Novel Commercial Arrangement	£ 194.05	149.10	77%
01	Initial background - evaluation of initial trial	£ 14.48	10.52	73%
02	Customer engagement	£ 209.08	300.38	144%
03	Integration of the Technology with charging points	£ 42.99	10.32	24%
04_2	Install technology and charging points	£ 659.71	551.03	84%
04_1	Establishment of Customer / Cluster trials	£ 346.42	421.26	122%
05	Monitoring the trials	£ 103.77	113.82	110%
06	Trial participant interviews	£ 202.36	101.51	50%
07	Network Modelling	£ 214.84	178.37	83%
08	Consultation with EV manufacturers - cycle times	£ 33.16	23.74	72%
09	Project recommendations and implementation	£ 273.23	95.20	35%
10	Dissemination	£ 230.73	172.10	75%
11	Programme Management	£ 595.62	383.68	64%
	IT	**£ 3.27**	**2.20**	**67%**
05	Monitoring the trials	£ 3.27	2.20	67%
	Travel & Expenses	**£ 107.43**		
04_1	Establishment of Customer / Cluster trials	£ 105.15		
05	Monitoring the trials	£ 2.28		
	Payments to users	**£ 311.76**	**279.12**	**90%**
04_1	Establishment of Customer / Cluster trials	£ 199.18	279.12	140%
12	Project Contingency	£ 112.58		
	Contingency	**£ 400.39**	**238.70**	**60%**
04_1	Establishment of Customer / Cluster trials	£ 82.07	238.70	75%
12	Project Contingency	£ 318.32		
	Decommissioning	**£ 26.29**	**0.18**	**1%**
04_1	Establishment of Customer / Cluster trials	£ 26.29	0.18	1%
	Other	**£ 72.88**		**0**
04_1	Establishment of Customer / Cluster trials	£ 72.88		
	Total	**£ 4,749.42**	**£3,420.50**	**72%**

Table 7-3: Forecast Cost At Completion

Task ID	Ofgem Categories / Project Tasks	Original PD	Forecast Cost At Completion(FCAC)	% Expenditure of Budget
	Labour	**£ 222.25**	**£231.94**	**104%**
00	Novel Commercial Arrangement	£ 19.92	£ 19.89	100%
02	Customer engagement	£ 1.27	£ 2.55	201%
04_2	Install technology and charging points	£ 37.44	£ 37.60	100%
04_1	Establishment of Customer / Cluster trials	£ -	£ 8.10	N/A
05	Monitoring the trials	£ 16.06	£ 16.06	100%
06	Trial participant interviews	£ 1.28	£ 1.3	102%
07	Network modelling	£-	£0.23	N/A
09	Project recommendations and implementation	£ 6.73	£ 673	100%
10	Dissemination	£ 30.48	£ 30.41	100%
11	Programme Management	£ 109.07	£ 109.07	100%
	Equipment	**£ 484.71**	**£ 256.50**	**53%**
04_2	Install technology and charging points	£ 484.71	£ 256.50	53%
	Contractors	**£ 3,120.44**	**£ 3,510.58**	**113%**
00	Novel Commercial Arrangement	£ 194.05	£ 176.79	91%
01	Initial background - evaluation of initial trial	£ 14.48	£ 10.52	73%
02	Customer engagement	£ 209.08	£ 522.85	250%
03	Integration of the Technology with charging points	£ 42.99	£ 17.11	40%
04_2	Install technology and charging points	£ 659.71	£ 675.05	102%
04_1	Establishment of Customer / Cluster trials	£ 346.42	£ 407.58	118%
05	Monitoring the trials	£ 103.77	£ 129.61	125%
06	Trial participant interviews	£ 202.36	£ 222.29	110%
07	Network Modelling	£ 214.84	£ 300.32	140%
08	Consultation with EV manufacturers - cycle times	£ 33.16	£ 30.38	92%
09	Project recommendations and implementation	£ 273.23	£ 144.26	53%
10	Dissemination	£ 230.73	£ 191.93	83%
11	Programme Management	£ 595.62	£ 681.91	114%
	IT	**£ 3.27**	**£ 2.70**	**82%**
05	Monitoring the trials	£ 3.27	£ 2.70	82%
	Travel & Expenses	**£ 107.43**	**£ 3.00**	**3%**
04_2	Install technology and charging points	£ -	£ 0.40	N/A
04_1	Establishment of Customer / Cluster trials	£ 105.15	£ -	0%
05	Monitoring the trials	£ 2.28	£ -	0%
09	Project recommendations and implementation	£ -	£ 0.20	N/A
10	Dissemination	£ -	£ 0.20	N/A
11	Programme Management	£ -	£ 2.20	N/A
	Payments to users	**£ 311.76**	**£ 279.12**	**90%**
04_1	Establishment of Customer / Cluster trials	£ 199.18	£ 279.12	140%
12	Project Contingency	£ 112.58	£ -	0%
	Contingency	**£ 400.39**	**£ 400.40**	**100%**
04_1	Establishment of Customer / Cluster trials	£ 82.07	£ -	0%
12	Project Contingency	£ 318.32	£ 400.40	126%
	Decommissioning	**£ 26.29**	**£ 31.84**	**121%**
04_1	Establishment of Customer / Cluster trials	£ 26.29	£ 31.84	121%
	Other	**£ 72.88**	**£ 7.00**	**10%**
04_1	Establishment of Customer / Cluster trials	£ 72.88	£ 5.00	10%
	Total	**£ 4,749.43**	**£ 4,723.07**	**99%**

7.2 Project funding allocations by task and category

The overall project expenditure to date and projected forward remains within the overall project budgetary restriction outlined in the Project Direction. The project is continuing in line with the plan outlined as part of the ongoing discussions relating to the Change Request to the Project Direction.

It is noted that in line with previous discussions between the project and Ofgem relating to the reallocation of funding detailed in the Change Request, the project is proceeding in line with the 'Forecast Cost At Completion' as detailed above and in previous Progress Reports, ensuring that:

- The project deliverables and associated learning are achieved;
- The project remains within the overall budgetary limit

8 Bank account

The bank account statement for the project, for the date range 1st December 2014 to 31st May 2015, is attached in Appendix A.

9 Intellectual Property Rights (IPR)

9.1 Current Reporting Period

The project has not generated any material that could be subject to IPR restrictions within this reporting period.

9.2 Next Reporting Period

The project is not expected to generate any material that could be subject to IPR restrictions in the next reporting period.

10 Other

The project is considered to be operating in line with the original submission aims and requirements, but is moving at a faster pace than was originally intended because of the additional terms introduced to project targets through the Project Direction v1.10. Despite this, My Electric Avenue (I²EV) is delivering wholly in line with the overall budget, spirit and intention of the project bid, whilst protecting the cost to, and interest of the customer. This is despite a shortfall of c£220k from the intended budget due to our transcription error, which has resulted in EA Technology committing additional in-kind contributions to the project.

Unforeseen issues have been experienced, either as a consequence, or exacerbated by the requirement to deliver all technical clusters in a simultaneous delivery fashion rather than a staged roll-out. To mitigate these issues, both EA Technology Ltd and Fleetdrive Electric have significantly increased their in-kind contributions to enable delivery of the My Electric Avenue Project.

11 Accuracy assurance statement

The individual sections of this Project Progress Report have been prepared by the project team delivering the various areas of the project within EA Technology and collated into a single document by the Programme Manager. The document has subsequently been reviewed by the Project Director, who also holds the position of Future Networks Director for the business before sign-off for issue.

Within SSEPD, the Project Delivery Manager have reviewed this document prior to final review and authorisation by the Director of Distribution.

Financial details are drawn from the SSE group-wide financial management systems and project bank account.

Prepared by:

Becky Lees	Assistant Project Manager	EA Technology
James Cross	Project Team	EA Technology

Reviewed by:

Duncan Yellen	Project Manager	EA Technology
Nigel Bessant	Project Delivery Manager	SSEPD

Authorised by:

Duncan Yellen Resource Manager – Network Management, EA Technology

Stuart Hogarth Director of Distribution, SSEPD

Appendix A. Risk Register

Risk Details						Pre-Mitigation			Post-Mitigation							
Risk Identifica	Risk Category	Date Risk	Target d for	Risk Details	Affected Parties	Likelihoo	Severity	Overall Risk	Mitigation Measure	Cost of Mitigatio	Mitig on	Responsib for Risk	Likelihoo	Severit	Overall Ri	Contingency Action in Event Risk is Realis
074	Business (All)	12-Sep-13	30/06/2014	Change Request to update Project Direction (from v1.10) is rejected by Ofgem, preventing movement of funds between Categories. Severely impacted Categories if rejected are Labour, Decommissioning and Contingency.	EA Technology	Probable	Severe	Severe	- Ensure clarity of rationale behind update request is clear within the document; - Ensure document is reviewed by SSE Regulation Team; - Open dialogue with Ofgem to resolve issue.	£ 15,000.00	Yes	EA Technology	Probable	Severe	Severe	- Clarify the specific elements of sub-contractor invoicing to ensure maximum alignment with Project Tasks outlined at bid stage. (For example ZCF contract to cover purchase and installation of charging to be allocated against Installation of Equipment rather than Establishment of Clusters). - Utilisation of Project Contingency.
073	Business (All)	12-Sep-13	10/01/2014	Request to Project Direction (update from v1.10) is rejected by Ofgem, preventing movement of funds between Ofgem Categories. Severely impacted tasks if rejected are Customer Engagement and Cluster Establishment (including funding of vehicles and purchase of equipment)	EA Technology	Almost Certain	High	Severe	- Ensure clarity of rationale behind update request is clear within the document; - Ensure document is reviewed by SSE Regulation Team; - Open dialogue with Ofgem to resolve issue; - Continue responding to Ofgem's requests for clarification and offer meetings / teleconferences to resolve concerns they may have.	£ 12,500.00	Yes	EA Technology	Possible	High	Moderate	- Clarify the specific elements of sub-contractor invoicing to ensure maximum alignment with Ofgem cost categories. (For example ZCF contract to cover purchase and installation of charging to be allocated against Equipment rather than Contractors). - Utilisation of Project Contingency.
023	Unallocated	01-Jan-13	31/12/2015	Due to the nature of the project (research trials into new, experimental technology) it is reasonable to assume that risks that have not been specifically forseen will occur. This line allows for the impact of currently unforseen risks.	All parties	Almost Certain	High	Severe	Ensure regular updates meetings/teleconferences held between all parties to discuss adherance to the project plan and identify risks and blockers to progress of the project.	£ -	Ongoing	All parties	Almost Certain	Moderate	High	Contingency plans to be developed as specific risks and/or blockers are identified/realised.
026	Business (All)	01-Jan-13	31/12/2015	Insufficient funding available in budget.	EA Technology	Probable	High	High	- Re-forecast task expenditure by category for resubmission of Project Direction criteria. - Analysis and planning of individual tasks to determine necessary budgets. - Fixed price contracts from some suppliers have been quoted at lower than the amount forecast in budget. Note Sep-2013: Likelihood increased from possible to probable due to number of people involved in meeting SDRC requirements/obligations for cluster recruitment	£ -	Ongoing	EA Technology	Probable	High	High	
012	Technical	01-Jan-13	31/12/2014	PLC cannot be fitted in substations or communication medium fails. Update: PLC successfully installed in all clusters except for Lyndhurst. The LV network for this cluster consists of Overhead Line requiring different methods of connection for the Monitor Controller. Update: Communication issues experienced during periods of high volume communications. Update: Software update deployed before Christmas 2014, PLC system has remained operational throughout the Christmas period including through the implementation of charging control.	EA Technology ANDTr	Probable	Moderate	Moderate	- Repeater units will be installed where required to ensure communications between ICBs and the relevant MC. - MCs installed in all but Lyndhurst cluster. Only one remaining cluster is different to those already installed and has been designed. Lyndhurst connections designed and approved, scheduled for installation mid-November. - Adaptations to control system functionality under test with an alternative method of connectivity to control charging points being investigated. - Adaptation to control algorithm implementation have been successful.	£ -	No	EA Technology	Possible	Moderate	Moderate	
007	Business (All)	01-Jan-13	31/12/2015	Availability or loss of key resources.	All parties	Possible	Moderate	Moderate	Consider succession strategies; identify and ensure suitable knowledge transfer and training to potential	£ -	Ongoing	All parties	Unlikely	Low	Low	Provide support to 'new' resources to bring them 'up-to-speed' as quickly as reasonably practicable.
043	Technical		31/12/2015	Excess callouts by participants due to 'failures.'	EA Technology	Probable	High	High	Revisits conducted out of hours - evenings and weekends to reduce inconvenience. All possible efforts to reduce number of revisits (tackle several actions in one visit rather than several).	£ 1,000.00	Ongoing	EA Technology	Unlikely	Moderate	Low	
030	Technical		31/12/2015	Security risk from data transmission. - Data / control signals can be intercepted. - Data can be blocked from receipt.	EA Technology ANDtr	Possible	Moderate	Moderate	- PLC technology is designed to form self-contained networks. - No personal information is transmitted within the	£ -	No	EA Technology	Unlikely	Moderate	Low	
052	Technical		31/12/2015	Equipment disruptively fails in substation.	EA Technology	Possible	High	Moderate	Provide clear instructions for maintenance crews (laminated guide in substations). • Possibly override system if loading is light (e.g. in summer)	£ 1,000.00	No	EA Technology	Remote	High	Low	
048	Technical		31/12/2015	External factors prevent operation of Esprit, e.g. Lightning Strike. - Esprit fails and prevents charging; - Esprit fails and prevents control unit from stopping charging potentially allowing an overload of the network.	EA Technology	Possible	Moderate	Moderate	Aug-2013: Esprit units will be set-up to 'fail-on' so in the event of communication failure customer vehicles will not be prevented from charging. - Sep2013: In the event of a lightning strike or similarly disruptive event, all charge points should default to 'on' allowing charging to occur but damage resulting from the 'event' cannot be predicted at this stage.	£ -	No	EA Technology	Possible	Low	Low	
032	Technical	Feb-15	01/06/2015	Reduced findings for SDRC 9.7 due to UoM deliverable being scheduled after SDRC delivery date.	EA Technology	Possible	High	Moderate	Planning sessions with UoM to plan for early findings to be made available for integration into the SDRC report. - agree content for SDRC with SSEPD prior to	£ 1,000.00	Ongoing	UoM / EA Technology	Possible	Moderate	Moderate	Use of planned modelling analysis / any initial DMU data / customer complaints / monitored data.
042	Business (Contractor/Supplier)		31/12/2015	Trial partners / suppliers miss an appointment slot with trial participants.	EA Technology SSEPD	Possible	High	Moderate	SSEPD to provide specifics of the requirements that must be adhered to by all partners and suppliers for inclusion in the contracts. (Require this information from NPG as well for inclusion in contracts in preparation for undertaking working in NPG	£ -	Ongoing	Fleetdrive Electric Zero Carbon Futures	Unlikely	High	Moderate	
027	Business (All)		31/12/2015	Interest rate risk arising from the interest expectations made by Ofgem. (Assumption made by Ofgem that project funds would accumulate interes at a rate of (Bank of England Base Rate + 2%).	SSEPD	Almost Certain	High	Severe	- SSEPD to discuss with Ofgem, ENA and other DNOs the implications and potential mitigation measures for this and all other Tier 2 bids.	£ -	Ongoing	SSEPD	Almost Certain	Moderate	High	

Risk Details						Pre-Mitigation			Post-Mitigation							
Risk Identifica	Risk Category	Date Risk	Target d for	Risk Details	Affected Parties	Likelihoo	Severity	Overall Risk	Mitigation Measure	Cost of Mitigatio	Mitig on	Responsib for Risk	Likelihoo	Severit	Overall Ri	Contingency Action in Event Risk is Realis
035	Business (Client)		12/03/2014	Project Timeline: Critical tasks and deliverables not achieved in line with Project Plan.	EA Technology	Probable	High	High	-Highlight critical tasks / deliverables and review process timescales. - Provide a schedule of anticipated document delivery in order to plan suitable resource availability. - As much notice as possible will be provided regarding individual documents, with requirements for authorisation and impact of these dates being missed. - Rolling schedule will be provided for new future months	€ -	Ongoing	EA Technology	Possible	High	Moderate	
036	Business (All)		31/12/2015	Possibility that SSEPD Steering Group members do not understand all details of Project Specific risks due to lack of direct, day-to-day involvement in the project.	EA Technology	Possible	High	Moderate	EATL staff (Dave A Roberts) to attend Steering Group meetings and maintain regular contact with SSEPD counterparts to minimise the impact of any mis-communication.	€ 18,000.00	Ongoing	EA Technology	Unlikely	High	Moderate	
041	Technical		31/12/2015	Esprit fails and causes low voltage events or power failures.	EA Technology	Possible	High	Moderate	- iHost alerts are set-up for each cluster to trigger warnings as required. - First choice feeders will be limited to feeders that are believed to be able to handle 10 EVs without Esprit. - Second choice would involve phased implementation to allow monitoring of limits in parallel with frequent discussion with Ofgem to push for reduced participation requirements for feeder cluster. Aug-2013: Esprit units will be set-up to 'fail-on' so in the event of communication failure customer vehicles will not be prevented from charging. Nov-2014: Evaluation of each cluster undertaken to determine security of the network in the event of non-functionality of the Esprit system. Cluster specific	€ -	Ongoing	EA Technology	Possible	Moderate	Moderate	
047	Technical		30/06/2014	Long term safety of operation, e.g. overheating.	EA Technology	Possible	High	Moderate	- The Espit 'system' will be enclosed in a sealed, hardened plastic case to prevent any equipment failures causing damage to surrounding infrastructure. -The equipment specification will ensure suitable safety measures to disable equipment if deemed necessary. - ICBs were designed to the Mkll unit improving safety and further reducing the risk of overheating problems.	€ 500.00	Yes	EA Technology	Possible	Moderate	Moderate	
067	Technical	15-Jul-13	31/12/2015	Failure of Esprit equipment results in damage to the distribution network.	EA Technology	Possible	Severe	High	- Testing and commissioning tests to improve confidence in the equipment's reliability will be undertaken. - Undertake network modelling of the proposed network cluster areas to ensure that the capability exists to install the Electric Vehicles without adversely affecting the network. - If modelling suggests potential problems will be encountered in the event of cluster establishment, advice will be sought from the respective DNO. Nov-2014: Evaluation of each cluster undertaken to determine security of the network in the event of non-	€ 1,500.00	Yes	EA Technology	Unlikely	Severe	Moderate	
072	General Public	12-Sep-13	31/12/2015	Insufficient data available on EV use and charging habits as trial participants do not complete surveys in sufficient quantities or in suitable timescales. Result will be that stated recommendations may later prove to be invalid.	EA Technology	Probable	High	High	Provide incentives to customers to complete the surveys, (e.g. prize draw entry).	€ 300.00	No	EA Technology	Possible	High	Moderate	Escalation in place to EA Technology if participants do not respond after 3 reminders from DeMontfort University.
037	General Public		12/03/2014	Exit strategy for managing participants who need to leave the project. - Loss of job, - Move house.	EA Technology Fleetdrive Electric	Almost Certain	High	Severe	If withdrawing from the project: - Return of vehicle cannot be enforced by the project as lease contract does not commercially pass through any company within the MEA project. If moving house, social trial participants can retain the vehicle, technical trial participants will be moved to the	€ -	No	EA Technology Fleetdrive Electric	Possible	Low	Low	Process document prepared to guide a fair and unbiased approach to making decisions relating to participants wishing to withdraw from trials where mitigation measures are not applicable.
049	Technical		31/12/2015	Operational changes affect operation of Esprit. - Closure of NOP causes controller interference.	EA Technology	Possible	Low	Low	- Rearrangement of local networks should not occur without respective design teams accounting for the project equipment. Sep-2013: Developing a clear schedule of live network	€ -	No	EA Technology SSEPD Northern Powergrid	Unlikely	Low	Low	
068	Technical	15-Jul-13	31/12/2015	Failure of Esprit equipment results in customer's car being unavailable for use.	EA Technology	Possible	Moderate	Moderate	- Testing and commissioning tests to improve confidence in the equipment's reliability will be undertaken. - Brief customers on available actions in the event the EV is unsuitable for use due to insufficient charge. - Provide support in Welcome Pack should car be insufficiently charged due to Esprit - and instructions on how to reimburse taxi costs.	€ 1,000.00	Yes	EA Technology	Possible	Low	Low	Customer will be able to utilise a local taxi firm and re-claim the fare from the project if the car should have been charged but was not due to a failure of the trial equipment. If Esprit functioned as designed then no payment foir the use of taxis will be provided. €50,000 was allowed for in the project budget to cover parking of additional customer vehicles and to cover taxi fares if required. This has been reduced in the current
121	Business (All)	Mar-15	01/11/2015	Lease mileage restrictions - customers exceeding mileage restrictions causing reduced vehicle usage. Potential implications for collection of charging data and Esprit data. Reduction in available data for technical trials.	EA Technology, Fleetdrive Electric,	Probable	Moderate	Moderate	Fleetdrive Electric contacted all customers nearing their mileage limits to discuss options, with the aim of highlighting that their LEAF still represents the lowest cost option even outside of mileage restrictions	€ 1,000.00	Yes	Fleetdrive Electric	Probable	Moderate	Moderate	None - the project cannot force customers to use their vehicles if they believe it is costign them more than alternative transport they may have access to
102	Technical	Feb-15	01/04/2015	Loss of data via Nortech due to transfer protocol failures	EA Technology	Possible	Moderate	Moderate	• Dual transfer protocols currently in place for additional reliability • Weekly checks		Yes	Nortech/EA Technology	Possible	Moderate	Moderate	Nortech to restore
103	Technical	Feb-15	01/10/2015	Loss of data via Nortech due to database failure on their side	EA Technology	Possible	Moderate	Moderate	• Historical backups in the form of weekly CSV files and SQL database		Yes	EA Technology	Possible	Moderate	Moderate	Nortech to restore
105	Technical	Feb-15	01/10/2015	Corruption of data by CARWINGS monitoring incorrect values	EA Technology	Unlikely	High	Moderate	• Validation exercise - verifying mileage and charge data with selected participants	€ 1,500.00	Yes	EA Technology	Unlikely	High	Moderate	Use of ICB current data where available, for charging behaviours and profiles
106	Technical	Feb-15	01/10/2015	Corruption of data by CARWINGS storing data in their database incorrectly wrt VINs	EA Technology	Unlikely	High	Moderate	No ability by the project to verify that data provided by Nissan is correct or otherwise.		No		Unlikely	High	Moderate	Request action by Nissan; use of ICB current data where available, for charging behaviours and profiles

107	Technical	Feb-15	01/10/2015	Loss of data due to CARWINGS not logging all trips and charges	EA Technology	Probable	Moderate	Moderate	Contacting participants with high loss: investigations have revealed that the majority (if not all) data loss is due to poor signal strength preventing the vehicles from transmitting data. There is no mitigation measure that can be applied in this instance.		No		Probable	Moderate	Moderate	Analysis on the basis of available data, noting its level of completeness. Tracking amount of lost data in dashboard
108	Technical	Feb-15	01/10/2015	Loss of data due to CARWINGS database failure on their side	EA Technology	Possible	Moderate	Moderate	There is no mitigation that can be applied in this instance, Nissan already have back-up and contingency systems in place.		No		Possible	Moderate	Moderate	Use of ICB current data where available, for charging behaviours and profiles

Risk Details						Pre-Mitigation			Post-Mitigation							
Risk Identifica	Risk Category	Date Risk	Target d for	Risk Details	Affected Parties	Likelihoo	Severity	Overall Risk	Mitigation Measure	Cost of Mitigatio	Mitig on	Responsib for Risk	Likelihoo	Severit	Overall Ri	Contingency Action in Event Risk is Realis
109	Technical	Feb-15	01/10/2015	Loss of data via CARWINGS due to transfer protocol failures	EA Technology	Possible	Moderate	Moderate	• Dashboard tracks last download • Weekly checks where action can be taken by John/Ian if no data coming through • Validation of protocol by Ronnie		Yes	EA Technology	Possible	Moderate	Moderate	Protocol fix (time and resource); analysis on the basis of available data, noting its level of completeness
117	Technical	Mar-15	31/12/2015	Relate to risk 102: EA storage for API and CSV files is reaching maximum, will require API to be stopped - therefore dual transfer of data will be reduced to one. Increases risk of data loss through data transfer	EA Technology	Almost Certain	Moderate	High	- sought expert opinion and confirmation of CSV transfer more reliable than API. CSV data transfer will continue on weekly basis, API data will be archived. Data from April - end of trials may be at risk		Yes	EA Technology	Possible	Moderate	Moderate	
120	Technical	Mar-15	01/04/2015	Continued loss of comms from some ICBs in all clusters - impact on data collection in remainder of trial period	EA Technology	Probable	Moderate	Moderate	Seeking costs for repeaters to be installed in selected (1 or 2) clusters and analysis of other possible causes.	£ 10,000.00	No	EA Technology	Possible	Moderate	Moderate	Engage with customers to host reeater units in worst affected clusters in return for financial incentive
122	Business (All)	Apr-15	01/06/2015	Complaints and customer feedback - customers complaints of charging curtailment at YHN means some participants are no longer using those provided by the project, and instead relying on public and home chargers	EA Technology, Zero Carbon Futures	Probable	Moderate	Moderate	Increased thresholds to reduce curtailment in this cluster, repeated requests for feedback on charging experiences - encouraging participants to continue to use the chargers. ZCF conducting parallel investigations to check charging posts are working correctly. Learning gained relating to the applicability of Esprit in a workplace environment	£ 5,000.00	Yes	EA Technology Zero Carbon Futures	Possible	Moderate	Moderate	EA Technology keeping DMU and UoM updated with developments during partner teleconferences
096	Technical	Feb-15	01/04/2015	ANDtr monitoring incorrect values for ICB currents/voltages or phase currents	EA Technology	Possible	Moderate	Moderate	On-site verification undertaken to ensure as far as possible that the correct feeders have been monitored.	£ 400.00	Yes	SSEC/EA Technology	Unlikely	Moderate	Low	ANDtr to replace faulty devices if sufficiently critical to the project (cost/time scales)
100	Technical	Feb-15	01/04/2015	Loss of data due to Nortech manipulating network data incorrectly at Envoy	EA Technology	Possible	Moderate	Moderate	Report that clarifies data processing has been confirmed by Nortech	£ 1,000.00	Ongoing	Nortech/EA Technology	Unlikely	Moderate	Low	Nortech to restore
104	Technical	Feb-15	01/04/2015	Loss of access to Nortech database; unable to access live data and reliance on data up to 1 week old (CSV)	EA Technology	Possible	Moderate	Moderate	• Historical access via SQL database or CSV files • Live SQL downloads via API		Yes	EA Technology	Possible	Low	Low	Nortech to restore
110	Technical	Feb-15	01/10/2015	Loss of access to CARWINGS database	EA Technology	Possible	Moderate	Moderate	• Once access is restored, data can be downloaded retroactively, so no mitigation required.		No		Possible	None	Low	EATL problem solving (time and resource), Nissan to restore
111	Technical	Feb-15	01/04/2015	Loss of staff/knowledge/problem solving of SQL CARWINGS download	EA Technology	Possible	Moderate	Moderate	• Several software engineers are familiar with protocols • Produce SQL database guide, including overview of the CARWINGS download process	£ 5,000.00	Ongoing	EA Technology	Unlikely	Moderate	Low	Ensure appropriate staff are trained such that tasks can be handed over when required.
112	Technical	Feb-15	01/04/2015	Loss of staff/knowledge/problem solving of SQL network CSV file download	EA Technology	Unlikely	Moderate	Low	• Ensure several software engineers are familiar with protocols		Ongoing	EA Technology	Unlikely	Moderate	Low	Cost and resource for handover
113	Technical	Feb-15	01/04/2015	Not obtaining all historical network data into SQL due to gaps in CSV files	EA Technology	Unlikely	Moderate	Low	• Validation of historical CSV files		Yes	EA Technology	Unlikely	Low	Low	Nortech to restore (included in agreement, time but no cost)
114	Technical	Feb-15	01/04/2015	Corruption of data due to incorrect CSV files	EA Technology	Possible	Moderate	Moderate	• Weekly Validation of CSV files		Yes	EA Technology	Possible	Low	Low	Nortech to restore (included in agreement, time but no

Appendix B. Project Bank Account Statement

Bankline

RBS The Royal Bank of Scotland

Statement for account **-**-** ******** from 01/12/2014 to 31/05/2015

Short name:	SOUTHERN ELECTRIC PO	Currency:	GBP
Alias:	SOUTHERN ELECTRIC PO	Account type:	SPECIAL INT BEARING
BIC:	********	Bank name:	NATIONAL WESTMINSTER BANK
IBAN:	**********	Bank branch:	READING MKT PLACE

Date	Narrative	Type	Debit	Credit	Ledger balance
	CLOSING BALANCE				**1,163,681.93Cr**
21/05/2015	SOUTHERN ELECTRI I2EV COSTS	EBP	317,786.91		1,163,681.93Cr
31/03/2015	31MAR-GRS 90790375	INT		1,073.39	1,481,468.84Cr
26/03/2015	SOUTHERN ELECTRI I2EV COSTS	EBP	419.75		1,480,395.45Cr
04/03/2015	SOUTHERN ELECTRI I2EV COSTS	EBP	372,122.03		1,480,815.20Cr
31/12/2014	31DEC-GRS 90790375	INT		1,195.66	1,852,937.23Cr
	OPENING BALANCE				**1,851,741.57Cr**
Totals			**690,328.69**	**2,269.05**	