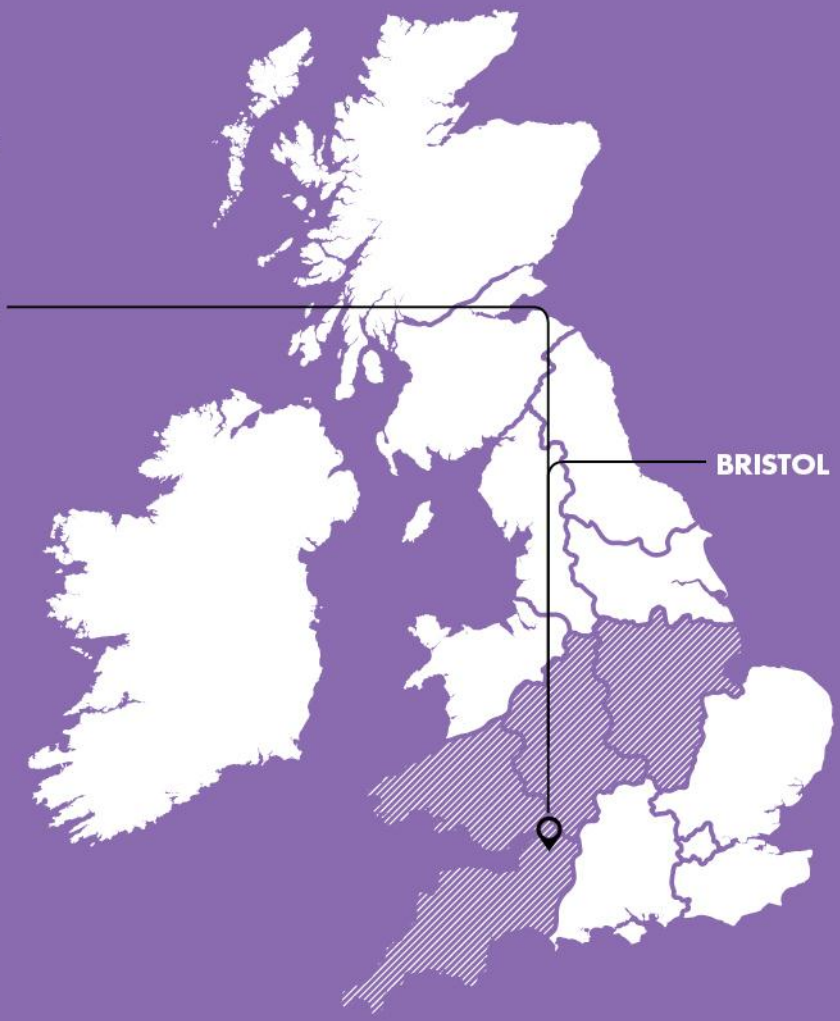
WESTERN POWER DISTRIBUTION

SOLA BRISTOL

PROJECT SOLA BRISTOL

PROJECT PROGRESS REPORT
REPORTING PERIOD: JUNE 2013 TO NOVEMBER 2013



LCN Fund Low Carbon Networks

BRISTOL CITY COUNCIL

UNIVERSITY OF BATH

KNOWLE WEST MEDIA CENTRE

SIEMENS

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Glossary

Term	Definition
Distribution Network Operators (DNOs)	
Photo Voltaic (PV)	
Direct Current (DC)	
Alternating Current (AC)	
Bristol City Councils (BCC)	
Post Doctorial Research Associate (PDRA)	
Factory Acceptance Tests (FAT)	

1 Executive Summary

This report details the progress of the Low Carbon Network Fund project focussing on the progress in the last six months, June 2013 to December 2013.

2 Project Background

SoLa BRISTOL is an alternative method to enable high density photo voltaic solar generation to connect to the low voltage network more efficiently through using an in home battery and variable tariffs. The project aim is to address the technical constraints that DNOs expect to arise on Low Voltage networks as a result of the adoption of solar PV panels. The trial uses in-home battery storage to provide benefits to customers and aid the DNO with network management. Thirty houses, ten schools and an office will have solar PV and a battery installed. The solar PV will be connected directly to the battery using a DC connection. The AC lighting circuits in the premises will also be converted to DC to enable customers to run small appliances on DC directly from the PV/battery. The battery will be "shared" between the customer and the DNO. The customer will be provided with a variable tariff to encourage electricity use at times of high PV generation and to use electricity stored by the battery when the network is heavily loaded. The DNO will be able to communicate with the battery to charge and discharge it to help with network management.

The project will aim to:

- solve the network problems which arise when a number of customers in a local area connect PV solar panels to their house
- investigate how a battery installed in the home can help customers to manage their energy usage and save money on their bills
- test how customers respond when offered different electricity tariffs throughout the day
- explore the benefits of utilising direct current (DC) in the home, rather than the traditional alternating current (AC).

3 Project Progress Highlights

In the fourth reporting period (June 2013 to December 2013) SoLa BRISTOL has focused on the Installation of equipment in the second and third trial homes, the first being the BCC EcoHome (reported on in the previous six monthly report). There have also been high level preliminary surveys completed on the schools and the office.

A customer engagement and Data Protection plan, including the installation report, has been submitted to Ofgem.

The following is a summary of the key activities and project updates during this reporting period.

Property 2 & 3 Installations

The Initial installations were undertaken in August and Commissioned on 4th September. A summary of the issues arising is reported in the Project Managers report.

Property 2 & 3 Interviews

The 2 customers in properties 2 & 3 were interviewed after the installations and a summary of their comments is included in the Project Managers report.

3.1 Dissemination of information

During the last six months of the project, greater exposure has been achieved. Details of the SoLa Bristol project have been shared through the websites, magazine articles and meetings with interested parties. It has also been showcased at the Energy Institute conference on 8th October and was included in the ESOF presentation on Energy Storage at this year's LCNF conference. On the 10th October the project was the focus of a local BBC News story with the Mayor of Bristol. The SoLa Bristol design information is also accessible through both the www.westernpowerinnovation.co.uk and www.LowCarbonUK.com websites.

Our external website has been updated, to ensure that elements relating to our future networks programme and the BRISTOL project can be easily found by a range of stakeholders. For further details please see www.westernpowerinnovation.co.uk/So-La-Bristol.aspx.

4 Risks

The main areas of risk to the project are listed below.

- *Recruitment risks*
  Due to the previous delays at the EcoHome and the trial home installations, the submission of the resulting Customer Engagement Plan was also delayed. The remaining 27 properties cannot be signed up until this plan is approved and signed off. The schools engagement is also dependant on this, although preliminary high level surveys have been done, and a summer update was sent out to keep potential participants' engaged. The risk is that customers that previously expressed an interest in the project are no longer interested or have moved.

- *Installation risks*
  Preliminary high level surveys of the office and the schools have been completed, and as each installation will be unique, there is a risk that the equipment design and space available on some premises may be restrictive. In consultation with Siemens and the installers, Avonline, it is thought that a common external cabinet would be the preferred option. This is being designed at present. It was intended that the installations of Domestic and Commercial properties would have been completed in the summer of 2013. Due to the delays experienced and previously reported in the EcoHome the submission of the Customer Engagement Plan was not submitted until October, and was then the subject of further Ofgem, queries. This has resulted in this milestone being moved back to the first quarter of 2014.

- *IT Equipment*
  There is a risk that once the schools are engaged in full there will be a reluctance to allow the required internal modifications to their Pc's AND Laptops. WPD are looking into supplying complete modified reconditioned PC's as an alternative to modifying the schools' existing equipment. Or supplying new DC P.C's entirely.

5 Learning

The problems encountered in the EcoHome installation have highlighted the implications of working with new equipment and innovative systems. More time needs to be built into projects for unforeseen problem solving.

Although it is understood that customer engagement can only come after the initial system has been tested and approved, some form of pre survey access, particularly in the schools and office would have been an advantage.

The initial installation in the EcoHome environment was a real advantage, as the issues encountered had little effect on customers, as the EcoHome is a demonstration property only with no residents.

All learning from the installations and associated customer engagement are included in the Project Managers report below.

6 Project Manager's Report

This is the fourth reporting period for the SoLa Bristol project that received £2.2m funds from Ofgem's Tier 2 Low Carbon Network Fund.

6.1 Project Aims

The project aims to solve a number or the key network problems which arise when a number of customers in a local area connect PV solar panels to their house. Through SoLa Bristol we will investigate how a battery installed in the home can help customers to manage their energy usage, save money on their bills and how this can provide network benefits. We will test how customers respond when offered different electricity tariffs throughout the day and the impact this has on the distribution network. And finally explore the benefits of utilising direct current (DC) in the home, rather than the traditional alternating current (AC) and the positive impacts this could have on the distribution network.

6.2 Project & Techniques Progress Highlights

Over the first year of the project, the SoLa Bristol project focussed on recruiting interested parties, designing the three techniques, DC Networks, Battery storage and Variable Tariffs that will be demonstrated together in 30 homes, 10 schools and an office. At the end of the last reporting period we were preparing the second and third trial home installations.

6.3 Trial Home Installations – progress

Before any construction work commenced detailed surveys' were carried out in the following areas:

- Structural survey of Loft area
- Electrical Survey

6.4 Structural report

The report was carried out By Casley Rudland Surveyors at a representative property, typical of all the potential homes included in the project. As it turned out this particular home was not selected as either property 2, or 3, but will be included in the next phase of the project. As all the homes were built at the same time and are of similar construction, It is representative of the type of home selected.

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Figure 1 - A typical Knowle West Street

The report recommended that additional support was required to support the weight of the batteries. Bristol City Council (BCC) has undertaken this work prior to installation.

The full report and calculations can be found in **Appendix 1**

6.5 Electrical report

BCC undertook a detailed survey of the 2 selected properties and have concluded that the wiring and layout of the homes is acceptable for the Sola Bristol installation.

There were issues with the Solar Panel wiring being too close to the mains gas installation, and a requirement to alter the wiring on the smoke alarm system, to keep it on the AC mains, not the proposed DC system.

Electrical issues

Property 2: Mains smoke alarms wired direct from fuse board, pv control equipment 90mm from gas mains.

Property 3: Smoke alarms wired direct from fuse board, original fuse board less than 150mm from gas pipe.

BCC Maintenance and Engineering department arranged for the original Solar Contractor to return and correct the wiring issues in relation to the proximity to the gas main.

They also ensured that all smoke alarms had their own AC supply.

6.6 Remedial works prior to installation Structural Issues

With the permission of the tenant, the BCC carpentry team arranged to re-enforce the roof trusses as per the structural report prior to the installation of the batteries. At the same time they created a walk way and battery support platform to enable safe working and installation. This was completed on both property 2 & 3.

6.7 Planned Installation Timeline

Property 2

12th August -	Loft Boarding and structural re-enforcement
13th August -	Battery Lift into loft space and construction of battery box
14th -16th August -	Installation of Sola Bristol Equipment and conversion of house lighting to DC.
16th August -	G59 relay testing. System commissioning and switch on.

Property 3

19th August -	Loft Boarding and structural re-enforcement
20th August -	Battery Lift into loft space and construction of battery box
21st -23rd August -	Installation of Sola Bristol Equipment and conversion of house lighting to DC.
23rd August -	G59 relay testing. System commissioning and switch on.

6.8 Actual Installation works

Property 2

12th August -	BCC contract carpentry team completed structural re-enforcement and created walkway and battery platform.
13th August -	Pickfords collected batteries, delivered to site and lifted into loft area.
14th August -	BCC electricians collected kit and delivered to site by 08.30am. Battery Control Transfer Box (BCTB), Studer Inverter and battery box lifted into loft, and mounted in position. AC mains cable to loft area needed to be extended to new Studer position. The existing Inverter needed to be removed from its mounting. This proved difficult as there was a release mechanism that the install team were not aware of. The original installer was consulted and the procedure explained. The PV cables from the isolation switch to the Studer were not provided and needed to be made up by the original installer (This was an oversight, and has now been resolved for all remaining installations).

There was also missing 50mm cables from the BCTB to the Studer. Arrangements were made to have these cables couriered to site to arrive before 10am on the 16th.

15th August - The new wiring for the 2 USB charging boxes was completed in positions preferred by the customer. The position of the Sola Bristol consumer unit was agreed with the customer and mounted on the wall. This was then wired in, along with the BCTB, the USB charger boxes and the Studer Inverter. The battery box was constructed and the batteries linked together. All light switches and fittings were changed in readiness for the DC connection except the bathroom fitting. All circuits however were left on AC so that the customer's lights were still in use.

16th August - Moixa attended site to update communication units, for property 2 & 3, in the consumer unit to replicate the settings used during the FAT tests. G59 tester arrived on site as planned at 09.30am. The expected cable had not arrived before 10am as planned, and after several calls to the courier it was realised that it had been incorrectly dispatched to the wrong depot. It was urgently re-directed and promised for 2pm. This was later delayed again to 5pm. It was then decided to delay the G59 and commissioning tests to the following week so as not to inconvenience the customer further.

22nd August - Missing cable was on site and installed by the BCC electricians. All bulbs were changed for DC LED's Bathroom light fitting changed to DC. G59 tests were completed by 12.30pm. Whilst commissioning the Sola Bristol system it was found that there were issues with the Moixa communications unit. The on-site engineer from Siemens tried to fix this, with conference call guidance from Moixa, to no avail. The decision was made to run the system in stand-alone mode without the communications unit and re-configure the Studer accordingly. Siemens then removed the suspect unit for further diagnostic testing.

All this was explained to the customer and it was agreed that once the issue was resolved, an appointment would be made to install the communications unit. This was made for Wednesday 4th September. On this day Siemens completed the communications upgrade and commissioned the complete system. The communications path was tested and proved.

Figure 2 - On-going works

The completed Loft Installation

Property 3

19th August - BCC Carpentry contractor failed to turn up as planned.

20th August - BCC Carpentry contactor commenced work, but due to the delayed start, the loft boarding was not complete when the batteries were delivered by Pickfords. This caused confusion and undue disruption to the customer as it was agreed that Pickfords would move on to their next job and return later that day to complete the lift. This was done by 15.00hrs.

The customer was concerned as she had been told by BCC through KWMC that there would be a preliminary visit on Friday 16th August by the loft contractor and work would start on Monday 19th (as planned). She waited home both days but the carpentry contractor did not start until Tuesday 20th.

21st August - Following the previous days issues WPD met with the customer and the BCC electrician teams to ensure that she was happy to continue and to give an assurance that work was back on schedule.

BCC electricians collected kit and delivered to site by 08.30am. Battery Control Transfer Box (BCTB), Studer Inverter and battery box lifted into loft, and mounted in position. The previous issues with missing PV and 50mm cables had been resolved so were not a problem in property 3. The mains cable in the loft did not need extending and the removal of the existing inverter went without any issues.

The customer had installed a bespoke ceiling fan in the living room and insisted this was to stay in situ. As it is not possible to run this off the DC network thought was given to wiring this light separately so that it remained on AC. There were concerns over other lamp shades and light fittings, but agreement was reached on replacements, with WPD providing a £50 voucher to the customer so that she could choose suitable replacements. This was also extended to Property 2 and is thought that this approach will be rolled out to all accepted participants.

22nd August - The customer requested only 1 x USB box to be fitted, and this was completed. The position of the Sola Bristol consumer unit was agreed with the customer and mounted on the wall. This was then wired in, along with the BCTB, and the Studer Inverter. The battery box was constructed and the batteries linked together. All light switches and fittings were changed in readiness for the DC connection except the bathroom fitting. All circuits however were left on AC so that the customer's lights were still in use. The G59 relay was tested by the same tester that had completed property 2 earlier in the day. Due to the issues with the Moixa communications unit at property 2 it was decided in consultation with the customer, not to commission the installation, but to leave the AC system in place until Weds 4th September, when the communications issue would be resolved and the system could be commissioned correctly.

23rd August - BCC electricians completed the wiring for the bespoke ceiling fan to remain on AC.

On the 4th September Siemens completed the installation of the communications upgrade as per property 2. The complete system was then tested and commissioned.
All communications paths were tested and proved, including the communications link to the Network Management unit at Marwood Rd sub-station. Data was seen by Siemens in their Newcastle facility.

Figure 3 - The completed Loft Installation

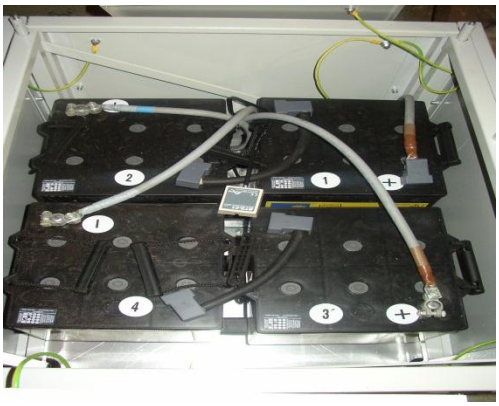


Figure 4 - The battery Bank

6.9 Substation Installation

The first Network Manager Unit was installed in Marwood Rd substation, in Knowle West, on 18th July and commissioned on 4th September. Marwood Rd was chosen as it feeds property 3, which is one of the initial trial homes. The unit is working and in Communication with Siemens and the property. There was a minor issue with the meter accuracy at current levels below 20A but Siemens have now resolved this.

It is expected that the following 11 substation installations will take approximately one day each to install and an hour to commission. There was no CML or CI impact on customers.

6.10 Testing and Commissioning

Siemens have provided on-site support throughout both installations and the Marwood Rd sub-station installation.

Figure 5 - Commissioning

Figure 6 - Substation Monitoring

Commissioning of trial properties two and three were completed on 04.09.13. Efforts during this day resulted in successful set-up and data transfer between the Marwood Road substation, house 18 (Property 3) and the data concentrator which is currently held at Siemens, Newcastle – please note this will be transferred to the University of Bath during the domestic installation roll-out. Further to this house 4 (property 2) was also successfully commissioned on a 'stand-alone' basis. These installations supplement that of the Bristol City Council 'EcoHome' completed earlier in the calendar year.

The day started with the commissioning of Property 3 communications system, this ensured that data could be transferred between the local substation at Marwood Road and the homes internal control system. An issue had been identified previously with this aspect of the communications network due to the incorrect supply of a connector by a third party to Siemens – this issue has been logged and corrected with the supplier. Initially the wiring & communications connections were reviewed and approved, modifying one cable to compensate for the issue highlighted above – specifically that between the Moixa HUB-002 and the Studer X-Comm unit. Once complete the Studer parameters were updated to represent the final system (including communications to the local substation rather than being 'stand-alone').

Property 3 was then signed off with the team then moving to property 2 to complete the same works, though without the updated Studer parameters due to this being a stand-alone system, as the Network Management unit is not yet installed in the sub-station. The final visit of the day involved a database update at Marwood Road substation to allow the communications link from property 3 back to the Data Concentrator. Signals were confirmed as received from an engineer at both Marwood Road and local to the Data Concentrator at Siemens.

Appendix 2 contains a full report from Siemens along with the data protection protocols.

7 Lessons learnt

7.1 Lessons learnt from Installation

Following the issues that arose during the first 2 property installs, a meeting was held between WPD, BCC and KWMC the following actions have been agreed to make sure that the remaining installs run smoothly:

A first point of contact for all installation issues has been set up. This will be a representative from KWMC.

Bristol City Council (BCC) has requested Siemens support on the final commissioning day on all domestic installs. BCC do not feel confident with the equipment to undertake this role themselves. Siemens have agreed to attend the commissioning days for the next 5 installations and will support more if BCC are still not confident to complete this task themselves.
It was thought that the tasks of loft boarding and battery installation need to be separated from the electrical installations. It has been agreed that WPD and BCC will draw up a program of works for the remaining 27 properties, once Ofgem give their approval to commence works.

BCC call centre staff have been briefed on the project, and all 'live' project properties have been highlighted.

An Information label with Sola Bristol logo and all emergency contact numbers has been produced, to fix to front of consumer unit in customers properties. See **Appendix 3**

7.2 Lessons Learnt from Customer Interviews

Both the homes had previous experience collaborating with the media centre, and in particular were familiar with KWMC staff. The two houses were involved due to an invitation from KWMC to take part. One of the houses had previously applied to the government for solar panels but had not heard back, while the other family had not considered solar panels prior to the project.

The two test homes have both commented on the value of having KWMC on the project. In particular they provide support for the householders and have been useful for communicating and providing updates about the project. In particular it was noted that during the battery install Jen worked hard to provide updates and details to the householders so that they understood why delays were occurring.

Both of the test homes have seen a monetary saving since having solar panels installed. The householders have seen their bills drop to around 65% of what they were paying previously and are anticipating that the battery packs will also further help them save money. One of the householders commented that she now pays more attention to her energy and has changed her electricity provider to get a better rate.

Both test homes reported that they have changed their energy behaviour since the project has begun. One family have changed their behaviour so that they now try to do laundry during the day (they used to do it in the evening). In the other family the daughter asks if she is allowed to switch the light on. Both also reported that they liked to see how much energy they were generating.

Communication has been integral during this project. There are a large number of partners involved in this project and it is important that there is effective communication between all of the partners and the householders.

It has been noted that at times the project has suffered due to miscommunication. In particular during the battery install a number of contractors and companies were involved. In some instances

misunderstandings and insufficient communication meant that the project was delayed and consequently the householders were sometimes frustrated by the progress. The householders reported that they were happier about project delays when there was honesty about the issues.

While sometimes the householders have been frustrated by the lack of progress and miscommunication, it has been noted the progress was smoother when the WPD project manager was present, as decisions could be made easily. The householders were also very positive about the involvement of KWMC staff who have worked hard to keep the householders informed of project changes and updates.

It is early stages with the battery installation however both test homes have reported being excited to see how this impacts on their energy use and monetary savings. One householder noted that WPD had been quick to make changes during the install to improve the equipment and she also commented that the contractors who had installed the battery were very friendly and had helped her to move the furniture in the house to allow for easier access.

One of the householders reported delays due to the light fitting requirements. While a solution has now been found, she suggested that for the next set of installs each house needs to be checked thoroughly in advance.

There was a suggestion that future householders would benefit from more detail about the process, in particular with regards to the extent that lofts and rooms might need clearing to allow for access and wiring. However it was acknowledged that these were test homes so it was anticipated that for the main set of houses more detail would be available to the householders.

One of the householders noted that she has already been using the USB socket to charge her phone and was very appreciative of the contractors taking the time to ask her where she wanted it to be located.

Both test homes have expressed excitement for the tablets, and are keen to explore how the tablets can help them understand their energy use. KWMC have worked in conjunction with the householders to discuss different methods of explaining the energy use.

Both householders have commented that they would like to know whether they will get to keep the equipment after the project concludes. Currently they are keen to keep the battery packs, however they have expressed concern that it will need suitable technical support and that it might be useful if WPD think about this now while contractors are installing the equipment.

7.3 Key Learning Points:

- KWMC have proved vital for the project. There familiarity with the area and householders has benefitted the project.

- Effective communication has been integral during this project. It is clear that in some areas this could be further improved, however the team are aware of this and have already taken action to document future communication methods.

- Householders are aware that delays are possible; these are more easily managed when there is honesty about the delay.

- During the install it is important that somebody with authority is present, and that they are able to liaise with all of the contractors to ensure the install process is smooth.
- Both of the test homes have reported benefits from the project; these include monetary savings and behavioural changes.
- Householders appreciated the friendly nature of the contractors.
- Future installs could be improved by providing more detail about the process including the length of the install and the space and access requirements.
- Householders are keen to know more about their energy use and are looking forward to using the tablets to explore this further.
- The householders are keen to know about the future for the project. In particular they would like to know what form of support will be available if the batteries stay in the houses after the project concludes.

A full Installation Report has been written and submitted and can be found on www.wpdinnovation.co.uk

8 DC Networks

The DC Network has been successfully demonstrated in the EcoHome since the 14th December 2012, supplying DC lighting and DC sockets. Through the installation it has been demonstrated that that the load and voltage drop across the DC network is not an issue. The power consumption of the DC lighting is approximately 50% of the datasheet.

There have been no adverse comments from the EcoHome volunteers regarding the DC lighting quality and the second and third trial property participants were also happy with the EcoHome installation.

The DC networks in the 2 trial homes have been running since the 4th September. Both customers have reported they are happy with the system. Light quality does not appear to be an issue, and property 2 is particularly happy with the Usb charging facility as they have many compatible devices.

9 SoLa Bristol Installations moving forward

The SoLa Bristol installation will only be progressed to the remaining 27 homes, schools and the office following on from the approval of the Customer Engagement Plan and the Data Protection Plan.

The Customer Engagement Plan was originally submitted to Ofgem on 2nd October 2013.

Figure 7 - Project Plan for SoLa Bristol roll out – domestics

10 SoLa Bristol Office and Schools Installation

In order to attempt to complete the schools installations within the summer break. The schools engagement has started with preliminary surveys underway. The intention is to complete all surveys by end of November to enable installations to commence in December.

This is however dependant on the approval by Ofgem of the submitted Customer Engagement and Data Protection Plans.

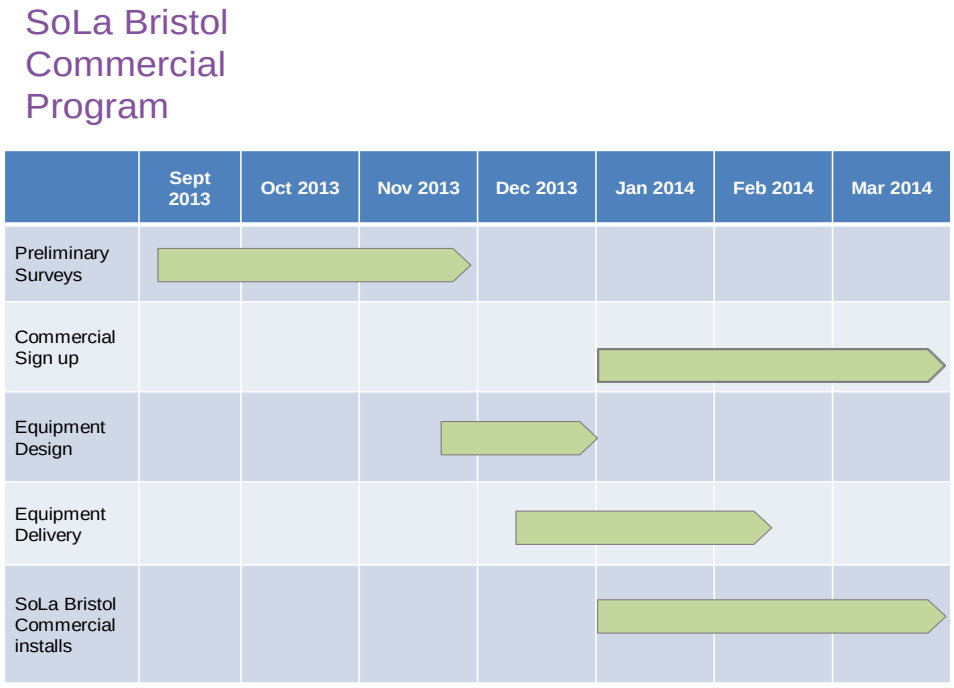


Figure 8 - Project Plan for SoLa Bristol roll out – Office and Schools

Key Issues

Delivery has been delayed by the issues with DC/DC converter, installation issues with the trial homes and gaining approval of the submitted Customer Engagement and Data Protection Plans. The program now is to have the domestic installs progressing in parallel with the commercial ones throughout the remainder of 2013 and into the first quarter of 2014.

11 Disseminations events

WPD attended the IET meeting in London to discuss the proposal for a standard/guide on the integration of electrical energy storage systems into buildings (i.e. 'south of the meter' applications, covering electrical/structural/fire safety, siting/sizing, circuit integration, control/inverter/comms integration).

The project was presented at the Energy Institute Conference in Bristol in October 2013 and at the LCNF conference in November 2013.

Sola Bristol was also a feature on BBC Local news on 10th Oct 2013, with the Mayor of Bristol.

12 Outlook to next period

In the next reporting period the project will be heavily involved in the installation phase of both the domestic and commercial properties, as well as the Sub-Station cabinet installations. In addition to this, once the Customer Engagement Plan and the Data Protection Plan are approved, the communication and data transfer protocols will be finalised and implemented.

Work is continuing on the Customer Tablet interface, and a screen shot of the latest update is shown below in figure 10. The Final version is expected to be available from December 2013.

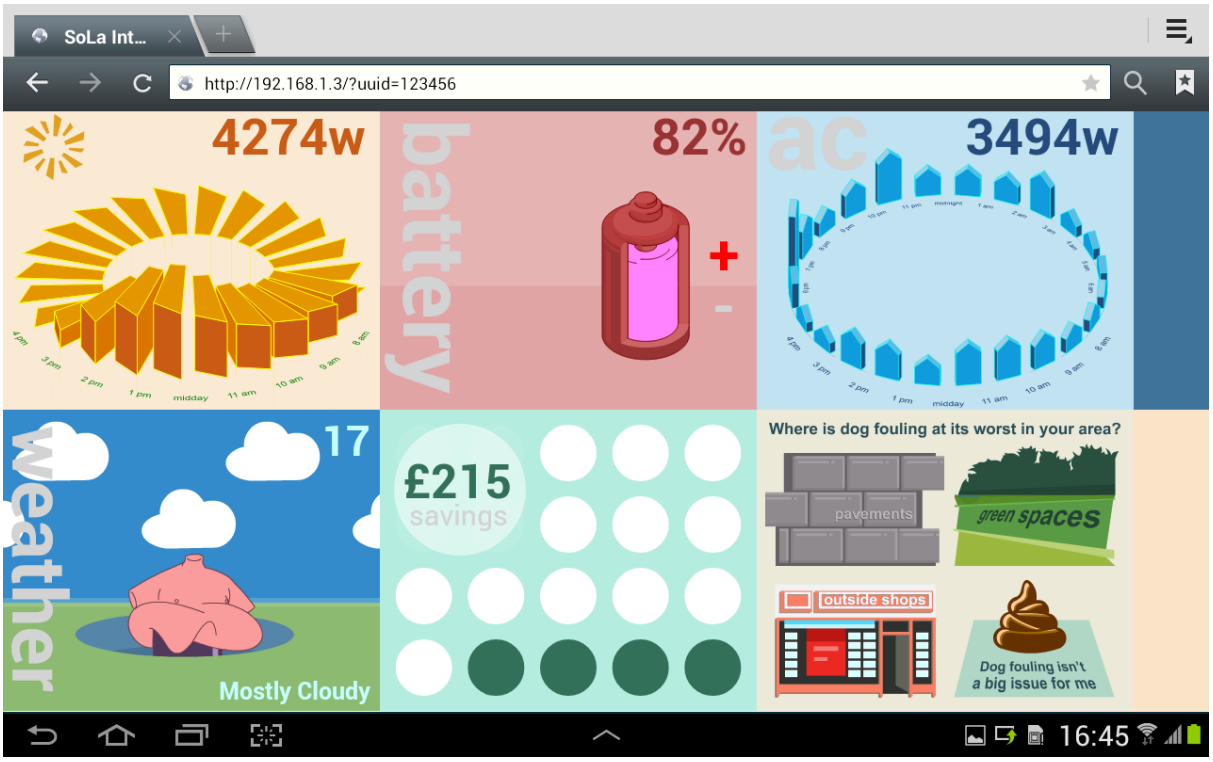


Figure 10 - Screenshot of proposed Tablet Interface

13 Business case update

No changes to the business case have been forecast at this stage. However, the increasing interest in energy storage beyond the meter has led to the IET investigating the requirement for standards / guides. This will significantly help the adoption of energy storage beyond the meter.

14 Progress against budget

BRISTOL remains on target to be delivered within the available project budget; delays in project delivery and where the payments schedules detailed in the collaboration agreements have not all reflected the expected spend during the 18 months of the project. The spend profile will be closer to the expected spend after the completion of the installations due to milestone payments dependent on the completion. Project outturn is not expected to exceed the 5% set out in the LCNF Governance document.

Table 1 - Progress against Budget

		Total Budget	Expected spend Nov 2013	Actual Spend Nov 2013	Variance over period	Variance over period	Notes
1	BCC Project Management	60.00	38.33	30.53	7.80	20%	1
2	Detailed Installation Survey and Planning	57.00	57.00	-	57.00	100%	2
3	Training and Installations	203.00	134.00	50.90	83.10	62%	2
4	Trial Property Recruitment, equip, maintenance and ongoing support	177.00	103.33	80.69	22.65	22%	3
5	Equipment Decommisioning	198.00	-	-		0%	
6	Scope Change Contingency	49.00	45.33	20.90	24.43	54%	2
7	Data Communications Manager and LV Network Manager	20.00	10.00	9.90	0.10	1%	
8	Distribution Sensing Equipment	11.00	11.00	12.15	-1.15	-10%	4
9	Customer Sensors Equipment	2.00	1.33	2.14	-0.81	-61%	4
10	Overall Project Manager	151.20	116.87	82.18	34.69	30%	6
11	Substataion Installation	29.00	29.00	1.87	27.13	94%	2
12	Battery Charging Costs	9.00	4.00	-	4.00	100%	2
13	Variable Tarriffs	9.00	4.00	-	4.00	100%	2
14	DC Meters	5.00	4.00	4.00	0.00	0%	
15	System Design and Engineering	173.19	155.33	116.46	38.87	25%	2
16	Domestic Premises Equipment	358.37	337.13	240.99	96.14	29%	2
17	School Equipment	302.02	288.85	203.10	85.75	30%	2
18	Office Equipment	31.33	29.97	21.07	8.90	30%	2
19	Substation Equipment	161.09	149.01	108.33	40.68	27%	2
20	Data archiving and Access equipment	98.17	90.47	66.02	24.45	27%	2
21	Installation, comissioning and operation support	141.64	110.98	95.25	15.73	14%	2
22	Smart Appliances ICT Equipment	30.00	20.00	-	20.00	100%	2
23	Input to smart tarrif	122.91	66.06	38.96	27.09	41%	5
24	input to network design	230.39	151.91	73.03	78.88	52%	5
25	Dissemination planning	118.25	69.01	37.49	31.52	46%	5
26	Workshops	12.00	6.67	3.80	2.86	43%	5
27	School engagement	24.00	13.33	7.61	5.73	43%	2
		2,783.56	**2,046.92**	**1,307.38**	739.54	**36%**	

Notes:

1. Awaiting invoicing from BCC.
2. Delayed spend profile due to the installation and report approval delays.
3. On-going support and maintenance costs still to be applied.
4. CT costs were higher than expected.
5. Due to installation delays Bath analysis work is also delayed.
6. Project Management costs lower than expected due to delays and sharing with other T2 projects

14.1 Bank account

Figure 9 - Bank Statements

15 Successful delivery reward criteria (SDRC)

Table 2 - Successful Delivery Reward Criteria

SDRC	Evidence	Target Date	Completed
Successful initial engagement with customers (9.1)	KWMC is leading the domestic engagement; they visited customers identified from desk top analysis as suitable for solar PV and the BRISTOL solution. Interested households were left with the project leaflet (Appendix 1) and Frequently Asked Questions (Appendix 2). All customers were invited to the drop in sessions to speak to the project team and answer any questions. Two drop in sessions where run on 26th April 2012, hosted by KWMC and supported by BCC, Siemens and WPD. Two, two hour sessions where held between 11am – 1pm and between 6pm – 8pm. 22 people attended from 11 homes. 60 homes registered an interest in the project before 12th May 2012. Bristol City Council is leading the schools and office engagement; project details were sent to the head teachers of schools with solar PV already installed and a suitable office. In order to meet the target to install equipment during the summer break, the schools engagement and survey work commenced in June 2013. On the 12 schools and an office that registered interest in the project before 12th May 2012.	**30/4/12**	**26/04/12**
Confirmation of the BRISTOL design	The Bristol Design was approved during the last reporting period.	**3O/09/12**	**28/09/12**
Installation and commissioning of equipment	Due to the delays with the DC/DC converter, issues in the EcoHome and the reluctance to install equipment in customers' homes until system confidence was high. There have been considerable delays in the domestic and commercial installs. It is now proposed to run both programs together, until the end of 2013, and into the first quarter of 2014.	**30/04/13(dom)** **30/04/13(off)** **31/08/13(sch)**	
Early Operational Performance of BRISTOL	The project is still on track to meet this successful delivery reward criteria using data from the EcoHome and the 2 trial homes.	**31/12/13**	

SDRC	Evidence	Target Date	Completed
Measured the impact on the LV network	The project is still on track to meet this successful delivery reward criteria.	**31/05/14**	
Customer Opinion	The project is still on track to meet this successful delivery reward criteria	**31/10/14**	
Keeping the lights on during power outages	The project is still on track to meet this successful delivery reward criteria.	**01/10/14**	
Suitability of solution for mainstream adoption	The project is still on track to meet this successful delivery reward criteria. Depends on successful installation rollout	**15/01/15**	

High confidence
Medium Confidence
Low Confidence

16 Intellectual Property Rights (IPR)

No Intellectual Property Rights have been generated or registered during this period. It is not anticipated that any IPR will be registered over the next reporting period.

17 Risk Management

Report any risks highlighted in box 26 of the full submission pro forma plus any other risks that have arisen in the reporting period, and describe how you are managing the risks it has highlighted and how it is learning from the management of these risks.

Table 3 - Risk Management

	Risk	Update
R002	Energy efficient smart appliances used for demand response are not available in the UK when required or appliances cannot be retrofitted (making them smarter)	Due to the limited development of smart appliances in Europe, there is no viable product we can offer domestic properties, further analysis will be completed to understand if smart appliances can be used in the schools and office.

	Risk	Update
R004	When surveying properties, the BRISTOL scope of works must change, resulting in unanticipated cost variations.	The condition placed on the project through the project direction prevents the project from visiting participants' properties. This has required a more generic design, with increased risk of variations in the project delivery. This risk now has an increased probability and impact. The scope of works has increased to include a G59 relay and commissioning for the project as detailed above. The commercial solution will now include an external cabinet.
R006	Thirty homes do not volunteer to participate in BRISTOL in one area, connected to one distribution substation.	30 domestic customers have had solar PV fitted to their homes in Knowle West. When these customers had their solar PV fitted by BCC it stated that having solar PV installed would allow them to be considered for the SoLa solutions (but did not commit them to it) The risk participants drop out or do not commit to the project after the initial installation is still live.
R007	Ten schools do not volunteer to take part in the project.	We have engaged with 26 schools that have had solar panels connected, 12 have registered interest as well as KWMC. Preliminary surveys have been done, but until we can actively engage with the schools, the risk of them not participating is still live. Schools' applying for academy status has placed an increased risk on the project as an increasing number of schools no longer use Bristol City Council for maintenance and IT.
R009	Bristol City Councils M&E teams or normal qualified electrical contractors are unable to install and maintain the premises BRISTOL equipment	Bristol City Council have installed the DC network and batteries in 2 homes, six BCC electricians have been successfully trained on the installation of the SoLa Bristol equipment. The electricians picked up the installation process very quickly and had no issues with the equipment assembly and installation during training. However they still require support from Siemens for commissioning. This will add cost to the project. An electrical contractor has been contracted for the schools and office installations. They have commenced preliminary surveys to assess the suitability of selected schools.

	Risk	Update
R013	The equipment is too heavy to be stored in the roof space.	The structural survey has been completed and there are minor modifications to the roof supports required. This will not impact on the project installations. The risk of the equipment being too heavy to be stored in the roof space is now closed
R014	There is no suitable location to store the equipment in homes, schools and an office	This risk is on-going as we are currently surveying the schools. This will be made easier by the design of the external cabinet, however this may impact on cost
R023	Bristol City Council are unable to support the customer engagement and installations	WPD and BCC are ready to start the remaining domestic properties installations. The arrangements for the schools and office installations started July 2013 with high level surveys and a project update letter.
R025	Schools do not allow modifications to their IT equipment	There may be a reluctance to allow modifications to existing IT Equipment , Resulting in either the purchase of new DC Pc'S or supplying pre modified re conditioned units.

Low Risk
Med Risk
High Risk

18 Consistency with full submission

A change request has been submitted and approved to move away from using the DC/DC converter within the schools and office installations.

19 Accuracy assurance statement

This report has been prepared by Mark Dale (Project Managers of the SoLa BRISTOL project), reviewed by Roger Hey (Future Networks Manager), recommended by Paul Jewell (Policy Manager) and approved by Phil Swift (Operations Director). All efforts have been made to ensure the information contained within this report is accurate. WPD confirms that processes in place and steps taken to prepare the Project Progress Report are sufficiently robust and that the information provided is accurate and complete.

Appendix 1

CASLEY RUDLAND

Consulting Structural Engineers 199 Whiteladies Road Clifton Bristol BS8 2SB Tel: 07860 369064 & 07836 342747

PROJECT: 60 Cossington Road Bristol BS4 1DP	Date: May 2013	Project No: 1130513
TITLE: Structural Calculations for support of batteries located in roof void	Made by: BS	Sheet No: Synopsis
	Checked by: DC	

Proposed works:

60 Cossington Road is a two storey end of terrace of four houses built by the local authority probably in the 1930's. Construction is in traditional materials with load bearing masonry walls supporting suspended timber floors and a pitched timber roof clad with tiles.
Solar panels have been fitted to one roof pitch and storage batteries are to be located in the roof void.
These calculations check the existing ceiling and roof timbers to support this extra weight and make recommendations for improvements.

Summary of Structural Requirements

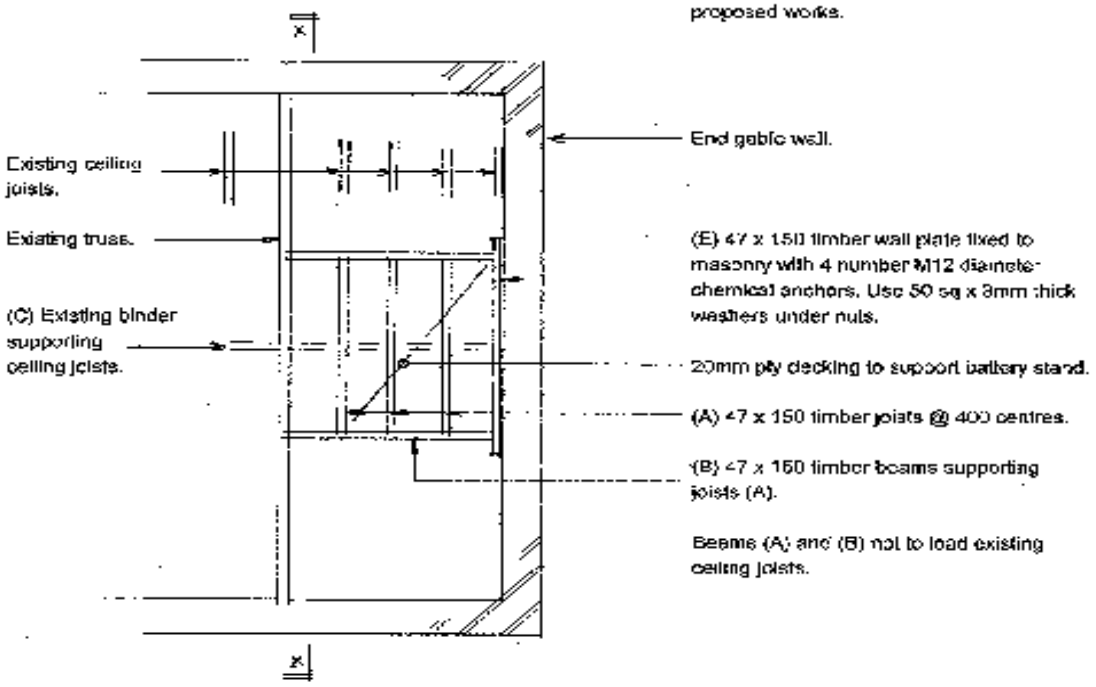
Existing roof framing	The existing roof is well framed with 50 x 100 jack rafters spanning from the ridge to external walls. The span of the rafters is split by a 75 x 135 purlin that is supported on timber trusses at approximately 1.65m centres. 50 x 100 celing joists at 400 centres span across the building and are supported mid span on a 50 x 100 binder spanning between the trusses. The ceiling joists could support the weight of the batteries but the binder fails. Consequently an independent frame of beams must be provided to support the decking on which the battery stand is supported. See sketch SK01 for details of this timber framing. The binder is identified as (C).
Existing trusses	The truss closest to the end gable wall will support the beams of the battery decking. An analysis of this truss with this extra loading gave a significantly increased moment in the bottom tie. To reduce this moment to a negligible amount a 47 x 150 tie (D) should be provided as indicated on sketch SK01. Fix tie to existing truss rafters with M12 bolts. Provide 50 square x 3mm thick washer plates under nuts.
Battery stand support	The battery stand should be supported on 20mm ply decking fixed to 47 x 150 grade C16 timber joists (A) at 400 centres. Joists (A) should be supported on 47 x 150 grade C16 timber beams (B). Beams (B) to be supported on the bottom truss member and on the gable masonry wall. Fix a 47 x 150 timber wall plate (E) to the gable wall with 4 number M12 chemical anchors. Provide 50 square x 3mm thick washer plates under nuts.
Battery stand	See Power Electronics Systems Ltd drawing 3PE 2630 01GA
Structural Calculations	See sheets 1 to 14 of Battery support calculations and sheets 1 to 3/1 of Truss calculations.

CASLEY RUDLAND

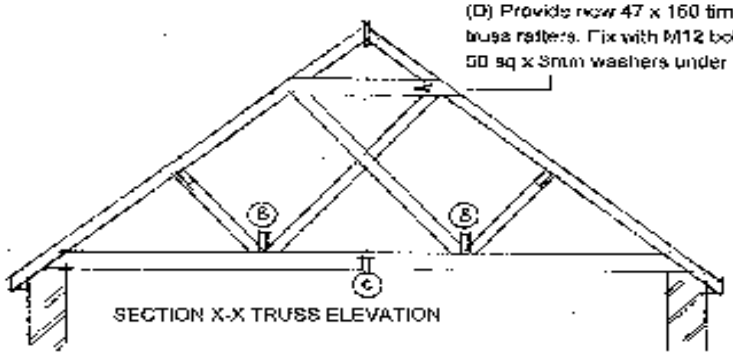
Consulting Structural Engineers 199 Whiteladies Road Clifton Bristol BS8 2SB Tel: (0117) 9732727

PROJECT:	60 Cossington Road Bristol BS4 1DP	Date:	May 2013	Project No:	111305/3
TITLE:	Detail of timber framing for battery support stand in roof void	Made by:	CR	Sheet No:	SK 01
		Checked by:	DC	Scale:	1: 50

NOTE:
All timbers to be grade C16 min.
Refer to synopsis sheet for description of proposed works.



PART PLAN OF ROOF



SECTION X-X TRUSS ELEVATION

Appendix 2

SoLa BRISTOL Commissioning & Communications Overview (including Data Protection)

Commissioning and Communications Overview.

Commissioning of trial properties two and three achieved completion on 04.09.13. Efforts during this day resulted in successful set-up and data transfer between the Marwood Road substation, house 18 (Property 3) and the data concentrator which is currently held at Siemens, Newcastle – please note this will be transferred to the University of Bath during the domestic installation roll-out. Further to this house 4 was also successfully commissioned on a 'stand-alone' basis. These installations supplement that of the Bristol City Council 'EcoHome' completed earlier in the calendar year.

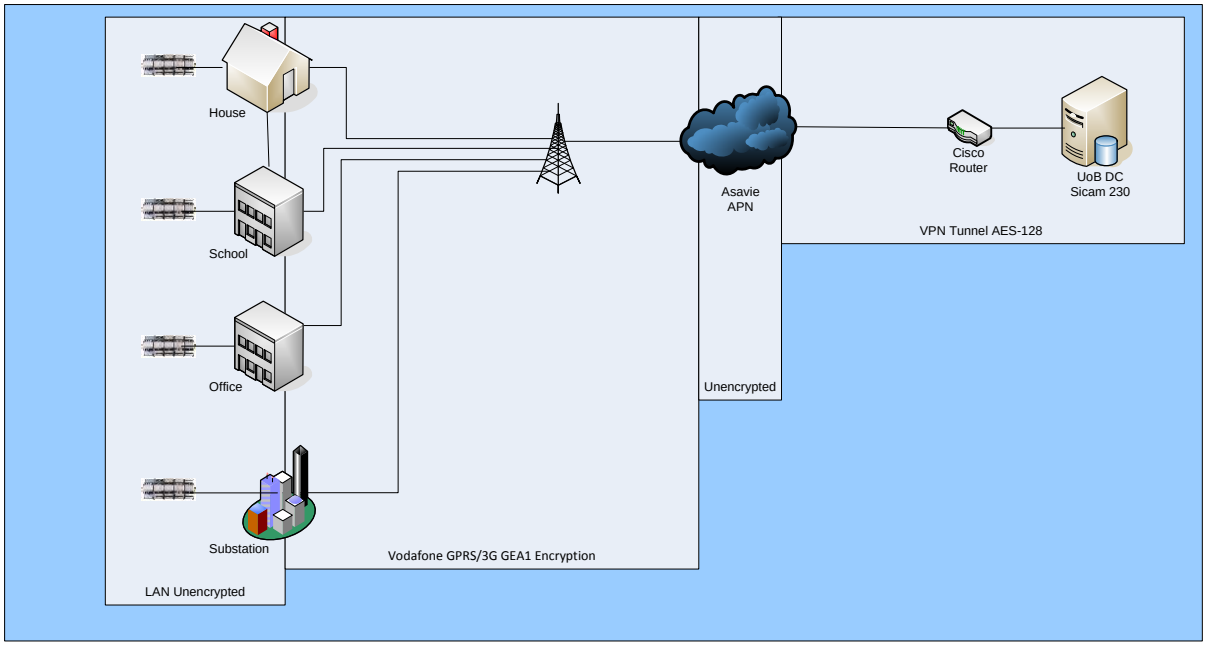
The day started with the commissioning of Property 3 communications system, this ensured that data could be transferred between the local substation at Marwood Road and the homes internal control system. An issue had been identified previously with this aspect of the communications network due to the incorrect supply of a connector by a third party to Siemens – this issue has been logged and corrected with the supplier. Initially the wiring & communications connections were reviewed and approved, modifying one cable to compensate for the issue highlighted above – specifically that between the Moixa HUB-002 and the Studer X-Comm unit. Once complete the Studer parameters were updated to represent the final system (including communications to the local substation rather than being 'stand-alone'). Property 3 was then signed off with the team then moving to property 2 to complete the same works, though without the updated Studer parameters due to this being a stand-alone system, as the Network Management unit is not yet installed in the sub-station. The final visit of the day involved a database update at Marwood Road substation to allow the communications link from property 3 back to the Data Concentrator. Signals were confirmed as received from an engineer at both Marwood Road and local to the Data Concentrator at Siemens.

Data Protection

There are four areas over which data for the Bristol SoLa trial is transmitted.

1. Within the monitored building on the local Ethernet LAN
2. Over Air transmission from the monitored building LAN to a private APN using Vodafone GPRS/3G
3. Within the Asavie Private APN routing infrastructure within the Vodafone network
4. Over a VPN from the Asavie APN to the SICAM 230 Data Server using the University of Bristol network

- Data Traffic on the local LAN at the House, School, Office or Substation is un-encrypted
- Data Traffic between the House, School, Office or Substation and the Asavie APN is encrypted using the standards GPRS/3G GEA1 Encryption Standard.
    - The encryption key is embedded in the device SIM and also stored in the HLR (Home Location Register) of the telecoms provider (Vodafone)
- Data routed within the APN is un-encrypted.
    - But is secured by the telecoms security standards
- Data egressing from the Asavie APN to the Data Server is via a VPN and encrypted using the AES 128 encryption standard
- On demand archive data exported from the Data Server onto a USB drive is unencrypted.



Appendix 3

Solar energy when you need it

Generic repairs line:

•Telephone: 0117 922 2200 (Option One) Monday to Friday, 8.30am to 6pm.
•Textphone: 0117 357 4444.
•Fax: 0117 922 2011.
•Email: repairorders@bristol.gov.uk Please do not email us if your repair is an emergency.
•Letter: Repairs, PO Box 595, Bristol, BS99 2AW.
•In Person: You can report a repair from any Customer Service Point by using our Freephone to the Customer Services Centre or a self-service point.

Emergency out of hours contact:

Telephone: 0117 922 2050
Textphone: 0117 922 3892
Fax: 0117 922 2379

Knowle West media Centre (for issues with tablet):

0117 903 0444