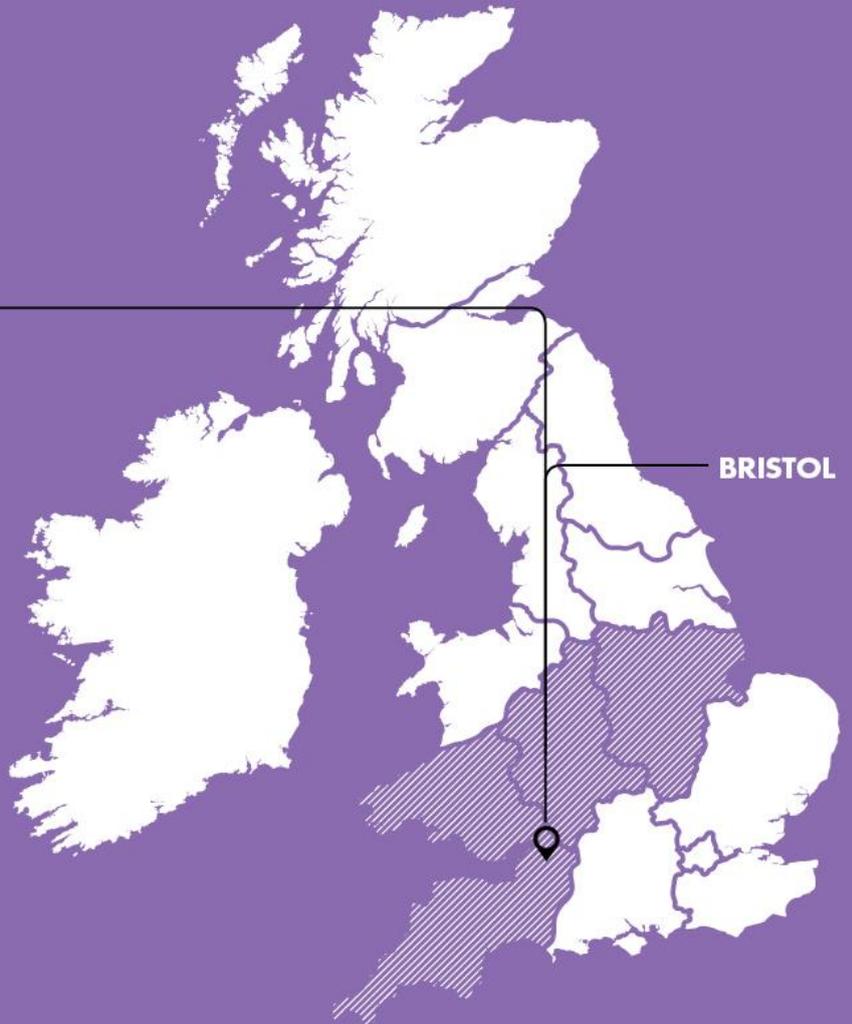


**PROJECT SOLA**  
**BRISTOL**

Change Request CCR 004 2014



## Contents

Domestic Installations delay .....	4
1. Introduction .....	4
2. Background to Project Delays .....	4
a) Amended Project Direction.....	4
b) Installation Contract .....	5
c) Equipment Design .....	7
d) Home Installations .....	7
e) Customer Engagement and Data Protection Plans.....	8
3. Solution Review following household incident.....	8
Proposed New Project Plan .....	10
4. Schools & Commercial Installations.....	11
Introduction .....	11
Appendix 1 – Previous WPD Change Mandates .....	15
Appendix 2- Email trail on BCC agreement delays.....	21
Appendix 3 DC/DC Converter delays .....	27
Appendix 4 E-Mail trail Loft Boarding.....	32
Appendix 5 SDRC’s From Published Proforma.....	35
Criterion (9.1) Completed .....	35
Evidence (9.1).....	35
Criterion (9.2) Completed .....	35
Evidence (9.2).....	36
Criterion (9.3) Amended Target Date .....	36
Evidence (9.3).....	36
Criterion (9.4) Amended Target Date .....	36
Evidence (9.4).....	37
Criterion (9.5) Amended Target Date .....	37
Evidence (9.5).....	37
Criterion (9.6) Amended Target Date .....	38
Evidence (9.6).....	38

Criterion (9.7) Amended Target Date .....	38
Evidence (9.7).....	38
Criterion (9.8) Amended Target Date .....	39
Evidence (9.8).....	39
Appendix 6 Preliminary School surveys .....	40
Appendix 7 marked up original Pro-Forma.....	41
Appendix 8 Letter of Support from the University of Bath.....	42
Appendix 9 DNO responses to Letter of Support .....	49

#### DISCLAIMER

Neither WPD, nor any person acting on its behalf, makes any warranty, express or implied, with respect to the use of any information, method or process disclosed in this document or that such use may not infringe the rights of any third party or assumes any liabilities with respect to the use of, or for damage resulting in any way from the use of, any information, apparatus, method or process disclosed in the document.

© Western Power Distribution 2014

No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means electronic, mechanical, photocopying, recording or otherwise, without the written permission of the Future Networks Manager, Western Power Distribution, Herald Way, Pegasus Business Park, Castle Donington. DE74 2TU. Telephone +44 (0) 1332 827446. E-mail [WPDInnovation@westernpower.co.uk](mailto:WPDInnovation@westernpower.co.uk)

## Domestic Installations delay

### 1. Introduction

The Sola Bristol Project has been subject to significant delays resulting in the requirement to revise the project timeline. The main reasons for these delays are:

- a. The **amended Project Direction** specified that we should avoid recruiting project participants until issues with the first three homes were resolved and a report produced.
- b. delays putting in place an **installation contract** due to the technical specification being revised,
- c. **Equipment design** modifications and repeated CE marking tests caused by system changes following initial installations,
- d. delays with trial **home installations** due to enhanced training needs and
- e. Additional time taken to produce, and for the approval of, the **customer engagement and Data protection plans**.

In addition to these, an internal fault in one property has caused damage to the Sola Bristol equipment. The resulting investigation and further system modifications have also caused further delays.

Due to these delays, the resulting phased rollout of domestic properties and the need to install the schools equipment over the 2014 summer break. This change request proposes extending the project by a full 12 months to allow sufficient time for the required data capture and analysis.

The delays experienced are explained in more detail below.

### 2. Background to Project Delays

#### a) Amended Project Direction

The project plan, submitted to Ofgem during the bid stage (August 2011) detailed the timescales for the design of the SoLa Bristol equipment, recruitment of customers and the installation of the equipment.

#### Project Plan – SoLa Bristol Bid

**Table 1.**

	2012												2013											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
<b>Siemens</b>																								
Equipment Design	█	█	█	█	█	█	█	█																
Factory Acceptance Testing										█	█	█												
<b>WPD</b>																								
Recruitment				█	█	█	█																	
Site Survey								█	█															
Installation													█	█	█									
SDRC 9.3																								

The project direction placed a customer engagement restriction on the project preventing WPD or our project partners from accessing customers’ premises or signing customers up to participate in the project other than those for the Initial Installation.

The project was re forecasted, accelerating the design phase to introduce an initial installation phase, taking into account we could not survey properties.

In addition to this, 3 change mandates were created in September 2012 for:

1. Delay due to sickness of key Siemens staff member
2. Use of contingency in Lieu of FiT payment for domestic customers
3. Use of AC rather than DC meter for FiT payments for commercial customers

These are attached for info as **Appendix 1**

**Revised Project Plan – Previous Change mandates CCR01 & CCR02 & CCR03 (Sept 2012)**

**Table 2.**

	2012												2013											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
<b>Siemens</b>																								
Equipment Design	█	█	█	█	█	█																		
Factory Acceptance Testing							█																	
<b>WPD</b>																								
Recruitment (not selected)				█	█																			
Site Survey (EcoHome & 2 & 3 <sup>rd</sup> homes)								█	█															
Initial Installation									█															
Full Recruitment										█	█													
Installation													█	█										
SDRC 9.3																								

The revised project plan facilitated the initial installation without changing the project milestones of the project direction. However, the SoLa Bristol equipment development has in fact been in line with the original project plan rather than the revised project plan due to unexpected complications (GPRS Communications and DC/DC conversion).

**b) Installation Contract**

The initial installation of the EcoHome was scheduled 11<sup>th</sup> & 12<sup>th</sup> October 2012; this was the earliest possible time due to complications in the design and testing.

An installation agreement was agreed with Bristol City Council (BCC). On the point of BCC signing the agreement the terms and conditions of the agreement needed to be amended. This prevented both parties from signing the new agreement in time for the scheduled initial installation date. The agreement was signed by BCC 26<sup>th</sup> November 2012 and the EcoHome (first property) was installed 12-14<sup>th</sup> December 2012. This legal issue delayed the project plan by 9 weeks, See below and **Appendix 2** for E-Mail trail with BCC

These delays were outside of the control of WPD. The issues and new learning we have gained about working with local authorities has been discussed with project stakeholders on many occasions. For example as early as 2012 we brought the issues to the attention of Ofgem. The quotes below are taken from an e-mail exchange between the initial project Manager and Ofgem. The full version of which is included in Appendix 2

“... Getting these details from BCC has proved incredibly difficult with us being repeatedly sent only the high level details, .....”.

“Our relationship with the BCC remains strong, there has been a significant effort from multiple different BCC members including senior management and they remain very apologetic to the length of time this is taking. However, it would be fair to say, the council is a big organisation. Many of their departments including the insurance and legal are not set up to deal with requests of this nature and are unable to respond to requests like this quickly, especially when it requires the cooperation of multiple different department in different office locations. The council employees often work part time and the legal department has a small number employees and this introduces significant delays to even the simplest requests.”

This contractual issues and legal delays were not envisaged at the time of original submission. SoLa BRISTOL was the first WPD LCNF project to partner with a local authority. Knowledge sharing with other DNOs has confirmed our assumptions were not unique, with other DNOs also scoring the risk of contractual difficulties lower than in hindsight it should be. The project knowledge register include the following entry related to contracting with BCC.

“This is not unique to BCC as many local authorities are also unable to respond quickly to abnormal request in this way. Whilst working with a Local Authority provides many clear project benefits, one of the restrictions is they are unable to respond quickly when issues like this occur and this can introduce significant delays if not factored into the project plan.”

WPD have done everything in our power to resolve the issues. These include senior management meeting including with executive director at the council. We have also used relationship built through our normal course of business (such as street works) to encourage improved performance. Our stakeholder engagement activities also gave opportunities to raise issues with elected officials including the elected Mayor or Bristol, George Fergusson who even visited one of the trail participant homes. To help mitigate the delays WPD also took on additional risk where justified. For example by accepting increased indemnities. This required the support the WPD senior team and our parent company PPL.

“Due to the slow progress I have now requested a WPD Indemnity approval form which recognises that signing a contract with such a low cap by an external party, results in WPD taking on additional risk, however the risks are very remote due to the mitigation methods already in place. Signing this agreement will allow the contract to be signed with WPD taking on a higher level of risk. The alternative to further delay the signing of the contract would make it impossible to finish the equipment installations ahead of the successful delivery reward criteria, although it will be very difficult with the current delays this legal issue has created. “

### c) Equipment Design

Most of the project sub-systems have been formed using off the shelf components. The exception to this is the DC/DC converter required to reduce the PV output from between 120V and 300V DC (dependent on sun light and temperature) down to 24V DC for the lighting circuits and battery storage. This is a PE Electronics unit that has been modified for the project. Siemens have worked with PE to create the modifications; including adding an extra control function through communications ports.

The DC/DC converter technology is CE marked and has been used in many applications over a number of years. The SoLa Bristol equipment including the DC/DC converter passed the Factory Acceptance Tests in Siemens Laboratory back in November 2012, In December 2012 PE informed Siemens that the modifications made to the unit meant that the unit needed to be retested for emissions (EMC) and Low Voltage Directive (LVD) Tests to be CE marked. We notified BCC of the issue with CE marking by email. We requested permission to install unmarked equipment in the eco-home to expedite project delivery timescales. This request was declined after careful consideration by BCC. The quote below is taken from an e-mail from the initial project manager to BCC, and is included in Appendix 2

“The DC/DC converter technology has been CE marked and used in many applications over a number of years. The SoLa Bristol equipment including the DC/DC converter passed the Factory Acceptance Tests in Siemens Laboratory back in November 2012, witnessed by myself. In December PE informed Siemens that the modifications made to the unit meant that the unit needed to be retested for emissions (EMC) and Low Voltage Directive (LVD) Tests to be CE marked. PE, Siemens and WPD undertook a risk assessment of the unit and feel there is no credible risk to not using the unit as the amendments are minor and have no impact on the operation of the unit. This was discussed with ....., he asked that we not use the DC/DC converter until it has passes the EMC and LVD tests. I fully respect this decision and the unit is currently undergoing these EMC and LVD tests, we are expecting it to be completed by 18/01/[13]. At this point the DC/DC converter is not being used (due to the lack of a CE mark) and the system in not running off the Solar PV. Neither myself or Siemens expected the unit not to be CE marked and have been surprised that it has required further testing. “

The DC/DC converter passed EMC testing and LVD testing. The unit was retested in Siemens Lab as part of the whole SoLa Bristol system, and was installed in the EcoHome on 21<sup>st</sup> March 2013. During installation of the SoLa Bristol equipment it was determined that the DC-DC converter was performing poorly; in particular it was determined that the input voltage was collapsing due to poor load regulation by the DC-DC converter The property was left without the Solar PV connected to the DC/DC converter, (effectively replicating the School and commercial installation), providing a DC network and battery storage using the Studer battery inverter.

The root cause was identified and a modified DC/DC converter was designed. This was installed on the 29<sup>th</sup> April 2013, and has been operating successfully ever since. This resulted in a delay of 2 months. A letter from Siemens is attached as **Appendix 3** along with the CE certificate.

### d) Home Installations

Once the EcoHome installation had been completed, tenants from property 2 & 3 were invited in to see the system working. Following this, the tenants signed up as the trial homes. Structural and electrical surveys were then conducted, and remedial works agreed.

Bristol City Council (BCC) decided that the required carpentry works could not be resourced in house so needed to go out to contract. Delays were experienced whilst the appropriate contracts were drawn up and awarded. In addition to this, the approved contractor failed to turn up during the second trial home installation causing a knock on effect and further delays. These delays were outside of the control of WPD.

Again the issue of co-ordinating the different departments of BCC and the time taken to do this was the main reason for the delay. The quotes below are from internal E-mails from BCC, and are included in **Appendix 4**

24<sup>th</sup> June “I wanted to check if we still have a problem with getting the loft boarding done for the 2 test homes for the So La Bristol project (smart grid project). I understand from Mark Dale at Western Power Distribution that there is some re-enforcement work needed to support the weight of the equipment in the lofts. But there was an issue if BCC carpenters could do it or if we need to get an external contractor in (I think you have a list) and he hasn’t heard back from your team. At the moment this is holding the project up and we’re getting concerned that some of the residents may pull out of the scheme due to the delays but also Ofgem are pushing for an update.”

25<sup>th</sup> June “, I have had so much trouble trying to organise a carpentry contractor for this project, I have now arranged a meeting with RA Gardeners tomorrow at 10.30 to outline the works required in the loft spaces and get them on board, I will update you as to how the meeting went and make arrangements for them to site visit the two proposed properties, I can then arrange things with Mark from WPD and make a start “

25<sup>th</sup> July”, I have booked the carpenters for the first site ( ) for the above due to start on the 12<sup>th</sup> August and have booked the electricians to start on the 14<sup>th</sup>

The installations were completed in the last week of August 2013 and commissioned on the 4<sup>th</sup> September. This resulted in a delay of 1month. **Appendix 4** is a copy of the E-Mail trail with BCC regarding loft boarding.

#### e) Customer Engagement and Data Protection Plans

Following on from the successful trial home installations an Installation report was submitted to Ofgem on 23<sup>rd</sup> September, and a meeting held to discuss the findings. Ofgem requested a Customer Engagement Plan update and that a Data Protection Plan should also be submitted. These were submitted on 2<sup>nd</sup> October and 6<sup>th</sup> November respectively. Following several iterations these plans were approved by Ofgem on 17<sup>th</sup> December 2013. This resulted in a delay of 2 months.

### 3. Solution Review following household incident

On the 8<sup>th</sup> November 2014 the customer in one of the properties fitted with the SoLa system experienced a fault within their iron that tripped the kitchen ring main AC circuit breaker. No other protection device operated. This fault created a surge around the house causing damage to the SoLa Bristol equipment, in particular the PE Electronics Inverter.

The result of this damage was that the inverter failed to charge the batteries via the mains, so the only charging was from the PV Panels. The AC supply to the inverter is fed from a separate circuit breaker housed in the same consumer unit as the kitchen circuit breaker, but is a separate circuit. This consumer unit is not part of the Sola Bristol equipment, but was part of the original domestic installation. The AC feed to the inverter is also the existing wiring, (It was re-used when the original SunnyBoy Inverter used for the pre-existing PV system was replaced).

On the 29<sup>th</sup> November the customers DC lighting failed as there was no charge left in the battery.

WPD and Siemens have carried out a thorough investigation and review of the SoLa system. BCC have carried out tests on the internal wiring and electrical earthing at the property, but no reason could be found for damage. WPD have assisted BCC and carried out on-site diagnostic checks of the SoLa equipment. Unfortunately before the failed unit could be recovered there was also a roof leak in early

December that has caused water damage to the SoLa equipment. This has therefore prevented any further investigation under laboratory conditions.

The battery maintained a suitable charge to supply the DC lighting circuit for 21 days, only supported by the PV panels, before it was exhausted. No failure alarms or indications were received by WPD or the customer. With this in mind, Siemens have since designed an early warning fault alarm to alert the tenant of such a problem, to avoid a repeat occurrence of main lighting failure.

In addition, BCC are planning to fit a "RCBO protection device"<sup>1</sup> to the circuit which is faster and more sensitive to earth faults. This will give the Sola Bristol equipment a greater level of protection should a similar fault occur in the future, and will be fitted to all future installations.

As the investigation into the system failure was inconclusive we are planning a phased roll-out of the next 27 properties. These will commence with the next 3 properties in March 2014, 4 in April and 5 in May, June, July and August. All Installations will be completed by 1<sup>st</sup> Sept 2014. Each batch of home installations will include periodic reviews by the project Steering Group (which includes BCC and Siemens) to assess operational performance and provide a "go/no-go" to the next phase.

A revised project plan for the domestic homes and phasing is set out below .This will affect the Successful Delivery Reward Criteria Dates as per **Appendix 5**.

### Proposed New Project Plan

The latest plan (Table 3) incorporates all the above mentioned delays and previous change mandates and is a realistic projection of the future works. Time scales and rollout schedules have been agreed with all partners and all are confident that timelines and future milestones will be met.

Table 3. Proposed new timeline

	2013	2014												2015											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
<b>Siemens</b>																									
Equipment Design	Completed																								
Factory Acceptance Testing		Proposed																							
<b>WPD</b>																									
Recruitment (not selected)	Completed																								
Site Survey (EcoHome only)	Completed																								
Site Survey 2 & 3rd homes	Completed																								
Initial EcoHome Installation	Completed																								
Installation 2 & 3rd homes	Completed																								
Ofgem Reports for approval	Completed																								
Full Recruitment			Completed	Completed																					
Site Survey			Completed	Completed	Completed																				
Domestic Installation			Completed	Completed	Completed	Completed	Completed																		
Commercial Installation			Completed	Completed	Completed	Completed	Completed	Completed																	
SDRC 9.3									Completed																
SDRC 9.4																									
SDRC 9.5																									
SDRC 9.6				Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed
SDRC 9.7																									
SDRC 9.8																									Proposed

Completed
Proposed

## 4. Schools & Commercial Installations

### Introduction

The original Plan for commercial installations was to replicate the domestic installations, on a larger scale, in 10 schools and an office. Due to the non-availability of a DC meter, as mentioned in Change Mandate 02 (Domestic) it was decided to remove the DC/DC converter element from the commercial installations. The WPD Change Mandate 03 concerning the non-availability of a DC meter, and the subsequent decision to convert the excess PV to AC for battery charging is attached as **Appendix 1**.

Due to the delays mentioned above, only preliminary surveys of the schools took place. 10 schools were initially surveyed, however only 5 are deemed to be suitable for the Sola Bristol solution See **Appendix 6** for summary of reports on rejected schools. This is due to the long cable run between the battery position and the IT Suite the Low Voltage DC cable size and associated volt drop would be unacceptable. .

A common external cabinet has been designed for all commercial installations as a suitable bespoke internal solution for each property would be unlikely. 7 units have been built to cover the Factory test, 5 schools and the office. Excess design and build costs for these 7 units is in the region of £39k, as per the request for variation below. It is hoped that the install costs saved by having a generic cabinet will cover this £39k, but no extra funding is requested for this. If needed the existing contingency allowance will be utilised. With many schools now opting out of Local Authority control, and applying for academy status, coupled with the current uncertainty of future BCC ownership of schools and the understanding that the proposed sample size will be sufficient to provide robust analysis. Further potential schools have not been sought.

## Request for Variation Form

To: Mark Dale (WPD)	From: Andrew Smyth (Siemens)	Siemens Reference: RFV - 006
Cc:		Date of Issue: 15.07.2013
Contract: <b>So-La BRISTOL</b>		Contract Ref: <b>77PO-03125</b>
Site(s): TBC within the Bristol area		
Subject: Commercial Enclosures & Engineering Works		
<p><b><u>Scope of Works</u></b></p> <p>With reference to drawing '3PE 2630 14 GA'.</p> <p>In-line with requests to locate the SoLa BRISTOL commercial hardware external to the schools, due to a number of internal constraints, sufficient re-engineering of the system and the provision of extra hardware has been required.</p> <p>The costs detailed below cover the re-engineering of the commercial solution as well as the design, build and supply of the bespoke enclosure. The price covers the initial seven commercial sites highlighted as suitable. A further RFV would need to be completed for the provision of the remaining four to fulfil the scope of eleven properties, ten schools and one office.</p> <p>Cable entry is assumed from below into the right hand panel only. No consideration has been made for the grounding and civil works associated with the installation.</p> <p>Note - this RFV does not include any additional costs associated with lighting or DC PC / Laptop charging which may require an alternate solution to that which was scoped.</p> <p>The delivery entails batch quantities delivered kerbside to a single location in the Bristol area. If required Siemens can liaise with specialist delivery contractors to assess and locate each unit, though this would be at extra cost.</p> <p><b>Offer valid until 18.07.13</b></p>		
<p><b>Price Implication &amp; Breakdown:</b></p> <p><b>Total Cost - £38,921.43</b></p>		
<p><b>Commercial Comment:</b> Any agreed variation will be invoiced as per the following –  30% upon acceptance  30% upon unit one ready for shipment  40% upon units two to seven ready for shipment</p> <p>All terms and conditions are as per original contract.</p>		
<p><b>Technical Approval:</b>  <b>Andrew Smyth</b></p>		<p><b>Commercial Approval:</b>  <b>Emma Spooner</b></p>
<p><b>Customer Response:</b>  Variation Agreed – Please proceed as described <input type="checkbox"/>  Variation Not Agreed – Please await further instruction <input type="checkbox"/></p>		
<p><b>Customer Approval:</b></p> <p><b>Name:</b> <span style="margin-left: 150px;"><b>Signature:</b></span> <span style="margin-left: 150px;"><b>Date:</b></span></p>		

4 schools have now had the Sola Bristol equipment fitted and commissioned, along with the training classroom at KWMC . This does replicate the use of a school classroom during term time, however during school holiday periods KWMC continues to be utilised. This will be taken into consideration at the analysis stage.

The table below represents the cost reductions applicable due to there being 5 installations as opposed to 10.

Installation/Decommissioning costs per school are taken from the original bid calculations, as follows:

Wiring Review	£400
Civil Works	£1000
Installation team Management	£1000
Installation	£6400
Maintenance	£1500
Materials	£2000
Decommissioning	£7400
<b>Total Per School</b>	<b>£19,700 (of which £17880 is LCNF funded )</b>

**The total installation/decommissioning costs to be refunded to LCNF is £89,400 (5x £17,880)**

In addition to this, reductions in hardware costs (Equipment, contractor and contingency costs) have been calculated using the original submitted costs. The costs have been adjusted to take account the proportion that was funded through the LCNF.

The original hardware costs were £245,600. Due to the reduction in school numbers, this has been reduced to £132,900. Therefore:

**Total Hardware cost reduction to be refunded to LCNF is £112,700**

The cost implication of the changes is set out in the table below together with impact on project learning.

Final Number	Cost Variation	Learning Impact
Five schools installed	Installation/Decommissioning Costs -£89400 (£17880 x5) Hardware Costs -£112,700	Statistically valid, 50% original sample size, impact on the network will be discernible 5 separate substations and schools monitored. Supporting Letter from UoB attached as <b>Appendix 8</b>

The total cost reduction for installing 5 schools instead of 10 will be:

£89,400 (£17,880 x 5) + (£112,700 hardware cost)

**Total to be returned to customers via LCNF will be £202,100**

The marked up original pro-forma, **Appendix 7**, has been amended to show the proposed new timescales. The first Installation was completed in March, with schools 2 – 5 installed over the summer break. All 5 schools were completed by 1<sup>st</sup> September 2014.

**Appendix 9** contains responses from all UK DNO's to the letter of support from The University of Bath

## Appendix 1 – Previous WPD Change Mandates

Project Number WPDT2003

Change Number

01

<b>Originator:</b> Philip Bale		<b>Tel:</b> 01332 827448	<b>Date:</b> 21/09/12
<b>Project Manager:</b> Philip Bale		<b>Project:</b> SoLa BRISTOL	
<b>Change Title:</b> Delay to Initial Installations due to sickness in Siemens Contractors			
<b>Change Type:</b>			
Resource	<input type="checkbox"/>	New Requirement	<input type="checkbox"/>
Change in Scope	<input type="checkbox"/>	Budget Change	<input type="checkbox"/>
Milestone Change	<input checked="" type="checkbox"/>		
<b>Other dependent projects affected:</b> None			
<b>Proposed change:</b> The Initial installation will now be conducted in October 2012, one month later than originally planned			
<b>Reason for change:</b> The delay in the initial installations is due to sickness within Siemen's sub-contractors. The main software engineer responsible for this section has been on long term leave due to illness. This has delayed to completion of the DC/DC converter.			
<b>Effect of NOT making change:</b> The initial installation cannot be installed in September without limiting the amount of Factory Acceptance Testing.			
<b>Impacts of Change:</b>			
Milestones	<input checked="" type="checkbox"/>	Deliverables	<input type="checkbox"/>
Resources	<input type="checkbox"/>	Project End Date	<input type="checkbox"/>
Costs	<input type="checkbox"/>	Benefits	<input type="checkbox"/>
Project Scope	<input type="checkbox"/>	Learning Outcomes	<input type="checkbox"/>
<b>Describe the impacts on the project for the categories above :</b> The initial installation was targeted for September 2012, delaying this by one month this will delay the further participant recruitment by one month. This will not have an impact on the project SDRC.			
<b>Cost of making the change (and justification):</b> £None None			
<b>Supporting Information:</b> Please see Appendix A			

<b>Signed:</b>	<b>Date :</b>
<i>Project Manager</i>	21/09/12
<i>Future Networks Manager</i>	
<i>Project Sponsor</i>	

Project Number WPDT2003

Change Number

02

<b>Originator:</b> Philip Bale		<b>Tel:</b> 01332 827448	<b>Date:</b> 21/09/12
<b>Project Manager:</b> Philip Bale		<b>Project:</b> SoLa BRISTOL	
<b>Change Title:</b> Use of project contingency in lieu of FIT – Domestic			
<b>Change Type:</b>			
Resource	<input type="checkbox"/>	New Requirement	<input type="checkbox"/>
Change in Scope	<input checked="" type="checkbox"/>	Budget Change	<input type="checkbox"/>
Milestone Change	<input type="checkbox"/>		
<b>Other dependent projects affected:</b> None			
<b>Proposed change:</b> For the domestic properties the output of the PV will now be metered as DC and FIT payments will not be claimed. We will install a 1% accurate non approved meter and use project contingency funds to pay Bristol City Council the FIT equivalent			
<b>Reason for change:</b> DECC have considered a request for a special dispensation use non approved meters to claim FITs. They have decided not to support, stating that the FIT scheme is not intended to support innovation			
<b>Effect of NOT making change:</b> BCC would not get FIT payment and likely withdraw support for the project.			
<b>Impacts of Change:</b>			
Milestones	<input type="checkbox"/>	Deliverables	<input type="checkbox"/>
Resources	<input type="checkbox"/>	Project End Date	<input type="checkbox"/>
Costs	<input checked="" type="checkbox"/>	Benefits	<input type="checkbox"/>
Project Scope	<input type="checkbox"/>	Learning Outcomes	<input type="checkbox"/>
<b>Describe the impacts on the project for the categories above :</b> The impact on the project is the costs associated with paying BCC the FIT equivalent payments.			
<b>Cost of making the change (and justification):</b> £15,470. <i>This is an estimation based on the expected PV outputs in Bristol for the duration of the project.</i>			
<b>Supporting Information:</b> Please see Appendix B			

<b>Signed:</b>	<b>Date :</b>
<i>Project Manager</i>	21/09/12
<i>Future Networks Manager</i>	
<i>Project Sponsor</i>	

Project Number WPDT2003

Change Number

03

<b>Originator:</b> Philip Bale		<b>Tel:</b> 01332 827448	<b>Date:</b> 21/09/12
<b>Project Manager:</b> Philip Bale		<b>Project:</b> SoLa BRISTOL	
<b>Change Title:</b> Use of AC rather than DC meter for FIT payments – commercial properties			
<b>Change Type:</b>			
Resource	<input type="checkbox"/>	New Requirement	<input type="checkbox"/>
Change in Scope	<input checked="" type="checkbox"/>	Budget Change	<input type="checkbox"/>
Milestone Change	<input type="checkbox"/>		
<b>Other dependent projects affected:</b> None			
<b>Proposed change:</b> For schools and offices intend to transform the existing PV generation from DC to AC using the existing PV converter and meter using the installed FITs approved AC meter. The system will then transform this output back to DC for use in classrooms and offices.			
<b>Reason for change:</b> DECC have considered a request for a special dispensation use non approved meters to claim FITs. They have decided not to support, stating that the FIT scheme is not intended to support innovation			
<b>Effect of NOT making change:</b> It is not feasible to meter at DC using approved meters. The project contingency deemed not appropriate as it would be greater than £100,000			
<b>Impacts of Change:</b>			
Milestones	<input type="checkbox"/>	Deliverables	<input type="checkbox"/>
Resources	<input type="checkbox"/>	Project End Date	<input type="checkbox"/>
Costs	<input type="checkbox"/>	Benefits	<input type="checkbox"/>
Project Scope	<input type="checkbox"/>	Learning Outcomes	<input checked="" type="checkbox"/>
<b>Describe the impacts on the project for the categories above :</b> The impact on the project is the learning generated, Using a combination of the two options available to the project in the domestic and commercial buildings will still maintain the original project learning.			
<b>Cost of making the change (and justification):</b> £None The PV inverter system has already been installed.			
<b>Supporting Information:</b> Please see Appendix B			

<b>Signed:</b>	<b>Date :</b>
<i>Project Manager</i>	21/09/12
<i>Future Networks Manager</i>	
<i>Project Sponsor</i>	

## Appendix 2- Email trail on BCC agreement delays

1.From:]

Sent: 12 September 2012 12:13

To:

Cc:

Subject: Fwd: FW: Project Bristol WPD\_BCC Agreement mark-up 30 08 12

Importance: High

**\*\* High Priority \*\***

Hi

Aware Paul you are meeting Philip next Tuesday (18th). Please can you let me know if you are happy to sign the revised Agreement Philip sent? I'm going to be working away from the office Mon-Weds (17-19th) next week so if I need to raise any issues with legal or WPD please can you let me know by tomorrow lunchtime if possible.

Many thanks

>>> "Bale, Philip M." <[pbale@westernpower.co.uk](mailto:pbale@westernpower.co.uk)> 30/08/2012 16:41 >>>

Hello

Please find attached the amended agreement for the completion of the three initial installations, this allows a time and materials approach up to a maximum agreed costs, (this is to be agreed between all of us but I am quite happy to keep it high in recognition of the uncertainty).

As there are no penalties for late delivery of the initial installations sections 4.6 and 4.7 have been removed (liquidated damages)

Please let me know if there are areas that need further discussion, when we can agree on Terms and conditions we can develop the schedules.

Sorry the document is thorough and length, this is a requirement from Western Power Distribution procurement team.

\*\*\*\*, can we have a catch up phone call tomorrow, is there a time that is best for you?

Best Regards

Philip Bale

2.-----Original Message-----

**From:** Bale, Philip M. [

**Sent:** 05/10/2012 16:31:37

**To:];**

**Subject:** Project Bristol WPD\_BCC Agreement mark-up 05 10 12

Hello \*\*\*\*,

Please find attached the agreement for the initial installation. I again apologies for the length of the document and the complexity, however I am governed by our procurement team on this matter. The procurement team are also reviewing this document and may come back with some small amendments on Monday.

I have amended the agreement to include the scope of works; this has been written to be as loose as possible to allow for us to all work together to install the equipment. Please note that the costs are not an issue on the initial three installations, this has been written into the contract as we do not want the council to be at risk of incurring any costs that wouldn't be refunded.

Please let me know if you have any questions or comments. I will require this to be signed before Thursday 11th October to allow the initial installation to occur in the EcoHome. I will be in Bristol from 7:00am on Monday all week.

Best Regards

Philip Bale

3. -----Original Message-----

**From:** Bale, Philip M. [

**Sent:** 12/10/2012 15:10:34

**To:**

**Subject:** RE: WPD agreement- BCC amendments

Hello \*\*\*\*,

I have been in discussions with \*\*\*\* today to try and find a solution that is mutually acceptable to both BCC and WPD. I have been informed that the equipment being installed is covered under the existing property insurance. Our legal team have asked for details regarding property insurance as this could help in finding a mutually acceptable position regarding the indemnities and liabilities section. When we have this we will propose some words and I will send these directly to you copying in both Lorraine and Dave. I agree there is probably room for negotiation between the original and current version of the agreement.

Thank you for the clarification on the FOI.

Regarding the agreement, I was under the understanding the main issue was the penalties for late delivery, the agreement was de scoped to 3 properties instead of 30 and the late deliveries removed so we could complete the initial works with a much lower financial risk to both WPD and BCC.

For the avoidance of doubt, I have been keen to find a mutually acceptable position for the contract and it has not been my attention for the council to sign an agreement they are not happy with. Attached is previous emails with the agreement with requests by me for comments both by email and by phone. I was subsequently informed the agreement was acceptable and proceeded on this basis.

I hope that we can now work together to find a solution fairly quickly, allowing us to re schedule and continue with the project.

Best Regards

Philip Bale

4.-----Original Message-----

From:

Sent: 12 October 2012 14:20

To: Bale, Philip M.

Cc:

Subject: RE: WPD agreement- BCC amendments

Dear Philip,

Thank you for your email. To reiterate, the Council would not be happy to agree to a very wide and unlimited indemnity provision as originally drafted in your agreement. This is the main issue at present but also that we would need to see a mirrored liability for any costs and damages that arise as a result of any defects with the plant supplied by WPD. This needs to be included in the "excepted risks" definition and in the liability section.

There may be some room for negotiation between our proposed wording and that of your original agreement. If your legal advisors want to put something forward I would then review and discuss with my client officers at the Council, as it will ultimately be their decision as to how they proceed. I will provide them with advice and guidance on the legal risks involved.

We can agree to the removal of the FOI clause, and rely on the statutory obligation to disclose information and 14.10 (i) of the agreement which reflects this.

When this matter was discussed back in May it was highlighted then that some discussion would need to had on the format of the agreement and negotiations on the wording. I am surprised at the attempt to push this through with no time for the Council to consult its legal dept and discuss amendments.

The two points above are the main areas of concern. Overall the contract is very commercial in nature and does not reflect the relationship and situation in which this work is to take place.

We look forward to hearing from you in order to progress matters.

Regards

Legal Executive

Corporate Services Legal Team

Bristol City Council

**From ofgem** [

**Sent:** 09 November 2012 10:29

**To:** Bale, Philip M.

**Subject:** BRISTOL solution

Hello Philip

Hope you are well. It has been almost a month since I saw you at Bristol. Thanks again for taking the time to show me around and introduce me to your project partners.

I was wondering if you have any updates regarding the initial installations on the Eco House? Additionally could you please provide an update on your engagement with BCC regarding the installations and the challenges you were facing?

Many thanks

Original Message-----

**From:** Bale, Philip M. [

**Sent:** 15/11/2012 15:48:25

**To:** ofgem];

**Subject:** RE: BRISTOL solution

Hello,

Thank you for your email. Unfortunately the EcoHouse installation still hasn't been completed or scheduled as yet. Over the last 5 weeks I have been working continually with our legal team and liaising directly with the Bristol City Council often daily to find different solutions, permitting the installation contract for the properties to be completed.

Please find below a summary of the situation:

The issue continues to be around the level of indemnity in the installation contract. The council have capped any claim at £16,500 with WPD being liable for any resulting claim exceeding this value. Any claims resulting from the installation of SoLa Bristol equipment in the properties by Bristol City Council includes claims as a result of substandard workmanship could result in WPD being liable for any claims exceeding the cap.

Our legal team do not think it was acceptable for the council to limit their liability at such a low level, however would accept this level of indemnity if it was confirmed by BCC that their insurance provision would cover the employee's workmanship/installation of the project equipment. Our legal team and I have repeatedly requested either a copy of the employee insurance details for their direct workforce (with the sensitive information removed) or a letter from the insurance company clarifying the councils insurance and that they would be insured for sub-standard workmanship.

Getting these details from BCC has proved incredibly difficult with us being repeatedly sent only the high level details, policy number and insurer details and limit of indemnity. However this is has not included any details of the insurance policy or confirmation of the policy. Discussions are currently on going between Bristol City Council and their insurance provider.

Due to the slow progress I have now requested an WPD Indemnity approval form which recognises that signing a contract with such a low cap by an external party results in WPD taking on additional risk, however the risks are very remote due to the mitigation methods already in place. Signing this agreement will allow the contract to be signed with WPD taking on a higher level of risk. The alternative to further delay the signing of the contract would make it impossible to finish the equipment installations ahead of the successful delivery reward criteria, although it will be very difficult with the current delays this legal issue has created.

Our relationship with the BCC remains strong, there has been a significant effort from multiple different BCC members including senior management and they remain very apologetic to the length of time this is taking. However, it would be fair to say, the council is a big organisation. Many of their departments including the insurance and legal are not set up to deal with requests of this nature and are unable to respond to requests like this quickly, especially when it requires the cooperation of multiple different department in different office locations. The council employees often work part time and the legal department has a small number employees and this introduces significant delays to even the simplest requests. This is not unique to BCC as many local authorities are also unable to respond quickly to abnormal request in this way. Whilst working with a Local Authority provides many clear project benefits, one of the restrictions is they are unable to respond quickly when issues like this occur and this can introduce significant delays if not factored into the project plan.

I will be including details for the delay in the upcoming six monthly report. Please let me know if you would like a more detailed analysis at the same time. I would request that this detailed analysis would not be made publically available.

Please let me know if you would like any further details.

Best Regards

Philip Bale

## Appendix 3 DC/DC Converter delays

**From]**

**Sent:** 11 December 2012 10:16

**To: Subject:** RE: Information Request

1. C of C

Attached is a copy of a proposed C of C for the three development units.

2. CE marking,

The testing is a process and is therefore difficult to predict but we need to allow five working weeks to cover both aspects. Whilst the time for the task is relatively short 3 days and 5 days plus 2 days for the report the elapsed time due to the nature of the testing takes longer.

3. Costs,

We are still awaiting all the suppliers' costs and hope to complete early this afternoon and certainly before 5pm.

4. Delivery Dates

The first of these 10 production units will be tight as it will hinge on the CE testing, however as discussed the boxes can be manufactured in readiness to accept the charge controller DC/DC converter.

5. Sample units,

Will confirm by lunchtime today.

Regards

**From: Sent:** 10 December 2012 09:01

**To:**

**Subject:** Information Request

**Importance:** High

Just a head's up for today, we will need clarification on the following -

- \* Certificate of compliance
- \* Accurate time scales for the completion of the CE marking process
- \* Costs for the remaining domestic builds
- \* Confirmation you can hit the dates provided
- \* Update of the three 'new' design builds - decision to be made on the process to change the existing unit within the 'Ecohome'.

A number of issues have arisen with the CE marking internally. Therefore I will need this document as a matter of urgency. Please send this over asap, in terms of the financials I'll give you a call this afternoon to discuss this figures if necessary, I will need them prior to 14:00.

With best regards,

Original Message-----

**From:** Bale, Philip M.];

**Sent:** 09/01/2013 08:18:01

**To:**

**CC: Subject:** SoLa Bristol - EcoHome installation

Hello All,

As discussed with \*\*\*\* on the phone yesterday afternoon:

We installed the SoLa Bristol system in the EcoHome over three days between the 16<sup>th</sup> -18<sup>th</sup> December. The installation of the equipment by the BCC electricians was very successful, they did an excellent job. The property is now running with a DC network powering LED lighting to the Kitchen, Offices, Toilets, Bedroom, Hall, Stairway, and the upstairs outdoor patio. We have used a range of light bulbs ranging from 3W – 12W with both cool and warm light. The system is running from the battery storage and the Studer inverter.

During the installation we have experienced issues, which I can provide more details on:

#### CE Marking of Equipment

Most of the project elements have been created using off the shelf components. The exception to this is the DC/DC converter required to reduce the PV output from 120V - 300V DC (dependent on sun light and temperature) down to 24V DC for the lighting circuits and battery storage. This is an off the shelf component from PE Electronics that has been modified for the project. Siemens have worked with PE to create the modifications, one of PE's existing DC/DC converters has been used for the project but modified to add extra control functionality through communications ports.

The DC/DC converter technology has been CE marked and used in many applications over a number of years. The SoLa Bristol equipment including the DC/DC converter passed the Factory Acceptance Tests in Siemens Laboratory back in November 2012, witnessed by myself. In December PE informed Siemens that the modifications made to the unit meant that the unit needed to be retested for emissions (EMC) and Low Voltage Directive (LVD) Tests to be CE marked. PE, Siemens and WPD undertook a risk assessment of the unit and feel there is no credible risk to not using the unit as the amendments are minor and have no impact on the operation of the unit. This was discussed with Paul, he asked that we not use the DC/DC converter until it has passes the EMC and LVD tests. I fully respect this decision and the unit is currently undergoing these EMC and LVD tests, we are expecting it to be completed by 18/01/12. At this point the DC/DC converter is not being used (due to the lack of a CE mark) and the system is not running off the Solar PV. Neither myself or Siemens expected the unit not to be CE marked and have been surprised that it has required further testing.

After the 18/01/12 the DC/DC converter will be retested in Siemens Lab as part of the whole SoLa Bristol system, being ready to be installed in the EcoHome W/C 28/01/13.

We have been working very hard to speed up the testing as much as possible to reduce these timescales. We will not recruit the second and third initial installation participants until the whole system is fully working and participants can see the whole system working in its entirety in the

EcoHome. This delay means the installation of all the domestic properties before the end of April is very unlikely. I will be discussing the updated project plan with Lorraine on Monday 14<sup>th</sup> January.

I hope this provides a comprehensive update to the initial installation issues, please feel free to call my mobile if you require further information. Although we have encountered the two issues, I have confidence in the installation and it is working well in the EcoHome. The feedback from the EcoHome volunteers has been really positive with the LED lighting performing better than expected.

Best Regards

Philip Bale

**SIEMENS****Infrastructure & Cities**

Western Power Distribution  
Avonbank  
Feeder Road  
Bristol  
BS2 0TB

FAO: Philip Bale

Name	Andrew Smyth
Department	Energy Automation
Telephone	+44 (0)191 495 3597
Fax	+44 (0)845 8053758
Mobile	+44 (0)7921 244914
E-mail	Andrew.smyth@siemens.com

Date	22 <sup>nd</sup> February 2013
------	--------------------------------

**SoLa BRISTOL – DC/DC Converter**

Dear Mr. Bale,

The SoLa BRISTOL project has seen significant progress since its kick off in March 2012, from the initial design concept to the position today where production of the Domestic Solutions is underway. Learning projects of this nature seek to explore new applications and methods of working and will occasionally encounter challenges in achieving the project goals, dissemination of learning is important to Siemens as part of our own core values, and we are happy to contribute this sharing of knowledge to wider stakeholders. Project risks have not only provided challenges but have given Siemens opportunities to propose improved solutions which we believe will introduce further advantages in terms of the cost effectiveness of the overall solution we are providing whilst adding to the learning outcomes of the SoLa Bristol Project.

An example of such challenges was the interface with the existing PV arrays installed in the Bristol City Council Homes. Siemens initial design was based around the use of charge controllers, however due to the operational parameters of these devices considerable modifications to the existing PV arrays in the Bristol City Council properties would have been required. Siemens and WPD jointly developed a solution utilising DC/DC Converters.

DC/DC Converters required a degree of adaptation for this application; therefore with its suppliers Siemens developed an enhanced DC/DC Converter which overcomes the design limitations of the charge controllers. Implementing this design change has delayed this phase of the programme, however has resulted in a more cost effective solution than the initial design proposal. Siemens are confident that this solution maximises its suitability for retro-fit applications and new build installations for both domestic and commercial applications.

If there is any additional information you require to complete your evaluation please do not hesitate to contact me.

Yours sincerely,  
for Siemens Transmission and Distribution Ltd.



Andrew Smyth  
Project Engineer  
NWE RC-GB IC-SG EA CP

Siemens Transmission and Distribution Ltd  
Infrastructure & Cities Sector

2 Koppers Way  
Monkton  
South Hebburn, Tyne & Wear  
NE31 2EZ

Tel.: +44 (0) 191 495 2244  
www.siemens.com

Siemens plc  
Registered No. 631625  
Registered Office: Faraday House, Sir William Siemens Square, Frintley, Camberley GU16 5QD

SCF DL2011-12

Page 1 of 1

**DECLARATION OF CONFORMITY**

We PE Systems Ltd  
Of Victoria Street, Leigh, Lancashire , WN7 5SE

*In accordance with the following Directive(s)*

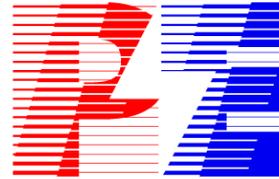
2006/95/EC The Low Voltage Directive  
2004/108/EC The Electromagnetic Compatibly Directive

*Hereby declare that:*

Equipment Solar Power Unit (Battery Charger)  
Type DC24/130/4kW\_MPPT

DESIGN AND MANUFACTURE  
OF ELECTRONIC EQUIPMENT

**POWER**



**ELECTRONICS**

PE SYSTEMS LIMITED  
VICTORIA STREET  
LEIGH WN7 5SE  
TELEPHONE (01942) 260330  
FAX (01942) 261835  
E-MAIL [sales@pe-systems.co.uk](mailto:sales@pe-systems.co.uk)

*is in conformity with the applicable requirements of the following documents*

Ref No.	Title
EN 61204-3-2000	Low voltage power supplies, d.c. output - Part 3 Electromagnetic Compatibility.
EN55022:1998 +corr:1999	Reference Standard for Class B limits for Conducted and Radiated Emissions
EN 60950-1:2006 +A12: 2011	LVD Testing Information Technology Equipment - Safety

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all applicable essential requirements of the directives.

Signed

Yours Faithfully

Mike Smith  
Managing Director of PE Systems Ltd.

Date 24-04-2013

## Appendix 4 E-Mail trail Loft Boarding

Hi \*\*\*\*, sorry for the delay, I have had so much trouble trying to organise a carpentry contractor for this project, I have now arranged a meeting with RA Gardeners tomorrow at 10.30 to outline the works required in the loft spaces and get them on board, I will update you as to how the meeting went and make arrangements for them to site visit the two proposed properties, I can then arrange things with Mark from WPD and make a start

Regards

Paul

**From:**

**Sent:** 24 June 2013 14:30

**To:**

**Cc:** Mark Dale ([mdale@westernpower.co.uk](mailto:mdale@westernpower.co.uk));

**Subject:** So La Bristol (smart grid) - boarding for lofts

Hi Paul

Just tried to call. I wanted to check if we still have a problem with getting the loft boarding done for the 2 test homes for the So La Bristol project (smart grid project). I understand from Mark Dale at Western Power Distribution that there is some re-enforcement work needed to support the weight of the equipment in the lofts. But there was an issue if BCC carpenters could do it or if we need to get an external contractor in (I think you have a list) and he hasn't heard back from your team. At the moment this is holding the project up and we're getting concerned that some of the residents may pull out of the scheme due to the delays but also Ofgem are pushing for an update.

Please could you update date me on your thoughts and how we can help your team to push this one along. I'm about to go into interviewing for the rest of the afternoon, but happy to give you a call in the morning to see if I can help?

Many thanks

**From:]**  
**Sent:** 25 July 2013 11:53  
**To:** Dale, Mark  
**Cc:**  
**Subject:** Knowle West Project

Hi Mark, I have booked the carpenters for the first site (48 Broadbury Rd) for the above due to start on the 12<sup>th</sup> August and have booked the electricians to start on the 14<sup>th</sup> can you forward me Phils Email address just to confirm when and where the kit is being delivered, I need to check the paperwork on it to ensure it meets all relevant standards.

Can you also confirm that the bathroom fitting now comes with a pattress just in case the existing wiring is surface mounted as the one in the eco house did not come with one.

Regards

**From:]**  
**Sent:** 22 July 2013 16:42  
**To:** Dale, Mark;  
**Cc:**  
**Subject:** RE: Sola Test Homes BCC

Hi Mark and Sue

I've spoken to \*\*\*\* the service manager for Planned Programme which covers the relevant team's in housing. She seemed quite confident that after we go through some issues at the Wednesday meeting we can get this moving. But she wants to be confident that everyone is clear on what is required from different teams, all our costs are being covered and we have a clear communication strategy with tenants, who have also been contacting us. I've sent her the contract with housing so hopefully we can resolve that, Mark I'll come back with any questions to you/Philip.

\*\*\*\* has met with Gardners for the carpentry and they are on standby to do the loft boarding work, and has also been in contact with WPD regarding the supply and storage of batteries coming down from Newcastle, and they are tying in with the 12<sup>th</sup> August dates. But \*\*\*\* awaiting sign off from \*\*\*\* to proceed.

In terms of the Mayor's visit, we also sent a request to the Mayor's office to see if he is available for a visit any time in the last 2 weeks in August/early Sept. He's really busy so waiting to hear back on that one. But it doesn't make sense to send him until the 2 homes are completed and we have updated the wider group of residents, as that could be a PR disaster!

I think we also need to link his visit into the wider work of KWMC, Sue would be good to chat to you about. I just tried to call as would also be really helpful to have an update on communication with the tenants. Is there a good time to catch you tomorrow?

Many thanks

-----

Future City Coordinator

Future City Team - Bristol Futures

Bristol City Council

**From:]**

**Sent:** 22 July 2013 15:21

**To:**

**Cc:**

**Subject:** RE: Sola Test Homes

There is a BCC meeting on Wednesday that will hopefully get things moving again. I have had no contact regarding the loft surveys and dates since the last time I spoke with you.

This morning I have discussed this with Lorraine from BCC and have stated that I need dates urgently for the loft boarding as I am expecting BCC to start the installs on 12<sup>th</sup> Aug and get both \*\*\*\* & \*\*\*\* completed that week.

The Mayor of Bristol would like to visit one or maybe both of the test homes towards the end of August, and it would not look very good if they were not completed due to hold ups from BCC.

Can you, tactfully, sound out the 2 homes in question regarding the Mayor's visit?

Thanks

Mark

**From:**

**Sent:** 22 July 2013 14:51

**To:** Dale, Mark

**Cc: Subject:** Sola Test Homes

Hi Mark,

Just wondered if you had you any news on the test homes and when they are likely to have the battery installs? I've just had a call from Lee of 48 Broadbury and I would like to let him know. I know it was supposed to be around this time.

Best wishes

## Appendix 5 SDRC's From Published Proforma

### Section 9: Successful Delivery Reward Criteria – Version 3

#### Criterion (9.1) Completed

**Successful initial engagement with customers:** This criterion corresponds to successfully holding a workshop with Bristol City Council, potential trial participants and interested parties before 30th April 2012. Through the workshop and customer engagement activities for the 30 domestic customers, 10 schools and an office will be recruited before 14<sup>th</sup> May 2012.

Holding the workshop on or before this date will demonstrate the project is on schedule to recruit and select trial participants' in line with the project plan. Prior to the workshop the customer communication plan will have been submitted and accepted by Ofgem. WPD will work with our partner, Bristol City Council and the trial participant recruitment specialist to engage with target domestic audiences and the selected schools from the Solar PV for schools scheme.

The workshop will be used to explain the purpose of the project, provide a guide to the installations, detail the project timeline and gather customer feedback. It will be an opportunity for customers to learn more about the project first hand and ask any questions they may have.

#### Evidence (9.1)

The recruitment plan, copies of material used to recruit trial participants and locations targeted will be recorded. Minutes and notes captured from the customer workshop will be stored for future use during knowledge dissemination outputs. Feedback from the event and recruitment process will be gathered through a post event questionnaire where any outstanding questions can be collated. The details of customers recruited to the project will be captured; high level information will be included in the first BRISTOL six monthly reports.

An overview of the workshop and feedback will be posted on the BRISTOL website for interested parties within a month of the event.

#### Criterion (9.2) Completed

**Confirmation of the BRISTOL design:** This criterion corresponds to signing off the design of the installations by 30th September 2012 for homes, schools and office after the trial participants and locations have been confirmed. The design will confirm the capability of the equipment being installed; details which equipment will be connected to the DC network, how the equipment will be connected together and the location of equipment in a typical home, school and the selected office.

The design will be developed with our partners, Siemens and the University of Bath. It will build upon the Technical Overview outlined in Appendix C and use the outputs from the detailed survey and planning, participants wiring and structural reviews. The final design will be published through the BRISTOL website.

The designs will be reviewed and modelled to predict the performance of the solution, customer benefits and distribution network benefits of the final design.

### Evidence (9.2)

Regular meetings will be held between WPD, Siemens and the University of Bath to develop the BRISTOL design. Summaries of the meetings and design decisions will be captured and recorded.

The results of the surveys, inspections and reviews will be recorded and stored by the University of Bath

The predicted performance and benefits will be recorded and stored. The predicted performance will be compared against the actual performance.

The final design will be signed off by WPD senior engineering managers and subsequently shared through the BRISTOL website.

### Criterion (9.3) Amended Target Date

**Installation and commissioning of equipment:** This criterion corresponds to installing and commissioning equipment in 30 domestic properties before ~~30<sup>th</sup> April 2013~~ 30<sup>th</sup> September 2014, 5 schools, before ~~31<sup>st</sup> August 2013~~ 30<sup>th</sup> September 2014 and an office before ~~30<sup>th</sup> April 2013~~ 30<sup>th</sup> September 2014. Prior to the installations WPD and our partners will Factory Acceptance Test the BRISTOL solution, provide training for the installation team, form method statements for installation, risk assessments for installation and operation, an appointment booking process, re-booking process, complaints procedure and operation guide.

### Evidence (9.3)

A test specification will be completed prior to the factory acceptant test and the commissioning of equipment; this will be signed off by the WPD project manager. The results from the factory acceptance tests will be analysed by Siemens and the University of Bath with final acceptance by WPD.

Project documents will be peer reviewed by the WPD Project Manager before they are issued. Copies of the project documentation will be stored by the University of Bath.

Regular installation progress reports will be posted on the BRISTOL website for interested parties to view.

A review of the installation and commissioning activities will be carried out, capturing any lessons learnt. If required, the method statements and other related documentation will be updated and stored.

### Criterion (9.4) Amended Target Date

**Early Operational Performance of BRISTOL:** This criterion corresponds to successfully operating an integrated DC network with storage in homes, schools and an office. The operational performance from the data captured through the LV Connection Manager will be analysed to provide an early snapshot of the BRISTOL performance since commissioning.

We will capture and share the early learning from deploying and running DC networks and battery storage in customer premises. Data will be captured up to ~~30th November 2013~~ 30<sup>th</sup> November 2014; the learning will be released

by 31st December 2013 2014. No customer sensitive data will be released, and any data relating to customers will be completely anonymous.

A review of the early learning will be undertaken to determine if any changes are required in the operation of the LV Connection Manager, including the battery use and charging algorithms to improve the future performance of the BRISTOL solution.

#### Evidence (9.4)

An operations report will be produced and shared through the BRISTOL website, Stakeholder Dissemination symposia, and the project advisory board.

The actual data will be collected and stored by the University of Bath. The performance data including system availability, battery usage, battery losses and data rates will be analysed and compared to the pre installation predictions.

If required, the method statements and other related documentation will be updated and stored.

Notes from the project meetings discussing operational performance in homes, schools and the office will be recorded and stored.

#### Criterion (9.5) Amended Target Date

**Measured the impact on the LV network:** This criterion corresponds to measuring the impact of the BRISTOL solution on the trial distribution substations operation, compared to the operation prior to the installation and commissioning of equipment in homes, schools and the office.

The long term operation of the distribution network will be captured through the LV Network Manager located in distribution substations, the data recorded will be analysed to monitor any changes in the voltage profile, load profile and power quality of the network as a result of the installation in homes, schools and the office. In substations with BRISTOL installed on one LV feeder, another similar LV feeder will also be monitored and used as a reference.

Through this criterion we will be capturing and sharing the early learning, measuring the network benefits of the BRISTOL solution, sharing the analysis before 31st May 2014-2015.

#### Evidence (9.5)

Findings shall be shared through a summary report published through the BRISTOL website by 31st May 2014-2015.

Notes from the project meetings discussing operational performance (changes to the LV voltage profiles, feeder demand profiles and power quality) will be recorded and stored.

The actual data will be collected and stored by the University of Bath. The performance data recorded by the LV Network Manager will be analysed and compared to the pre installation predictions.

If required, the method statements and other related documentation will be updated and stored.

**Criterion (9.6) Amended Target Date**

**Customer Opinion:** This criterion relates to learning about customer acceptance of a BRISTOL solution. We will specifically report on how they feel about virtual asset sharing, taking up space in their home, the energy savings, how disruptive the equipment has been, how easy it is to operate and if their opinion of the BRISTOL solution has changed over time.

WPD will work with the trial participant recruitment specialist and the University of Bath to design a process and subsequently capture customers' feelings on the project in line with the customer communication plan.

The first assessments will commence ~~be completed~~ before ~~30<sup>th</sup> June 2012~~ 30<sup>th</sup> March 2014 to capture customers' opinions before the trial starts, the second assessment will commence before ~~30<sup>th</sup> June 2013~~ 30<sup>th</sup> November 2014 to capture customers' opinions during the trial and the third assessment will be completed before 30<sup>th</sup> November 2014 2015 to capture customers' opinions after the trial. All surveys will be completed by 30<sup>th</sup> November 2015

**Evidence (9.6)**

The Customer Communication Plan, detailing customer contact will be on the website

Knowledge will be captured using a mixture of questionnaires and interviews with results published two months after each assessment is completed.

Any customer complaints will be resolved within 14 days and the responses will be stored.

Analysis will be shared with all trial participants, Bristol City Council and GB DNOs through the BRISTOL website. The learning from the customer opinion will be used to update the customer communication plan.

**Criterion (9.7) Amended Target Date**

**Keeping the lights on during power outages:** This criterion corresponds to testing the domestic BRISTOL solution during an AC power outage. WPD will ask selected domestic customers to test the energy security section provided by the battery storage between ~~1<sup>st</sup> October 2013 and 1<sup>st</sup> October 2014~~ 1<sup>st</sup> June 2014 and 1<sup>st</sup> June 2015.

The performance of the DC network and batteries will be monitored, through the LV Connection Manager. Customers' behaviour and use of energy during the short outage will also be captured through the LV Connection Manager and a survey. This test will inform us of the capability of the BRISTOL system during a power outage and the potential value to customers.

The trials will be scheduled at different times of the day with different weather conditions and battery capacities to maximise the learning. Selected customers will be invited to undergo this test only once during the trial.

**Evidence (9.7)**

The data from the LV Connection Manager and responses from the domestic questionnaire will be stored by the University of Bath.

The power outage test plan and communication methods used will be designed and stored by the University of Bath and will be signed off by the WPD Project Manager.

The learning generated by analysing the data will be shared with all stakeholders and interested parties through the end of project report on **15th January 2015 2016**.

Customers' energy demands during the short power outage test will feed into the battery size review at the end of the project (SDRC 9.8 (5)).

#### **Criterion (9.8) Amended Target Date**

**Suitability of solution for mainstream adoption:** This criterion corresponds to writing a comprehensive end of project report summarising the project findings. The report will contain sufficient information to advise other UK DNOs: **(1)**If the BRISTOL trial demonstrates solar PV can be integrated into the distribution network using battery storage and DC networks. **(2)**How the measured results compared to the predictions made in the set up and development period (SDRC 9.2). **(3)**How the solution could be used to incorporate other LCTs into the distribution network **(4)**What customer benefits were recorded throughout the trial. **(5)**How efficient the batteries operated, the costs of battery procurement for DNO and Customer versus the financial benefits. **(6)**The significant lessons learnt during the trial, how these would be reflected in a future roll out of the BRISTOL solution if used as an alternative to conventional network reinforcement. **(7)**Which policies and standards would need to be modified to allow a BRISTOL solution and **(8)**What impact the inclusion of BRISTOL will have on DNO business plans. The report will also contain an appendix with all the early learning reports from previous milestones and a feasibility study for installing a BRISTOL solution in an office using the learning generated from the trial.

#### **Evidence (9.8)**

The end of project report will review the detail knowledge generated from the design and operation of the BRISTOL project. The report will include the appendices from the key areas of learning highlighted in the other Successful Delivery Reward Criteria. The report containing the information above will be published by **15th January 2015 2016**.

The results from this milestone will determine if the solution can be adopted into mainstream. If limiting factors are present, preventing the inclusion into mainstream adoption at the end of the project, the report will recommend areas that need to be monitored (e.g. the future cost of energy storage, deployment of smart meters ...) which may facilitate the future inclusion as a network reinforcement technique.

## **Appendix 6 Preliminary School surveys**

See Separate attachment

## **Appendix 7 marked up original Pro-Forma**

(see separate attachment)

## Appendix 8 Letter of Support from the University of Bath



Department  
of Electrical  
Engineering

University of Bath Claverton

Down BATH BA2 7AY

22nd May 2014

**Rory McCarthy**

Senior Policy Analyst

Smarter Grids &

Governance 9

Millbank

London

SW1P

3GE

**With reference to: Sola Bristol**

Dear Rory,

We are writing to report our findings on the likely impact from the reduced sample size and trial time on the learning outcome of the project.

In assessing whether the reduction in school numbers from 10 to 4 might adversely impact on the

learning outcome, particularly on the relevance of the Sola Bristol solution to wider communities, we analysed the energy usage patterns across 4 schools as well as their load factors. This is to assess the similarities or differences of their energy behavior through a range of energy indicators. In the meantime, we also assessed the range of coverage from the chosen 4 schools. This is carried out through a comparison of the school type and school size of the 4 schools versus the 103 schools across Bristol.

Our analyses indicate that for the majority of the primary and infant schools, their energy behavior can be adequately represented in the available data. Of the chosen 4 schools for trial, 3 are primary and infant schools, which represent 66% of schools in Bristol (total 103 schools). 1 is a school for disabled children of varying ages. Further, these schools differ in their sizes, both in term of pupil number and space, the 4 schools' pupil size ranges from 185 to 507, space size ranges from 1316 m<sup>2</sup> to 5260 m<sup>2</sup>, this represents 53% of coverage for primary and infant schools in Bristol, indicating the chosen schools are not concentrated at one part of school spectrum but have a wide-spread coverage.

Next, we investigated whether energy behavior differs significantly across the 3 primary schools given the large variations in school sizes. Our statistical analyses indicates that despite the large differences, the schools follow a similar commercial usage patterns during term time weekdays, the variance across the schools in terms of consumption patterns is 3%, and in terms of load factor is 0.7%. Even when we included the 4<sup>th</sup> school, which is a special school for disabled children where they display very different consumption patterns and volume, the variance is only increased to 7%. It is thus highly unlikely that the missing 6 schools will substantially increase the variability, particularly among primary and infant schools.

In assessing whether reducing the trial analyses for schools from 7 months down to 3 months would have adverse effects on the project early learning report, we have analysed the load dynamics across the schools over 1 year, from March 2013 to April 2014. Our aim is to establish whether the school energy behavior displays strong seasonal dynamics as those exist in domestic customer, where a full-year data is desirable for trial analyses. Our investigation shows that the major time differentiator lies between term time weekdays and holidays/term time weekends, the difference exists from school activities is significantly stronger than the seasonal effects. On week day term time, all schools follow a typical commercial usage pattern, i.e. morning rise from 6-8 am and evening tail around 5-6pm. During holidays and weekend, schools typically experience low energy activity and consumption. This is shown in Figures 1 (a) (term-time weekday load profiles) and (b) (term-time weekend/holiday load profiles), illustrating distinctive load differences between term-time weekdays and holidays/term-time weekends. Figure 2 depicts a close correlation between school holiday periods and load clusters with low school energy activity. This kind of pattern change is well captured in the trial data, suggesting a reduction in trial time should not significantly compromise the learning outcome.

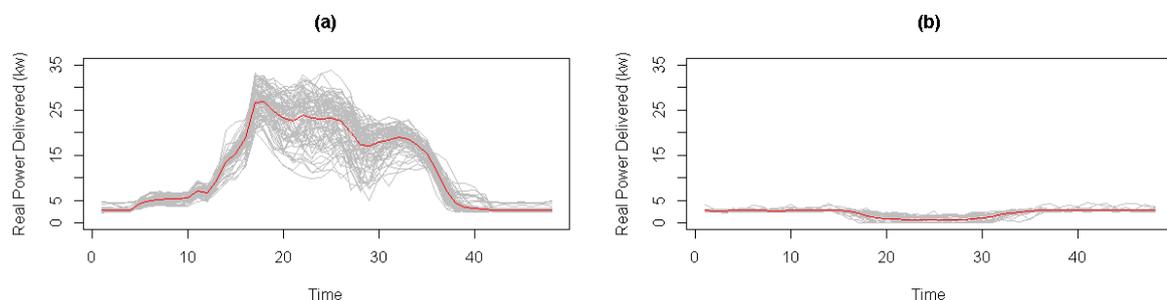


Figure 1. Illustration of load differences between term-time weekdays and holidays/term-time weekends.

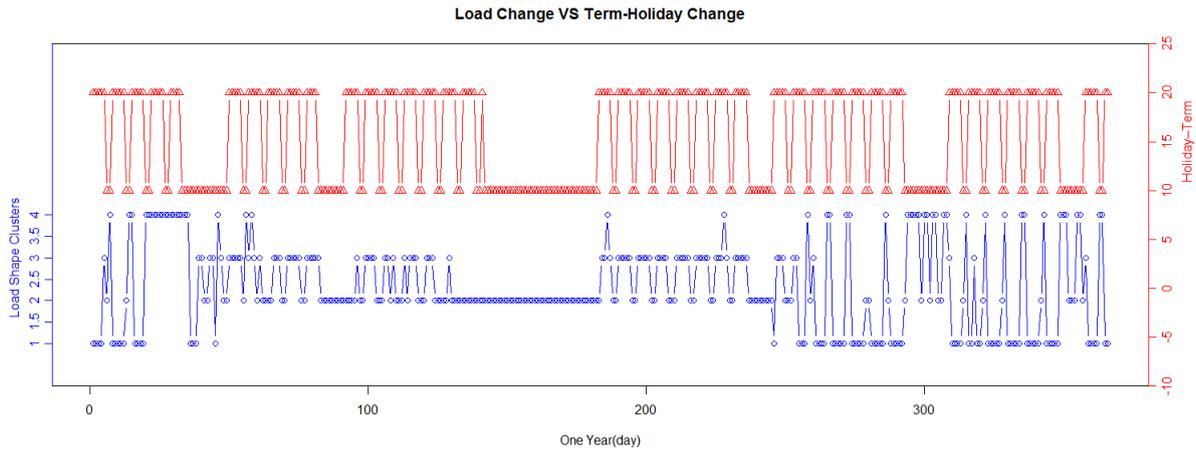


Figure 2. Load change versus Term-term/holiday changes.

We also carried out a second assessment to consider the sample size reduction in more general terms.

When the goal is to estimate a certain average quantity (such as the average energy consumption across schools), the margin of error on any estimate varies systematically according to the ratio of the square roots of the original and proposed sample sizes. The difference between a sample size of 4 and a sample size of 10 is a factor of 0.63. However, if we take KWMC as an additional school albeit only at the term time, the difference between the sample sizes becomes 0.68. This tells us that, whilst of course a larger sample would provide a smaller margin of error on any estimates taken, the difference is far below an order of magnitude with the sorts of numbers we are considering here.

The domestic properties phased rollout will, we believe, provide a significant increase in data availability and a better understanding of the Early Operational Performance learnings that are reportable in November 2014 as part of SDRC (9.4) and the measured impact on the LV Network SDRC (9.5) reportable in May 2015

In the original project plan, for **SDRC (9.4)** it was expected to have the full 30 domestic properties providing data for 7 months. With the revised plan, the table below shows the expected data available, with 2 homes providing data for over a full 12 month period.

2 homes	14 months data	since Sep 13
3 homes	8 months data	since Apr 14
3 homes	7 months data	since May 14
3 homes	6 months data	since Jun 14
4 homes	5 months data	since Jul 14
5 homes	4 months data	since Aug 14
10 homes	3 months data	since Sep 14

We conducted statistical analyses to explore if there are material impacts to learning outcomes from reduction in the trial duration. In particular, we would like to examine if the variability between 30 homes over 7 months (original plan) is significantly higher than 2 homes over 14 months (revised plan), essentially we investigate whether the time extension of 2 homes can compensate the overall reduction in sample size and to what degree. As data from the trial homes are not yet fully available,

our analyses is based on smart metering data from the Irish smart metering project, where 14 month data reading from 30 domestic dwellings (sharing similar social profiles such as the type of property and occupancy income) are used in this assessment, emulating the trial situation in our project.

Over the course of 12 months between 2009 and 2010, the variance between the 30 homes for each month is listed in table I. As shown in the table, the variances through the 12 months are stable and in average around 0.7 kW (0.5 kW in summer and 0.8 kW in winter). It indicates that the dissimilarities between the 30 homes are fairly consistent throughout the year. If the trial time for all 30 homes is reduced from 7 months down to 3 months, the variance will be reduced from 4.03KW down to 1.75KW. Table II shows the variances between customers in the revised plan. With several homes metered between 3-8 months, the total variance can reach 2.56 kW. However, it is lower than that of 4.03 kW in the original plan. The question is to what degree the extension of 2 homes' trial period to 14 months can compensate the reduction in the variability. To assist the analyses, we conducted further analyses of variability of individual homes over the time scale of 14 months; this is shown in table III.

Table III shows the variance of each of the 30 customers over the course of 14 months. It is clear from the table that different customers have very different variability in their energy usage pattern over time. For example, homes 1082 and 1763 have very little variation in their energy usage throughout the year, while homes 1625 and 2669 show large variations in their energy usage patterns over time.

Table I Variance between 30 homes in each month

Month	Variance between 30 customers (Power, kW)
January	0.88
February	0.81
March	0.67
April	0.55
May	0.54
June	0.53
July	0.59
August	0.62
September	0.53
October	0.55
November	0.67
December	0.89

Table II Variance for each group under the revised plan

Month	Variance between customers under the revised plan
8 months 3 customers	0.46
7 months 3 customers	0.40
6 months 3 customers	0.35
5 months 4 customers	0.39
4 months 5 customers	0.38
3 months 10 customers	0.58
Total	2.56

Table III Variance over time (14 months) for each of the 30 homes

Customer ID	Average variances over 14 months (Power, kW)
1031	0.31894
1072	0.221184
1082	0.092024
1147	0.28519
1534	0.151587
1625	1.445243
1669	0.409658
1751	0.80803
1763	0.068326
1822	0.271546
1925	0.620368
1949	0.751521
2078	0.220017
2146	0.233602
2163	0.422739
2165	0.542568
2198	0.43119
2426	0.491466
2666	0.081611
2669	1.261157
2682	0.61671
2709	0.142234
2736	0.445435
2835	0.382293
2917	0.166857
2927	0.572941
2961	0.338392
2966	1.071502
2990	0.816422
3019	1.086921

Under the original plan with 30 homes over 7 month, the variance covered is 4.03kW. In the revised plan, the variability over time will depend on the nature of the two homes. If the two homes with extended trial time are in the group with high variability (such 1625, 2669), the variance covered by the two customers over 14 months alone would be 2.81 kW. Adding the variability of the rest of 28 homes over different months, the accumulative variance would reach 5.37 kW under the revised plan, which would cover even larger variability than the original plan. However, if the two homes with extended trial time are from the low-variance group that has little variations over time, the revised plan would have a variance of 2.82 kW, significantly lower than the original 4.03kW.

For the Solar Bristol project, addition to the two homes with extended trial time there is also the Eco-home where the consumption patterns can be controlled and simulated to reflect a variety of load patterns, this would add significant variability to the two homes. Even taking the average variance in the group to reflect the variability of the two homes, over the course of 14 months they will have a variance of at least 0.95 KW. By combining the variance from the rest of the 28 homes with differing trial durations as detailed in Table II, the revised plan would have 87% (3.51/4.03) coverage of the original plan.

Whilst it is desirable to have the full 7-months trial across the 30 homes, the project has benefited from the phased roll-out, such that the early learning in hardware/software design, integration and deployment from the 2 home can be immediately fed into the rest of homes, minimizing the adverse impacts to the rest of trial homes.

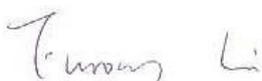
For **SDRC (9.5)** it was originally expected to have the full 30 domestic properties providing data for a full 12months. With the revised plan, the table below shows the expected data available.

2 homes 20 months data	since Sep 13
3 homes 14 months data	since Apr 14
3 homes 13 months data	since May 14
3 homes 12 months data	since Jun 14
4 homes 11 months data	since Jul 14
5 homes 10 months data	since Aug 14
10 homes 9 months data	since Sep 14

We also performed statistical analysis for 12-month duration (original plan) versus 9-month duration (revised plan), and reach similar conclusions.

Overall, we conclude that the reduction in sample size and trial time are unlikely to fundamentally alter the learning outcome of the project.

Yours sincerely,



Prof. Furong Li

Professor of Electrical Engineering

Department of Electronic & Electrical

Engineering University of Bath

Bath BA2 7AY

+44-(0)1225-386416

.

## Appendix 9 DNO responses to Letter of Support

**From:** Cox, Steve [<mailto:Steve.Cox@enwl.co.uk>]

**Sent:** 24 September 2014 11:44

**To:** Sawdon, Helen L.

**Subject:** RE: Your Feedback re; Proposed Changes to Sola Bristol Tier 2 LCNF Project

Helen

We are happy to support the proposed revisions and agree the changes will not materially affect the learning or the projects value to Electricity North West

Kind Regards Steve

Steve Cox

Head of Engineering

Electricity North West



98 Aketon Road  
Castleford  
WF10 5DS

jim.cardwell@northernpowergrid.com

Roger Hey  
Future Networks Manager  
Western Power Distribution  
Avonbank  
Feeder Road  
Bristol  
BS2 0TB

Direct line: 01977 605938  
Mobile: 07713 332789

26 September 2014

Dear Roger

#### Consultation on the Sola Bristol project change request

Thanks for the opportunity to comment on your Sola Bristol Change request which I support.

I have reviewed the proposed changes and the University of Bath report and have restricted my comment to the key changes required:

- The reduction of schools from 12 to five; and
- The increase of the trial duration by 12 months.

Explicitly, for the avoidance of doubt, I am not commenting on the other issues covered in the University of Bath report since I did not understand that they were germane to the change on which you are consulting.

My interpretation of the University of Bath report with respect to the schools is that this change would give you a monitoring period of 15 months for five schools compared to the original plan of 12 schools for seven months. I support this change on the basis that the University of Bath report is proposing that a monitoring period of 15 months for four schools would be statistically robust. You have not made explicit why you are proceeding with five schools as opposed to the four that you need for a robust result. I speculate, and would support, that you are proceeding with five so that there is a margin of safety in case one of the schools does not ultimately proceed to plan. I recognise that innovation projects will rarely proceed exactly to plan and this number of schools does not appear to be significantly inefficient.

Lastly, you make no mention of cost in your letter and so I would also expect to see an analysis of the impact on costs. Potentially I would expect for underspends in certain cost lines that have the potential to deliver a more efficient set of learning outcomes.

#### NORTHERN POWERGRID

is the trading name of Northern Powergrid (Northeast) Ltd (Registered No: 2906593) and Northern Powergrid (Yorkshire) plc (Registered No: 4112320)

Registered Office: Lloyds Court, 78 Grey Street, Newcastle upon Tyne NE1 6AF. Registered in England and Wales.

If you would like an audio copy of this letter or a copy in large type, Braille or another language, please call 0800 169 7602

[www.northernpowergrid.com](http://www.northernpowergrid.com)

I trust this gives you the feedback you need to proceed in your discussions with Ofgem. Please let me or Andrew Spencer know if you need more input or comment.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Jim Cardwell', with a stylized, cursive script.

Jim Cardwell  
Head of Regulation & Strategy



Scottish and Southern Energy Power Distribution  
Inveralmond House  
200 Dunkeld Road  
Perth, PH1 3AQ

Roger Hey  
Future Networks Manager  
Western Power Distribution  
Avonbank  
Feeder Rd  
Bristol  
BS2 0TB

19<sup>th</sup> September 2014

Dear Roger,

Regarding the application to Ofgem for a change to the number of schools participating in the Sola Bristol Project, and an extension of the project timeline, I have reviewed the evidence you set out both in the analysis completed by University of Bath, and in your six monthly progress report (June 2014).

The delay to the project, has resulted in new learning from the failure investigation and the adoption of several early warning systems. Allowing a time extension to act on this learning will provide verification of the effectiveness of these measures, while allowing the original learning objectives to also be met.

Having reviewed the University of Bath analysis of the proposed reduction to the number of schools taking part in the trials I am satisfied that this will not adversely affect the learning outcomes.

Scottish and Southern Energy Power Distribution support this change request.

Kind Regards,

A handwritten signature in black ink, appearing to read 'Stewart Reid', written over a horizontal line.

Stewart Reid  
Future Networks and Innovation Manager



Future Networks

Roger Hey  
Avonbank  
Feeder Road  
Bristol  
BS2 0TB

Your ref

Our Ref:ac/wpd/SB/001

Date  
26<sup>th</sup> September 2014

Contact / Extension  
Alan Collinson  
0151 609 2420

Dear Roger,

**SP Energy Networks Comments on WPD Change Request  
"Sola Bristol"**

Thank-you for the opportunity to comment on your proposed change request in relation to the above LCNF Tier 2 project. Generally, we are supportive of your request to extend the timescales to your project. We recognise that the duration of trials are important to ensure sufficient information is captured and ensure the results are relevant.

**Change Request Issue 1 – Reducing the number of schools involved in the trial from ten to four**

The supporting letter you have provided from the University of Bath suggests that the reduction in the number of schools from the original target of 10 to 4 (+1 adult education centre) but undertaken over a longer period of time can provide similar learning. We will refer to the expertise of the University of Bath if this can provide an equivalent level of learning.

**Change Request Issue 2 – Extension of the project timescales by 12 months**

We believe that this is reasonable and would agree that an extension would allow for additional time to ensure that the results are relevant and useful for future applications.

Our aim with the comments is to extract the maximum learning from your experiences so far and to help you achieve maximum success in the future, whilst still maintaining value for money for customers.

Regards,

Dr Alan Collinson, Technical Specialist, SP Energy Network

Ochil House, 10 technology Avenue, Hamilton International Technology Park, Blantyre, G72 0HT

Telephone: 0141 614 1000

[www.scottishpower.com](http://www.scottishpower.com)

SP Transmission Ltd, Registered Office: 1 Atlantic Quay, Glasgow, G2 8SP Registered in Scotland No. 189126 Vat No. GB 659 3720 08  
SP Manweb plc, Registered Office: 3 Prenton Way, Prenton, CH43 3ET Registered in England and Wales No. 2366937 Vat No. GB659 3720 08  
SP Distribution Ltd, Registered Office: 1 Atlantic Quay, Glasgow, G2 8SP Registered in Scotland No. 189125 Vat No. GB 659 3720 08



**Registered Office:**  
Newington House  
237 Southwark Bridge Road  
London SE1 6NP

Registered in England and Wales No: 3870728

**Company:**  
UK Power Networks  
(Operations) Limited

Roger Hey  
Future Networks Manager  
Western Power Distribution  
Avonbank  
Feeder Rd  
Bristol  
BS2 0TB

13<sup>th</sup> October 2014

Dear Roger,

**UK Power Networks response to Western Power Distribution Change Request  
(Sola Bristol Tier 2 LCNF Project)**

We welcome the opportunity to comment on your proposed change request in relation to the above LCNF Tier 2 project. We recognize the challenges that innovative projects face and the need to adapt to changes, while maintaining the focus on the original objectives and learning points.

Following our review of the letter of support from the University of Bath, please see below our specific comments:

- a. Change 1: Reduction of number of schools participating in the project from ten to five**  
The statistical analysis undertaken by University of Bath has shown that the reduction in the sample size will not fundamentally change the learning outcomes and therefore we are supportive of the proposed change. Our supportive decision was based on the evidence provided by University of Bath.
- b. Change 2: Extension of the project timeline by 12 months**  
In regards to the proposed extension of the project, and taking into account the fact that innovation projects face challenges, we understand and support that the change in data collection periods will not impact the learning outcomes for the domestic property trials. Based on this evidence including the letter from University of Bath, and that no other trial learning outcomes are impacted by the change we support the extension of the project timeline by 12 months.

In conclusion, we believe in the value that the Sola Bristol project will deliver to the electricity industry. Therefore, given the provided evidence and proposed changes we are able support that the change request be approved.

We trust you find these comments useful and constructive in the reassessment of the delivery of the Sola Bristol project.

**Return Address:**  
Newington House  
237 Southwark Bridge Road  
London  
SE1 6NP  
Martin.wilcox@ukpowernetworks.co.uk

Yours sincerely

A handwritten signature in blue ink that reads "M. Clark". The signature is written in a cursive style with a horizontal line underneath the name.

Michael Clark On behalf of Martin Wilcox  
Head of Future Networks  
UK Power Networks