Low Carbon Network Fund Project Progress Report June 2013

Flexible Networks for a Low Carbon Future

Version:	1.0
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1. Executive summary

1.1. Project Background

This project will trial a combination of smart network interventions and customer energy efficiency measures at three network locations. The objective is to demonstrate how they can release capacity on the HV network, allowing greater take up of low carbon technologies such as solar PV and heat pumps without the need for traditional network reinforcement. The project will also encourage specific I&C customers to improve the energy efficiency of their buildings to reduce their electricity demand in order to alleviate the need for reinforcement.

The results from these trials have the potential to inform future network planning and operational practices. This project will help DNOs more accurately assess operational plant ratings using dynamic techniques and how best to actively control the network at the EHV/HV level. It aims to provide evidence of the capacity headroom available in existing networks that can be used before traditional network reinforcement needs to take place. This will enable networks to connect more customers and plan network reinforcement activities to be timed optimally.

The overall project is divided in to 12 distinct work packages which complement each other and provide multiple methods which work together to achieve the overall aim of a 20% increase in network capability.

1.2. Project Progress Highlights

During this third reporting period of the project (December 2012 – June 2013) the project has completed a number of key milestones and continued to progress on many others.

Following the delays to the procurement and delivery of the substation monitoring equipment, the installation teams accelerated the installation program and regained much of the delay time. This element is now complete.

The enhanced network monitoring data is now being collected and stored in the iHost database. This important data enables detailed analysis of the network performance to be undertaken and to help determine how improved network utilisation may be achieved.

The baseline headroom document for the three trial sites has been completed and will be published shortly. The document sets out the network capacity for the three trial sites prior to the commencement of the project. This baseline will be the reference point from which capacity gains will be measured and the success of the project will be judged.

A contract is about to be placed for undertaking an assessment of the primary transformers for the application of dynamic rating. This will identify the suitability of the trial sites primary transformers for application of any dynamic rating. Following the assessment the suitable transformers will have the equipment fitted.

Testing of the flexible network control is nearing completion on the trial units installed in the Power Networks Demonstration Centre (PNDC) which opened in early May. The installation of the network automation in the St Andrews area is nearing completion and will be capable of reconfiguring the operating arrangement to balance load automatically.

A study for gaining capacity through creating an automated Flexible Network in the Whitchurch area has been completed. The study has determined that there can be a capacity gain through the application of flexible network automation in this area. The installation of the equipment will now follow.

The Building Research Establishment (BRE) has completed an initial model of the anticipated load in the trial areas using standard building models. BRE have also engaged with over 150 customers in the trial areas to collect energy consumption data and interest in participating in the energy efficiency trials. Engagement has been more challenging than anticipated with only 5-10% responding positively. Of these positive responses further discussions are progressing.

A visit by Ofgem was hosted in the SP Manweb area to see firsthand the activities on the project which was a very useful meeting. It is important that we continue to engage with stakeholders including Ofgem at a detailed level to ensure a broad understanding of the challenges of the project.

1.3. Key Risks

Recruitment Risks – BRE have led engagement with Industrial and Commercial customers within the trial area to examine the scope for energy efficiency to reduce electricity consumption. Engagement has proven to be challenging however a number of customers have been identified to progress discussions with to participate in trialling energy reduction measures. There is a risk that insufficient participation may not realise the target reduction of 2%. We do however remain confident that this will be mitigated through the other measures being undertaken.

Procurement risks – There is a general risk for procurement matters in that, to ensure best value is secured and robust governance procedures are followed, the timescales for procuring equipment may be longer than expected. This project has encountered delays in the procurement of high value equipment for the enhanced network monitoring. The risk of the delays of obtaining the monitoring equipment has been mitigated to some degree by accelerating the installation program. This was originally planned for 6 months duration and has been condensed in to 10 weeks by increasing the number of staff involved.

Installation risks – There have not been any major risks in the installation of equipment. The majority of risks were mitigated through undertaking of site surveys to identify what type of equipment could be practically installed and ensuring that the procurement specifications took account of any constraints. Further risks for the equipment installation were safety related and these were managed through the production of an "Installation Safety Method Statement" which provided further safety guidance to existing company safety procedures.

Other Risks – An ongoing risk is that a substantial change to the load in the area (such as a new customer) may change the need for the project by automatically triggering necessary reinforcement as it cannot be accommodated even with a successful outcome from the Flexible Networks project. At this time no major changes are known within the time period of the project.

1.4. Learning Outcomes

Learning points are reviewed by the Flexible Networks project team at regular meetings, to establish what was learned from the activities undertaken. For the last period following the installation phase of the substation monitoring equipment it was determined that were a number of actions which significantly contributed to the success of deploying substation monitors in a retro-fit situation. These were;

- Through detailed site surveys before specification and procurement, we identified the situations that the monitors would need to install into and determined the type of unit and sensors that would be most suitable. This avoided problems where the equipment would not fit or was not compatible with the type of network apparatus it was being connected to.
- The preparation of a detailed installation method statement and installation guides meant that all eventualities had been considered for the selected sites and no unforeseen safety issues were encountered.
- The thorough training of the installation staff ensured the equipment was installed safely and set up correctly on a single visit.
- Ensuring that robust processes were in place for testing the units prior to installation was an important step to prevent having to remove units not working correctly, return them to the factory and reinstallation afterwards.

Engagement with I&C customers has proven more difficult than initially anticipated, key challenges have included contacting the appropriate person in the organisation, gaining interest and trying to overcome misconceptions such as the purpose of the contact.

The process for learning capture is generally achieved through reporting and project documentation. For example, the documents produced for the installation method statement and installation guides can be utilised in future and shared with others. Also the rationale and methodologies applied within the project are also being documented so that the reasons behind key decisions on the project are captured. These documents will be published in due course.

External dissemination is undertaken at any forum at which the project is presented and these are listed in the Work Package 3.2 progress update in section 2. This will also be undertaken via the proposed project specific learning event later in the year. Internal dissemination is undertaken via our innovation conferences, the project teams' attendance at other department's team meetings and through documentation provided to staff.

2. Project manager's report

The last six months period has seen good progress in a number of areas and the project is generally running to plan apart from a few elements which have been delayed. The progress and details of each of the specific work packages is set out below

Work Packages 1.1 - Improved use of primary substation data

The network capacity assessment report, which provides the definitive starting point for the available headroom for the three trial areas, is complete and is undergoing final document formatting prior to public release. The report will be published on the project web site in due course.

The principles we are using for the data analysis of the substation monitoring data were presented at the National Physical Laboratory workshop on "Measurement for Smart and Intelligent Grids", held at the Royal Academy of Engineering, London. The presentation was well received and has been forwarded on to Ofgem, by request. An audio recording of the presentation is also available on Youtube.

Work Planned during the next 6 months:-

- Publish the network capacity assessment report.

Work Package 1.2 - Improved secondary substation data monitoring

Following the delays last year in the procurement and delivery of the substation monitoring equipment, the installation teams have made good progress and the substation monitors have been fitted. Data is being received into the iHost database server and is available for network analysis and to support the other work packages.

The two suppliers chosen for the substation monitoring equipment were, Selex-ES UK using their 'Gridkey' unit and Embedded Monitoring Systems Ltd using their 'Subnet' unit. There were a number of reasons for this strategy.

- To spread the risk of any equipment/component issues that may arise from a single manufacturer, particularly given the application of the technology.
- Each unit offered different solutions for the various applications across the range of sites. E.g. the suitability for primary substations versus secondary substations, the number of analogue channels required and meeting the constraints of the installations.
- The opportunity to gain experience from the installation and use of different units and to explore how we may derive further network benefit from any additional functionality available.
- Over the life of the project we will be able to see the operation and performance of the different monitors.

Members of the project team involved in the monitoring visited the suppliers during the factory acceptance testing stage to verify the factory testing and check on the quality control methods utilised.

So far the substation monitors have performed as required and the suppliers have provided valuable support to the installation and commissioning phases.

The installation works have gone particularly smoothly and the information collected from the initial site surveys really helped to design-out site specific difficulties. The use of the prepared installation method statement and the installation guides establish that they were fit for purpose and assisted staff when installing the equipment.

Commissioning the devices has been straightforward with minimal onsite work. Configuration of the monitors onto the iHost server was supported by our partner Nortech, who are also undertaking further work to simplify the data access and improve the user interface for the latest substation information.

The Primary installations in Scotland were delayed due to faulty SIM cards supplied to the monitor manufacturers. This has highlighted the importance of good quality factory testing by the manufacturer prior to shipping the products. This avoided wasted time at the installation and commissioning on site. Particularly as several monitors are pole mounted, which would require working at heights access to remove and send back the units to the manufacturer and a similar amount of work to reinstall them.

Work Planned during the next 6 months:-

- Determine optimal locations for the LV network voltage monitors following analysis of the substation voltage profiles.
- Continued monitoring of the operation and reliability of the devices and data communications.
- Monitor the hosting and processing of network data from iHost for analysis.
- Review the output from the monitors and disseminate results to the Design and Operations sections.

Work Packages 1.3 and 1.4 - Improved operational and planning tools

The load growth forecasting tool has been implemented and tested. An interesting feature of the tool is its ability to assess network risk beyond a simple consideration of maximum demand. It also provides a method of assessing the magnitude and duration of the larger peak load events. The tool is now being evaluated internally by the Network Design department before sharing more widely.

Preparations are underway by the University of Strathclyde for the initial assessments of the first batch of secondary substation monitoring data. Prototype

generic data assessment tools have been written and are currently being assessed, initially focussing on making sure that the data flows are functioning correctly. The University of Strathclyde has developed links with Bath University and Reading University – the two other academic institutions involved in significant processing of network monitoring data being collected as part of other Ofgem Low Carbon Network Fund projects. This is ensuring effective knowledge transfer and is avoiding duplication of effort.

The industry best practice guide to for data monitoring and analysis due in Q3 2012 is not being finalised until we have completed more data analysis. We consider that we cannot provide a "best practice guide" until we have undertaken more comprehensive analysis of the data now being provided by the network monitoring, and consulted with other DNOs on the learning from other projects in relation to network monitoring. We consider this will have little impact on the project for ourselves and for the other DNO's, particularly as the monitoring element has overlap with other LCNF projects which are involved in LV network monitoring and the assessment of monitoring devices. This point is also set out in section 11 as a deviation from the full submission. We expect this milestone to be delivered by the middle of 2014 once sufficient data has been collected and engagement with other DNOs has been undertaken.

Work planned during the next 6 months:-

- The main focus will be the evaluation of the secondary substation data by the University of Strathclyde.
- The new network monitoring data will be used to validate the network models developed by TNEI
- Develop data retrieval and visualisation requirements for Nortech's iHost system, based on the initial findings from the University of Strathclyde analysis.

Work Package 2.1 - Dynamic thermal ratings (DTR)

Weather stations have been installed at the selected Primary locations. This will provide weather data via the "iHost" server to correlate to both the monitoring (in WP 1.2) and to DTR of dynamically rated equipment.

A tender for Primary Transformer testing and dynamic assessment is currently underway which should be awarded by the end of June.

We are sourcing alternative smaller sensors which have now become available, to measure the actual 33kv OHL conductor temperature. The previous option was deemed unsuitable for 33kV overhead lines, after having been trialled on 132kV conductors. Extensive discussions have been held with the relevant staff involved in our LCNF Tier 1 project looking at the dynamic rating of the 132kV overhead line in North Wales to ensure any prior experience is applied, whilst recognising the

differences in applying the technology at 33kV rather than 132kV such as the relative strength of the overhead lines.

Work Planned during the next 6 months:-

- To evaluate the condition assessment of the primary transformers at St Andrews, Cupar, Whitchurch, Liverpool Road, Ruabon and Yockings Gate following survey.
- To model the determined dynamic rating of Primary transformers.
- Install equipment at selected Primary transformer sites to verify the DTR model.
- To procure and install the 33kV OHL conductor temperature sensors.

Work Package 2.2 - Flexible network control

The Central Communications Unit (CCU), with enhanced radio bandwidth to serve the purposes of the project have successfully been tested in the Power Network Demonstration Centre (PNDC). We are now progressing to site installation and testing.

A study for gaining capacity through creating an automated Flexible Network in the Whitchurch area has been completed. The study has determined that there can be a capacity gain through the application of flexible network automation in this area. The installation of the equipment will now follow using the same approach as has been developed for St Andrews area.

Work Planned during the next 6 months:-

- Complete the installation of additional automation points across the Network.
- Installation of trial CCU equipment in to Primary substations to extract analogue data and undertake flexible control approach.
- Demonstration of Flexible Control approach to quantity possible capacity headroom that can be achieved in practice whilst ensuring network risk is not compromised.

Work Package 2.3 - Energy efficiency

A building load profile modelling tool has been developed as part of the project. The tool initially generated a high level, predictive model for each of the three trial areas based upon the estimated quantity and mix of buildings/premises on the network in question. The model generated the initial profiles by applying industry accepted load profiles to the properties deduced as being on the network following a detailed desk based study which identified quantity and mix of individual commercial

property/premises type and floor area by relevant post code areas. Further investigations ensured that the domestic sector was also accurately modelled, also by post code but additionally supplemented with UK Government Housing Condition survey findings, before assumed energy efficiency levels where applied to all buildings. More recently, substantial work has been undertaken to refine the model so that it predicts the load using known supply connection point data and thus no longer relies on high level post code data. Further work has also enabled the tool to develop such that it can now model down to individual sub-station level which makes it a much more useful tool. The next steps are to continue to refine the tool to make it as accurate as practicable as well as conducting some comparisons between the tool modelled output and actual monitored data; a process which will help calibrate the accuracy of the tool and evaluate its effectiveness.

Stakeholder Interaction and Opportunities Identification - An intensive stakeholder interaction process was undertaken in an attempt to gain valuable support and input from organisations who were deemed likely to be key contributors and benefactors in helping realise the overall aims of the project. The targeted stakeholders comprised a mix of public and private sector organisations and included Local Authorities, Historic Scotland, Water Authorities, Further Education Establishments, large industrial and commercial organisations and a range of other private sector businesses including some small and medium enterprises. The process ensured that a wide range of sectors, businesses and building types were invited to participate in the project across each of the three trial areas. Over 150 organisations were contacted using a range of approaches and of these approximately only 5-10% showed an interest in the project, the opportunities it could help realise, and thus were happy to engage with the process. As a result we are now working with these parties in more detail and are currently building upon these relationships. Over the next few months we hope to have highlighted and developed a range of site specific, cost effective, intervention measures. Whilst this part of the project has proved extremely difficult the project is likely to have helped build some important relationships with key consumers.

Work Planned during the next 6 months:-

- Continued refinement of load modelling and comparison with actual substation monitoring data

- Identify and propose intervention measures with customers

Work Package 2.4 - Voltage regulation

Two trial locations for utilising voltage regulating devices to solve voltage problems have been identified in St Andrews and Whitchurch. The voltage regulators will support the application of the flexible network automation, by resolving voltage issues anticipated when the network is automatically reconfigured and encounters an N-1 situation.

An 11kV voltage regulator package solution has been installed on the PNDC network; this will enable simulation tests to be carried out for the network parameters that would be encountered in the two trial sites.

Operational policy directive has impacted on the solution requiring additional functionality for remote control capability. This is to account for a safety alert following a fatality involving the local operation of a tap changer. We do not envisage this to have a material impact on the budget requirements for the technology.

Work Planned during the next 6 months:-

- Resolve remote control issues
- Further trials at the PNDC to mimic real-time network scenarios
- Undertake network alterations to accommodate voltage regulator

Work Package 3.1 - Internal stakeholder engagement

The ED1 preparation team have engaged with the LCNF project teams to identify how the learning outcomes from this project can be embedded within our business plan. A number of the solutions we are developing have been factored into our business plan which we see as an early sign of the success of the project in gaining internal acceptance.

The business champions and steering group for the project held a meeting in May to discuss the project progress and agree how the learning from the project, once proven, may be accepted into normal business operations.

Internal staff continue to be briefed on the LCNF activities and projects to gain support and nurture ideas for any other operation benefits that can be derived via a variety of approaches including team briefs, intranet updates and other ad-hoc meetings. These will continue over the next six months to maintain the awareness of the project that we have generated.

Work Package 3.2 - External stakeholder engagement

BRE have had a number of meetings with larger customers around the trial sites to discuss and advise of possible energy efficiency measures, as well as extensive telephone and electronic communication. Historic Scotland who are currently engaged with the project as a potential site for energy efficiency solutions are intending to include a story on their blog discussing involvement.

Plans for a project learning dissemination event to be held in Scotland are underway and it is proposed that the event will be held at the Power Networks Demonstration

Centre (PNDC) in late September, the details of the event and invitations will be communicated in the near future.

The project details, aims and objectives were presented to the New Energy Forum group in London in April, this forum was attended by several different organisations involved in future energy systems and gave an opportunity for knowledge sharing. The Flexible Networks data analysis strategy was also presented at a conference held by the National Physics Laboratory on data monitoring with a very positive response to the approach we are taking.

Further meetings have been held with Wrexham County Borough Council to keep them informed of the project progress and to advise on any further Carbon Reduction activities being considered.

Work Package 3.3 - Verification of experimental design

Work is ongoing with University of Strathclyde for them to review the methodologies of the work packages.

Work Package 3.4 - DNO policy changes

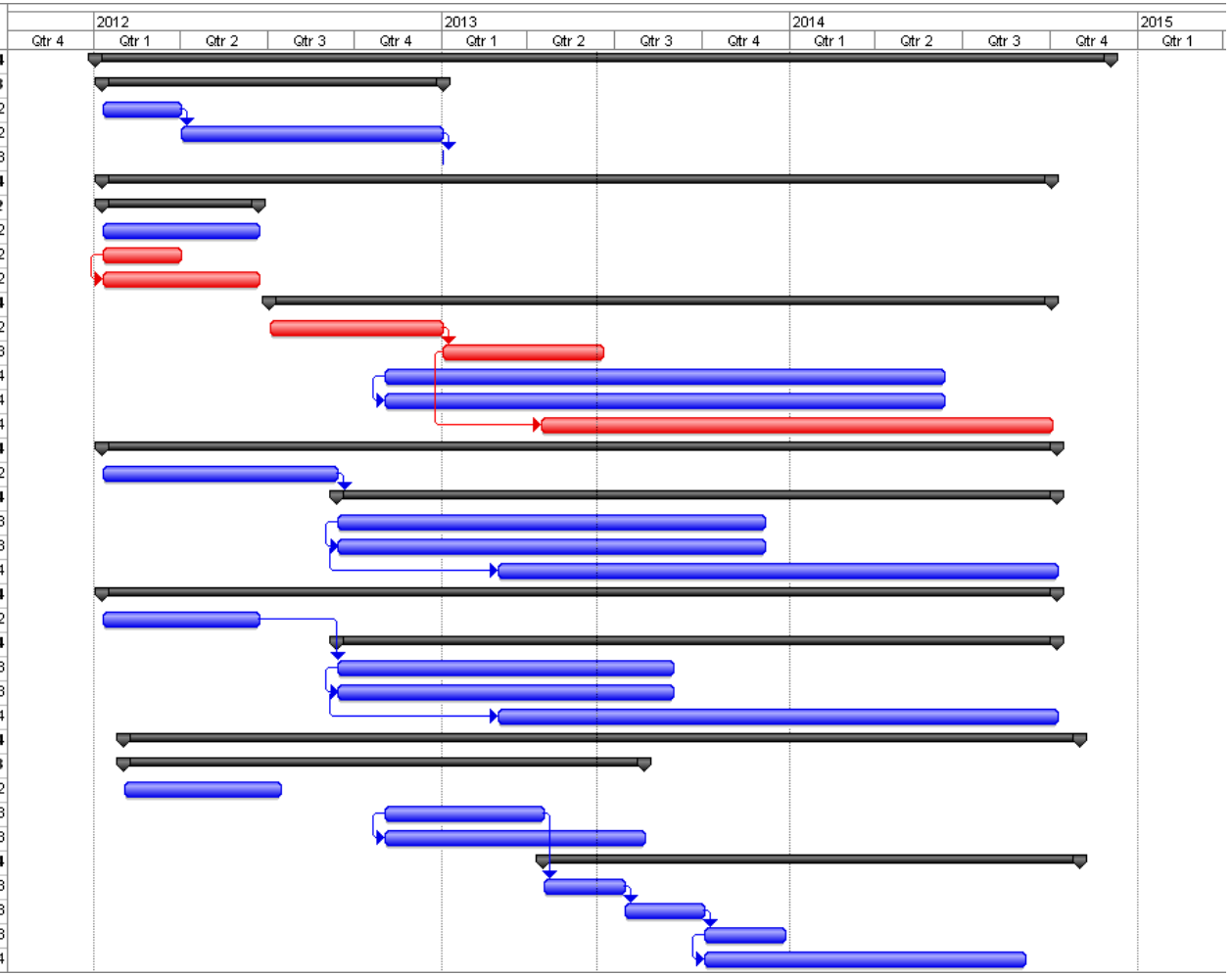
The activities of this work package do not commence until the latter stages of the project plan.

3. Key Issues

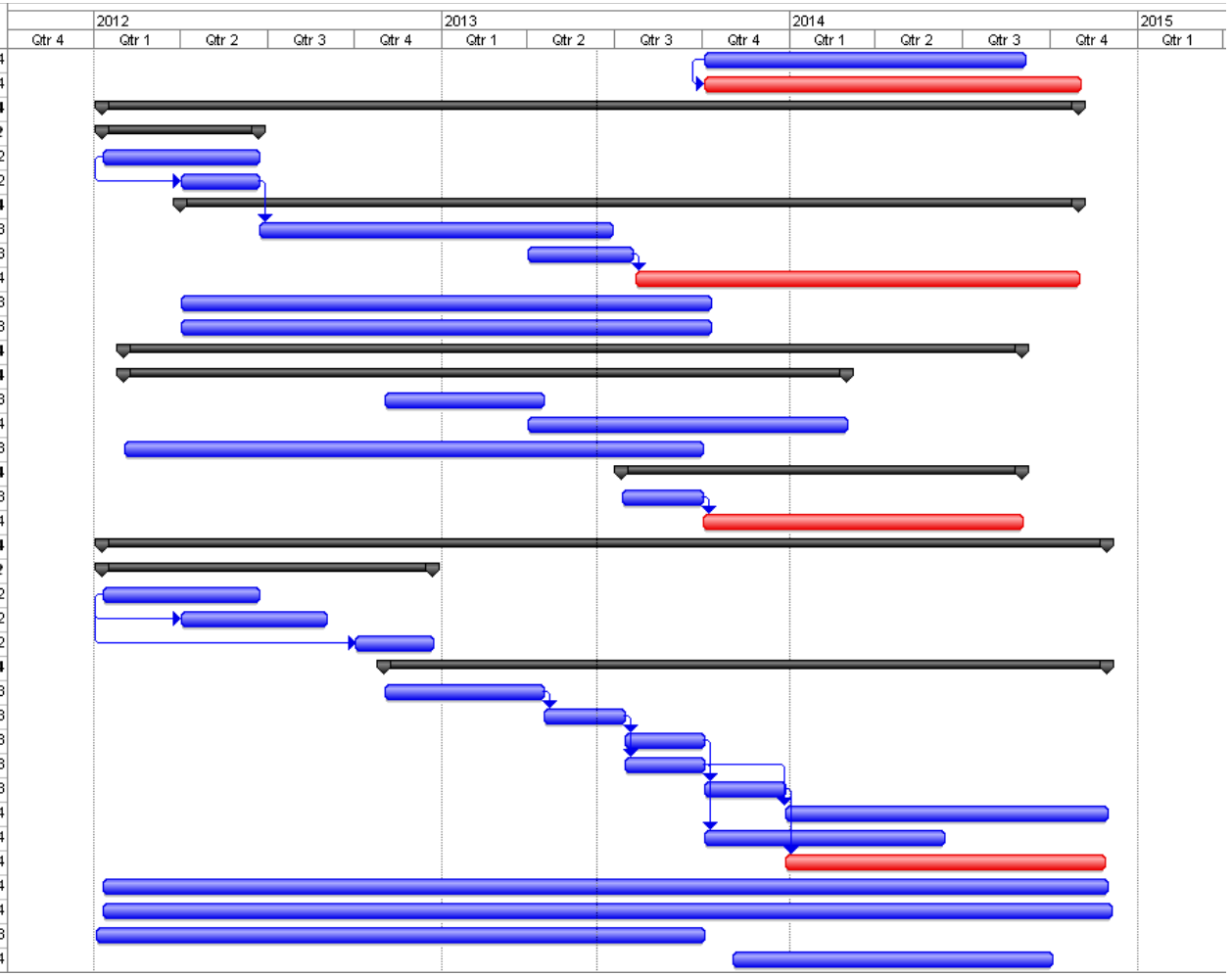
There are no specific issues in the overall delivery of the project. Some elements have experienced delays in their implementation however we are confident that the overall milestones and goals of the project will be achieved within the duration of the project. The finite limitation on resources with the necessary expertise combined with resourcing other innovation activities continues to be a challenge.

Project **Plan**

ID	Task Name	Start	Finish
1	**Work Packages**	**Mon 02/01/12**	**Wed 03/12/14**
2	**Work Package 1.1**	**Mon 09/01/12**	**Tue 01/01/13**
3	Design	Mon 09/01/12	Fri 30/03/12
4	Development and Testing	Sun 01/04/12	Mon 31/12/12
5	Issue of good practice guide	Tue 01/01/13	Tue 01/01/13
6	**Work Package 1.2**	**Mon 09/01/12**	**Wed 01/10/14**
7	**Engineering Design**	**Mon 09/01/12**	**Thu 21/06/12**
8	Test case design methodology	Mon 09/01/12	Thu 21/06/12
9	Functional and Integration specifica	Mon 09/01/12	Fri 30/03/12
10	Installation methodology	Mon 09/01/12	Thu 21/06/12
11	**Monitoring Deployment**	**Mon 02/07/12**	**Wed 01/10/14**
12	Equipment procurement	Mon 02/07/12	Mon 31/12/12
13	Installation	Tue 01/01/13	Mon 17/06/13
14	Software development	Thu 01/11/12	Wed 11/06/14
15	Procedure development	Thu 01/11/12	Wed 11/06/14
16	Testing and Validation	Mon 15/04/13	Wed 01/10/14
17	**Work Package 1.3**	**Mon 09/01/12**	**Wed 08/10/14**
18	Design	Mon 09/01/12	Wed 12/09/12
19	**Development and Testing**	**Thu 13/09/12**	**Wed 08/10/14**
20	Software development	Thu 13/09/12	Wed 04/12/13
21	Procedure development	Thu 13/09/12	Wed 04/12/13
22	Testing and Validation	Thu 28/02/13	Wed 08/10/14
23	**Work Package 1.4**	**Mon 09/01/12**	**Wed 08/10/14**
24	Design	Mon 09/01/12	Thu 21/06/12
25	**Development and Testing**	**Thu 13/09/12**	**Wed 08/10/14**
26	Software development	Thu 13/09/12	Fri 30/08/13
27	Procedure development	Thu 13/09/12	Fri 30/08/13
28	Testing and Validation	Thu 28/02/13	Wed 08/10/14
29	**Work Package 2.1**	**Wed 01/02/12**	**Fri 31/10/14**
30	**Engineering Design**	**Wed 01/02/12**	**Wed 31/07/13**
31	Test case design methodology	Wed 01/02/12	Fri 13/07/12
32	Functional and Integration specifica	Thu 01/11/12	Wed 17/04/13
33	Installation methodology	Thu 01/11/12	Wed 31/07/13
34	**Technology Deployment**	**Thu 18/04/13**	**Fri 31/10/14**
35	Equipment procurement	Thu 18/04/13	Wed 10/07/13
36	Installation	Thu 11/07/13	Wed 02/10/13
37	Testing and Verification	Thu 03/10/13	Wed 25/12/13
38	Software development	Thu 03/10/13	Wed 03/09/14



ID	Task Name	Start	Finish
39	Procedure development	Thu 03/10/13	Wed 03/09/14
40	Testing and Validation	Thu 03/10/13	Fri 31/10/14
41	**Work Package 2.2**	**Mon 09/01/12**	**Thu 30/10/14**
42	**Engineering Design**	**Mon 09/01/12**	**Thu 21/06/12**
43	Test case design methodology	Mon 09/01/12	Thu 21/06/12
44	Functional and Integration specifica	Sun 01/04/12	Thu 21/06/12
45	**Technology Deployment**	**Sun 01/04/12**	**Thu 30/10/14**
46	Equipment procurement	Fri 22/06/12	Fri 28/06/13
47	Installation	Mon 01/04/13	Fri 19/07/13
48	Testing and Verification	Mon 22/07/13	Thu 30/10/14
49	Software development	Sun 01/04/12	Wed 09/10/13
50	Procedure development	Sun 01/04/12	Wed 09/10/13
51	**Work Package 2.3**	**Wed 01/02/12**	**Mon 01/09/14**
52	**Energy Surveys**	**Wed 01/02/12**	**Fri 28/02/14**
53	Customer engagement	Thu 01/11/12	Wed 17/04/13
54	Energy surveys	Mon 01/04/13	Fri 28/02/14
55	Modelling	Wed 01/02/12	Mon 30/09/13
56	**Network trials**	**Tue 09/07/13**	**Mon 01/09/14**
57	Installation	Tue 09/07/13	Mon 30/09/13
58	Testing and Verification	Tue 01/10/13	Mon 01/09/14
59	**Work Package 2.4**	**Mon 09/01/12**	**Fri 28/11/14**
60	**Engineering Design**	**Mon 09/01/12**	**Fri 21/12/12**
61	Test case design methodology	Mon 09/01/12	Thu 21/06/12
62	Functional and Integration specifica	Sun 01/04/12	Fri 31/08/12
63	PNDC test methodology	Mon 01/10/12	Fri 21/12/12
64	**Technology Deployment**	**Thu 01/11/12**	**Fri 28/11/14**
65	Equipment procurement	Thu 01/11/12	Wed 17/04/13
66	Installation Ph1	Thu 18/04/13	Wed 10/07/13
67	Installation Ph2	Thu 11/07/13	Wed 02/10/13
68	Testing and Verification Ph1	Thu 11/07/13	Wed 02/10/13
69	Testing and Verification Ph2	Thu 03/10/13	Wed 25/12/13
70	Procedure development	Thu 26/12/13	Fri 28/11/14
71	Testing and Validation Ph1	Thu 03/10/13	Wed 11/06/14
72	Testing and Validation Ph2	Thu 26/12/13	Wed 26/11/14
73	**Work Package 3.1**	Mon 09/01/12	Fri 28/11/14
74	**Work Package 3.2**	Mon 09/01/12	Wed 03/12/14
75	**Work Package 3.3**	Mon 02/01/12	Wed 02/10/13
76	**Work Package 3.4**	Fri 01/11/13	Thu 02/10/14



4. Consistency with full submission

One element from the submission was that in work package 1.1 we set out was that we would undertake "Completion of a new industry best practice guide to for data monitoring and analysis that will include detailed consideration of measurement and modelling uncertainty - Third quarter 2012".

We have purposefully delayed the completion of this document until further analysis work is undertaken, as it is considered that we cannot provide an industry best practice guide until we have carried out a substantial portion of the analysis work and determined the learning for the guide. We also intend to consult with other DNOs for the creation of such a document to ensure a consensus that this is a best practice guide. We expect this document to be available mid 2014 once sufficient data has been collected and we have engaged with other DNOs on this subject.

5. Risk management

Several risk perceptions have been updated in the table below, to reflect how certain risks have not materialised in those aspects of work completed with a review and consideration for those risks that still exist.

No.	WP	Risk Description	Mitigation	Contingency Plan	Current Perception
1	WP 1 WP 2	The network trial sites may not be representative enough in terms of topology, and load and generation issues to provide learning for other UK DNOs.	Three network trial locations have been selected with different topology, varying levels of PV connection and different customer demographics. UoS will also provide expert review of experimental design to ensure that outcomes are technically robust, representative and verifiable.	Monitoring can be transferred to other sites relatively easily if required. It would not be necessary to repurchase monitoring equipment.	The three trial sites are still considered suitable for the experiments of this trial, i.e. Wrexham – high penetration of PV, St Andrews – increasing load and generation in a radial type network, Whitchurch – increasing load in an interconnected type network.
2	WP 1.2	There is a risk that procurement timescales could lengthen if monitoring equipment is not readily available.	The majority of the monitoring equipment has been deployed before by SPEN so procurement timescales are well understood.	As equipment for network trials becomes available, it will be installed at each of the 3 network trial areas consecutively with sites prioritised depending on criticality of network benchmarking. This will prevent any significant slip of project timescales.	Complete. Monitoring equipment is now delivered and installed. Only risk remaining is large scale failure of the population of units, this is perceived as low risk, as they are performing satisfactorily to date.
3	WP 1.2	Customers may suffer supply interruptions during installation of monitoring equipment.	Installation of monitoring at substations should not require an outage in most cases and if outage is required, it should be possible to minimise customer supply interruptions by load shifting.	It has been assumed that a small percentage of secondary substations will result in supply interruptions and a detailed customer engagement strategy has been developed to deal with this.	Complete. There have been no interruptions to customers during the monitoring equipment installations.
4	WP 1.2	The development of a "smart" monitor, may require additional time due to unforeseen development risk.	To mitigate this, SPEN will be engaging with a technology partner (Nortech) with expertise in developing algorithms for these devices and with a clear business plan in line with the aims and objectives of the LCNF project.	This is not on the project critical path.	Complete. The equipment development work has been completed, with the monitor suppliers. No delaying issues arose and all equipment is working satisfactorily.
5	WP 1.1 WP 1.2	Significantly more data will be generated to collect, communicate, store and process. Increase in costs of communication systems.	The magnitude of annual raw data storage required has been estimated. Work Packages 1.1 and 1.2 will explore the management of large datasets.	Sampling rate can be optimised as necessary.	Complete. Sampling rates and data size have shown to be acceptable for the data being collected.
6	WP 1.2	There could be data privacy issues for customers due to the	The existing SPEN regulations governing data privacy for customers will be used in this		Complete. There are no data privacy issues. Ofgem have approved our 'Customer

		extensive programme of monitoring to be deployed.	project.		Engagement Plan' and this includes how we will ensure customer privacy.
7	WP 1.2	Increased visibility of the network through enhanced monitoring may actually erode anticipated headroom.	Traditionally, there has been a degree of conservatism applied to network design.	Greater knowledge of headroom will improve risk management and reinforcement prioritisation for the network, protecting customers and ensuring P2/6 compliance.	No change.
8	WP 1.3 WP 1.4	The development of new tools and processes for the control room and network design involves some complexity and time/cost risk.	SPEN has engaged partners with expertise in the development of tools/software for this application (UoS, TNEI).	This is not on the project critical path.	No change.
9	WP 1.3 WP 1.4	Failure of internal user to adopt new tools and processes.	This project contains a detailed component of internal stakeholder engagement (WP 3.1), from the start of the project, to obtain user input and maximise likelihood of adoption. Business change techniques will also be utilised.	Executive buy-in could be utilised	No change. Business champions at manager level are being used to ensure adoption of LCNF learning.
10	WP 1.3 WP 1.4	The 11kV network has not been modelled in entirety, only in limited network areas when it has been required. The LV network is not modelled in detail at all. There is minimal data available on legacy assets at these voltage levels. Once 11kV and LV network models are created, there needs to be a clear maintenance strategy to reflect new connections.	The impact of this on the value of data will be investigated through a detailed uncertainty analysis. In addition, tools that can be used to automate the process of model creation will be investigated. It is not the intention to model all LV networks in detail but rather to improve representation of them. Strategies for model maintenance, through engagement with key customers for example, will be developed.	UoS has developed a GIS software that could be used to accelerate input of overhead line lengths.	No change.
11	WP 2.2	From investigation of flexible network control, it may be found that the trial networks are	A range of representative network area topologies and characteristics are being investigated.	This will be a learning point in itself. This should provide some excellent insight into the capacity headroom increases possible with this	The Whitchurch network investigation has shown a worthwhile return for flexible network control.

		already running efficiently or that there are diminished returns associated with the use of this network technology.		technology for a range of representative topologies and characteristics.	
12	WP 2.3 WP 3.2	Engagement with external stakeholders i.e. customers, other DNOs, academia, local councils and authorities, community groups, may not be very effective.	A detailed element external stakeholder engagement is included in the project and UoS is providing support on knowledge dissemination. A customer engagement strategy has already been developed and BRE Trust will be involved in carrying out the energy surveys.		No change.
13	WP 2.3	It may not be possible to achieve the expected energy efficiency savings or there may be a lack of customer uptake.	A focussed approach will be used to target customers who should be able to achieve the most energy savings through proposed energy efficiency measures. A network benchmark will be established through monitoring before energy efficiency measures are trialled to provide a technically sound appraisal of possible benefits.	A customer cash incentive of £100k in total will be made available to encourage uptake. A reasonable outcome may be that energy efficiency measures do not have an adequate cost-benefit case.	No change.
14	There is a possibility of the unforeseen appearance of a load of up to 5-6MW at St Andrews or Whitchurch before the next price control period, that would require reinforcement. Even though this load is a marginal increase, it may cause P2/6 non-compliance.		Use early outcomes from LCNF project to delay reinforcement where possible.	Typically, the onus would be on the connecting customer to subsidise network reinforcement although regional development agencies may contribute. The network may need to be reconfigured but would still provide useful learning on network behaviour.	No change.
15	The project may not provide the expected capacity headroom increases and St Andrews and Whitchurch may need to be reinforced using the traditional approach and/or it is not possible to connect much additional PV at Wrexham.		This project is based on a methodology of integrated, discrete work packages which have all been identified as having the potential to provide headroom increases. Risk is mitigated through		No change.

6. Successful delivery reward criteria (SDRC)

Project budget (criteria 9.1) – At present the spend is lower than budget to date for a number of reasons;

- The expenditure on most of the Dynamic rating and Whitchurch network automation equipment has not yet been incurred.
- The procurement cost of the monitoring equipment was lower following the tender process.
- The installation costs for the monitoring equipment have been lower than expected.
- None of the contingency budget has been required to date.
- No payments to users have yet been made to date.

Project Milestone Delivery (criteria 9.2) – the overall deliverables of the project remain on track however some elements of the project have experienced delays as would be expected in any major innovation project of this scale. We believe that these will not impact the overall delivery of the project.

Creation of a Flexible Network (criteria 9.3-9.5) – no update can be provided until the project is complete however we remain confident that a 20% headroom can be created.

Engagement, dissemination and adoption (criteria 9.6) – Internal business champions have been established at manager level to ensure staff engagement and adoption of successful technology roll-out.

The Flexible Networks project team continue to engage with Energy Networks staff to ensure the support and acceptance of the project methodologies and application.

A Flexible Networks LCNF learning event is being planned for September time, to share the learning that we have encountered to date.

7. Learning outcomes

The installation of the substation monitoring equipment has been very successful which can be attributed to a number of key factors;

- The survey of all sites undertaken at the outset helped inform the equipment specifications and ensured the monitors procured were suitable for the situations they were to be utilised.
- The preparation of detailed the installation method statement and installation guides meant that all eventualities had been considered for the selected sites and no unforeseen difficulties were encountered.
- The training of the installation staff ensured the equipment was installed safely and correctly on a single visit.

Challenges in engaging with I&C customers with regard to energy matters

- Identifying the appropriate person in an organisation to make contact with,
- Gaining interest and trying to overcome misconceptions such as the purpose of the contact,
- Providing suitable justification for the customer on the benefit of participating in undertaking further energy efficiency measures. A large number of customers already have extensive energy efficiency and management technology and practices in place. Further measures are not regarded as being economic or are technically too difficult to implement.

8. Business case update

We have no changes or update to the business case as we believe that the project will still be completed within budget on time.

9. Progress against budget

Table 1 below is a summary of the total project budget position from commencement to June 2013.

Table 1.

Activity	Budget to June 2013 (£k)	Actual to date (£k)	Funding carried forward (£k)	Commentary
Labour	1,340	678	-662	The monitoring installation labour costs were less than initially forecast. Some other work package labour costs have not yet been incurred or charged to the project.
Equipment	1,688	759	-929	The final costs of the substation monitoring equipment were less than originally budgeted. Various other equipment costs for Dynamic rating and network automation not yet incurred or invoices awaiting payment.
Contractors	861	350	-511	Currently awaiting several contractor invoices which have not been recognised within our budget update.
IT	306	88	-218	The IT costs for Dynamic rating have not yet been incurred until interface matters are finalised.
Travel & Expenses	15	15	0	
Contingency & Others	365	0	-365	No spend of contingency has been required to date.
Payments to users	50	0	-50	No payments to users have been made to date however we expect these to be incurred within the next 6 months.
Totals	**4,627**	**1,890**	**-2,736**	

The above table shows a variance between the initial budget to June 2013 and the actual to date. This is due to a number of costs to the project having not been incurred in line with the project progress and some costs have yet to show against the project.

The contingency budget for the project elements which have been completed to date has not been required.

In line with the funding arrangements, SPD have contributed to costs incurred for a proportion of the expenditure for which they receive a direct benefit, detailed in table 2 below. Costs for the LCN funded element have been transferred from the bank account and a copy of the statement is included in the Appendix.

Table 2.

Activity	SPD Contribution to date (£k)	LCNF costs (£k)	Total/Actual to date (£k)
Labour	272	406	678
Equipment	534	225	759
Contractors	148	202	350
IT	34	54	88
Travel & Expenses	5	10	15
Contingency & Others	0	0	0
Payments to users	0	0	0
Totals	**992**	**898**	**1890**

10.Bank account

A copy of the bank statement detailing the transactions of the Project Bank Account since its creation is attached to this report. The figures in the statement relate to the LCN funded costs only and not the total project costs. The total debit from the LCNF bank account is lower than the LCNF until the date of the next costs reconciliation. Minor differences in the reconciliation between costs and funding being transferred from the bank account are due to timing of transactions.

11.Intellectual Property Rights (IPR)

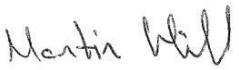
The project is not funding the development of any technology which should create foreground IPR. All partners have accepted the LCNF default IPR arrangements. This approach has not changed since the project commenced and we do not anticipate any further changes.

12.Accuracy assurance statement

The Project Manager and Director responsible for the 'LCNF - Flexible Networks Project' confirm they are satisfied that the processes and steps in place for the preparation of this Project Progress Report are sufficiently robust and that the information provided is accurate and complete.

Steps taken to ensure this are:-

- Regular update reports from each project team member for their area of responsibility.
- Evidence of work undertaken by the project team is verified by the section manager as part of their day-to-day activities. This includes;
  - Checking and agreeing project plans.
  - Holding regular team project meetings and setting/agreeing actions.
  - Conducting frequent one-to-one meeting and setting/agreeing actions.
  - Confirming project actions are completed.
  - Approving and signing off completed project documents.
  - Approving project expenditure.
- Weekly reports are produced by each section manager of the progress of the work their department is undertaking.
- Director and Senior Management summary reports for the project progress are produced.

Signature (1):  Martin Hill – Future Networks Manager

Signature (2):  Jim Sutherland – Engineering Director