Flexible Networks for a Low Carbon Future

Low Carbon Network Fund Project Progress Report

December 2012

Version:	1.0
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Flexible Networks for a Low Carbon Future Project

Reporting period June 2012 – December 2012

1. Executive summary

1.1. Project Background

This project seeks to 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, heat pumps and EV charging points without the need for expensive network reinforcement. The project also intends to 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 so that it happens only when genuinely needed.

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.

A foundation element of the project involves enhanced network monitoring, which will allow detailed analysis to accurately determine existing performance, and then influence how the deployment of the various technologies can improve the network design and utilisation, including the flexible control of load/voltage and network dynamic rating.

1.2. Project Progress Highlights

During this second reporting period of the project (June 2012 – December 2012) the project has consolidated the initial phase work and a number of key achievements have been made, including:-

- A second meeting was held in September with all the Project Partner teams and the Scottish Power LCNF team, where all parties presented on their activities to date and progressed the collaborative working between them.

- Two internal innovation conferences have been held for over 100 staff in both SPD & SPM licence areas for internal dissemination and to raise awareness of the project.

- LCNF Conference in Cardiff.

- The Customer Engagement plan has been approved by Ofgem.

- Procurement of network control equipment *(fourth quarter 2012)*

- Completion of detailed design specifications for voltage regulators *(third quarter 2012)*

- Initial milestones by project partners have been achieved, in that BRE have undertaken early engagement with customers *(third quarter 2012).*

- The procurement of the network monitoring devices has been completed and awaiting delivery *(fourth quarter 2012)*.

2. Project manager's report

2.1. Project Progress

Since the last report in June it has been a busy period on the project simultaneously pulling-together the various aspects of the work packages, many of which are well underway but not yet reached completion.

In September we held a second project workshop for the Flexible Networks project team and representatives from each of the project partners. This proved very beneficial to all parties and provided cohesion of the various work elements that each of us is working on. Each party gave an update on the work undertaken so far, learning to date and the next stages of their work. The 'better use of existing data' analysis gave a good insight into the issues of data interpretation and data correction, and this will form the basis of the good practice guide which we will be publishing in Q1 for 2013. TNEI and the University of Strathclyde are devising methodologies of how to reduce the ambiguity of data trend interpretation and algorithms which can provide accurate correction of rogue data values.

BRE provided an update to their analysis of the three trial sites, whereby they have mapped the areas with population, building and usage types to construct a picture of what the expected the electricity load would be against median and upper quartile energy efficiency. Further work is ongoing to match this against the 'actual' electrical load for the areas and to highlight the rating of the areas efficiency, and then to look to target any energy efficiency measures.

Also in September, we held two innovation conferences for SP Energy Networks staff. The presentations covered various innovation initiatives with particular focus

on Flexible Network but also included a summary of the other LCNF projects ongoing in by other DNO's. We included a session to engage with the staff and to seek their views of how distribution networks could develop to meet the future needs of the population. We received positive feedback on the innovation projects ongoing and staff were pleased to see the level and commitment to the development of the network. As part of SDRC 9.6, feedback from staff has been recorded and documented as evidence.

In October the team put significant effort into preparing for the annual LCNF conference in Cardiff. We created a stand with handouts explaining the various LCNF projects ongoing in Scottish Power and presented on the 'Flexible Networks' project, one of which can be found at: http://www.spenergynetworks.co.uk/innovation/documents/Flyer_FlexibleNetworks.pdf . We had a number of approaches from interested parties wishing to discuss further details of the project and also allowed us the team to learn from issues of a similar nature from other DNO's experiences.

In November Ofgem approved our 'Customer Engagement Plan' for this project which is now published on our website. As the Flexible Networks project is focussed on being DNO led, the main thrust of our domestic customer engagement is to either install a supply point voltage monitor, where we are unable to do this on the LV network, or should we need to have a system outage to install network monitoring equipment. However the kit we have procured and installation methods we have devised for the monitoring equipment should mean that shutdowns to customers are not required.

The procurement contracts for the equipment have been concluded, however this has taken slightly longer than anticipated while the procurement governance was robustly applied to ensure best value for the project. To counteract this we have identified additional resources to accelerate the installation program and provide the network data as soon as possible for the new data analysis to commence.

Nortech have completed their milestones ahead of plan and the 'iHost' data hub servers are installed, and up and running. The system is now receiving data from the test case sites we have installed and is working successfully.

BRE have commenced their early milestone of engaging with the major load customers. They have had meetings with St Andrews University about how they may be able to reduce their energy use through expert energy surveys and advice. The university are willing to work with BRE and we are confident that gains can be achieved.

We continue to maintain the project website which contains information about the project. We will enhance the information in this area shortly with project documentation and more narrative of the project as it progresses.

2.2. Key Issues

There are no specific issues in the delivery of the project. Delays incurred in the first year associated with the procurement of equipment have now been resolved and we will be increasing our focus on the areas which have been slightly delayed to ensure we regain this time and keep the overall outcome of the project on track.

2.3. Key Deliverables/Events

The key delivery stages of the project detailed later in the document.

2.4. The next 6 months

During the next 6 months a number of key elements of the work packages will come together and we will be publishing several documents on the SPEN LCNF website, such as;

- The 'BRE stakeholder engagement plan', detailing how the project will work with larger customers to drive the energy efficiency gains.
- The 'substation' and 'LV network' monitoring specifications which detail the functional requirements of the equipment we have procured.
- An 'installation guide' for the selected monitoring equipment.
- An industry 'good practice guide' to for data monitoring and analysis, that will include detailed consideration of measurement and modelling uncertainty.

As the network data becomes available we can commence early analysis of the network performance and identify what flexible network options can be implemented.

3. Business case update

We have no changes or update to the business case.

4. Progress against plan for the Work Packages

4.1. Work Packages 1.1, 1.3 and 1.4 - Improved use of primary substation data, Improved operational tools and Improved planning tools

The load growth assessment and forecasting tool (part of Subtask 1.1) has been developed and is fully functioning for the SP Manweb license area. The tool will be fully functioning for the SP Distribution license area by the end of December, as planned.

11kV network models, which form the basis of the network design activities within Task 2, have been constructed for the three trial areas.

The network capacity headroom assessments have been carried out for the three trial networks and the associated capacity headroom report is in progress.

The first draft of the network monitoring best practice guide is in progress.

Work Planned during the next 6 months:-

- Completion of the network monitoring good practice guide.
- Completion of the network capacity headroom report.
- Preparation for the initial assessments of the first batch of secondary substation monitoring data
- Initial network modelling to confirm the appropriate first-pass network designs for incorporation of the Network Automation, Voltage Regulation and Dynamic Thermal Ratings.

4.2. Work Package 1.2 - Improved secondary substation data monitoring

The monitoring equipment suppliers have been selected and two test case sites have been installed to prove the successful functioning of these devices to the iHost data hub. This has given us confidence of the installation program now that any installation issues encountered have already been minimised.

The preferred bidders for all monitoring equipment have been identified, however due to delays in the procurement and delivery of equipment, this element has been delayed. It is planned to accelerate the installation program early in the New Year to minimise the delay. We have opted to select three different monitoring equipment providers to mitigate any technology risk, to try a variety of different equipment and ensure the approach that we are taking is robust regardless of the equipment Energy Networks or any other DNO opts to use in the future.

The monitor installation safety method statement is completed and installation guides have been produced for the installation teams as well as internal briefing

packs for staff. The internal staff appointed for the monitoring installation have been trained on the installation of the monitor devices. The full catalogue of documents will be published on our project website in due course once the installation process is underway and we have confidence that these are appropriate based on further operational experience.

The iHost data servers have been installed and configured ready to store monitored network data in line with the initial project plan.

Work Planned during the next 6 months:-

- Complete installation of the monitoring equipment.
- Hosting and processing of network data from iHost for analysis.

4.3. Work Package 2.1 - Dynamic thermal ratings

The installation of equipment to apply dynamic rating to assets requires network outages to carry out the work. Due to the winter outage restrictions most of this work is planned after March 2013. These outages will not impact customer's supplies.

Learning from a previous LCNF Dynamic Thermal Rating Tier 1 project is being adopted by using weather stations already trialled on network. Procurement for these is underway, with installation planned for early 2013.

A tender for the Dynamic Rating assessment of Primary Transformers will shortly be issued. The primary transformers Dissolved Gas Analysis has been completed on transformers within the trial and no issues were detected. The transformers within the trial sites have a range of sizes and age that reflect the general substation population. This will be repeated annually to assess any change in the condition of the assets as they are dynamically rated.

Work Planned during the next 6 months:-

- To install weather monitoring equipment to seven Primary sites.
- To establish communications for all weather monitors to the "iHost" server.
- To undertake condition assessment of the primary transformers at St Andrews, Cupar, Whitchurch, Liverpool Road, Ruabon and Yockings Gate following sampling.
- To procure and install the 33kV OHL conductor temperature sensors.

4.4. Work Package 2.2 - Flexible network control

The supplier of the Central Communications Unit (CCU) and enhanced radio has successfully completed factory acceptance tests and we are now progressing to site installation and testing. This will include comparing VHF to UHF attenuation and performance to Envoy data collector units installed at remote network switching points.

The purchase of the CCU and radio units is underway. Data retrieval trials from the remote network switching points using the 'Envoy' unit have been successful.

Work Planned during the next 6 months:-

- Complete the installation of Envoy data collectors in 'Noja' switching units
- Installation of trial CCU equipment in to Primary substations
- Commissioning and testing of the trial radio system
- Network mapping into the PowerOn Control system

4.5. Work Package 2.3 - Energy efficiency

Buildings Research Establishment (BRE) has completed both their stakeholder engagement plan and initial analysis of the three trial areas. Further requested information has been requested from SPEN by BRE and we are in the process of collating and furnishing BRE with this information.

As a consequence of the delays in obtaining some of the outstanding data BRE have been unable to complete the stakeholder workshops and associated work in line with the October 2012 delivery timetable but this has not impacted the overall work package deliverables. We are working to undertake this early in the New Year to regain the lost ground.

4.6. Work Package 2.4 - Voltage regulation

Voltage Regulator specification has been completed and the network models for integrating this into the network are also complete. Analysis work on a specific area of network in St Andrews is underway, to determine how voltage regulators will be utilised to work in conjunction with an active network management system and allow system load transfer whilst avoiding the consequential voltage issues.

4.7. Work Package 3.1 - Internal stakeholder engagement

Two internal innovation conferences have been held for over 100 staff in both SPD & SPM licence areas, where a broad selection of staff across the SP Energy Network businesses heard about various innovation initiatives and of the main LCNF projects ongoing in other DNOs. This engaged with the staff and sought their views of how networks could develop. We received positive feedback on the innovation projects presented.

The Scottish Power staff who operate on the network have been briefed about the activities of the Flexible Networks project and its aims and objects. Also about the new network monitoring and other equipment they with encounter during their day-to-day activities.

4.8. Work Package 3.2 - External stakeholder engagement

The customer engagement plan has been completed and approved by Ofgem.

Scottish Power took part in the Annual LCNF conference and presented the details of this project and this forum was an excellent opportunity to provide conference visitors with details of the project and its aims and objectives on both the exhibition stand and presentation made at the LCNF Conference.

We have also held further meetings with some of the significant stakeholders in the trial areas. A further meeting with St Andrews University was held in Q3 to keep them informed of the project developments and to raise the awareness of the project. A further meeting was held with Wrexham Borough Council to keep them informed of the project works and to undertake a trial voltage monitor installation on a Council supply point.

4.9. Work Package 3.3 - Verification of experimental design

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

4.10. Work Package 3.4 - DNO policy changes

The activities of this work package do not commence until the latter stages of the project plan. All equipment specifications developed to date have complied with the company's equipment approval process to ensure that it is fully compliant for installation on the network and the specification can be used again in the future. The relevant specifications will be published as part of the projects dissemination.

5. Progress against budget

Below is a summary table of the project budget position from the project commencement to 7th December 2012.

Activity	Budget to Start Dec 2012 (£k)	Actual costs to date (£k)	Funding carried forward (£k)	Commentary
Labour	1,041	462	-579.8	We have revised some labour costs downwards and equipment installation costs not yet incurred due to the delay in equipment delivery.
Equipment	1,266	61.4	-1,205.0	Monitoring equipment costs not yet incurred.
Contractors	657	280	-377.1	Some contractor work not invoiced for project elements which have not been signed off as complete.
IT	230	88	-141.8	The IT costs for Dynamic rating have not yet been incurred.
Travel & Expenses	11.8	14	+3.1	Additional collaboration visits to other DNO's and suppliers during first year were higher than expected, but only normal travel expected during the remainder of the project.
Contingency & Others	179	0	-179.8	No spend of contingency has been required.
Payments to users	37.5	0	-37.5	No payments to users have been made to date.
Totals	**3,519,341**	**907,075**	**-2,612.3**	Under spend will be recovered in 2013 once invoices have been received.

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 the table below. The costs for the LCN funded element had been transferred from the bank account and a copy of the statement is included in the Appendix.

Activity	SPD Contribution (£k)	LCNF costs (£k)	Total/Actual costs to date (£k)
Labour	175.6	286.5	462
Equipment	34.6	26.8	61.4
Contractors	121.1	159.1	280
IT	34.3	54.0	88
Travel & Expenses	4.9	10.0	14
Contingency & Others	0	0	0
Payments to users	0	0	0
Totals	370.6	536.5	**907,075**

6. Bank account

A copy of the bank statement detailing the transactions of the Project Bank Account since its creation is attached to this report in Appendix 2 (Confidential). The figures in the statement relate to the LCNF funded costs only and not the total project costs (as shown in the table above).

7. Successful delivery reward criteria (SDRC)

7.1. Project budget (criteria 9.1)

At present the spend is lower than budget for two reasons, firstly expenditure on the high cost equipment has not yet been incurred, and secondly we expect not to require most of the contingency following successful test case installations for the network monitoring.

7.2. Engagement, dissemination and adoption (criteria 9.6)

Two internal innovation conferences have been held for over 100 staff in both SPD (5th September) & SPM (11th September), where staff across the whole SP Energy Network businesses learnt of various innovation initiatives within Scottish Power and about the main LCNF projects ongoing in other DNO's. A follow up survey was completed to gain feedback from the staff to consider how we can best disseminate this type of information. The staff were encouraged by the level of innovation being undertaken across the electricity supply industry.

7.3. Engagement, dissemination and adoption (criteria 9.6)

Through team briefings and internal document circulation the staff's understanding of the Flexible Networks project and its aims and objectives has been raised.

7.4. Engagement, dissemination and adoption (criteria 9.6)

The opportunity has been taken to provide external stakeholders with visibility of the project and its early outcomes via the exhibition stand and presentation made at the LCNF Conference, Cardiff, in September.

7.5. Engagement, dissemination and adoption (criteria 9.6)

The Monitoring Best Practice Guide will be published on the project web site in January 2013.

8. Learning outcomes

The Work Package 1.1 - Improved use of primary substation data, has provided early learning of which data is best captured to be most useful in the network analysis. The learning from this will be published in a Monitoring Best Practice Guide early in 2013.

9. 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.

10. Risk management

The project risks table below has been updated with any developments in the risks to the project. There have been no major changes to the risk table for this report.

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	Delivery of monitoring equipment is further delayed.	Discussions with the vendors has provided us with confidence that the equipment will be available in time for Q1 2013 delivery and installation	Three vendors have been selected to minimise any technology problems and also minimises the risk if one vendor is delayed in making equipment available.	Monitoring equipment now procured. Test case installations proved successful. Only risk remaining is large scale failure of the population of units, this is perceived as low risk.
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.	No change. However, site surveys indicate that the customer interruptions to facilitate monitor installations should be minimal.
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.	Nortech has successfully tested the selected monitors for data transfer.
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.	Sampling rates and data size have been evaluated during the testing of the monitors and these have been acceptable.
6	WP 1.2	There could be data privacy issues for customers due to the extensive programme of monitoring to be deployed.	The existing SPEN regulations governing data privacy for customers will be used in this project.		Ofgem have approved our 'Customer Engagement Plan' and this includes how we will ensure customer privacy..

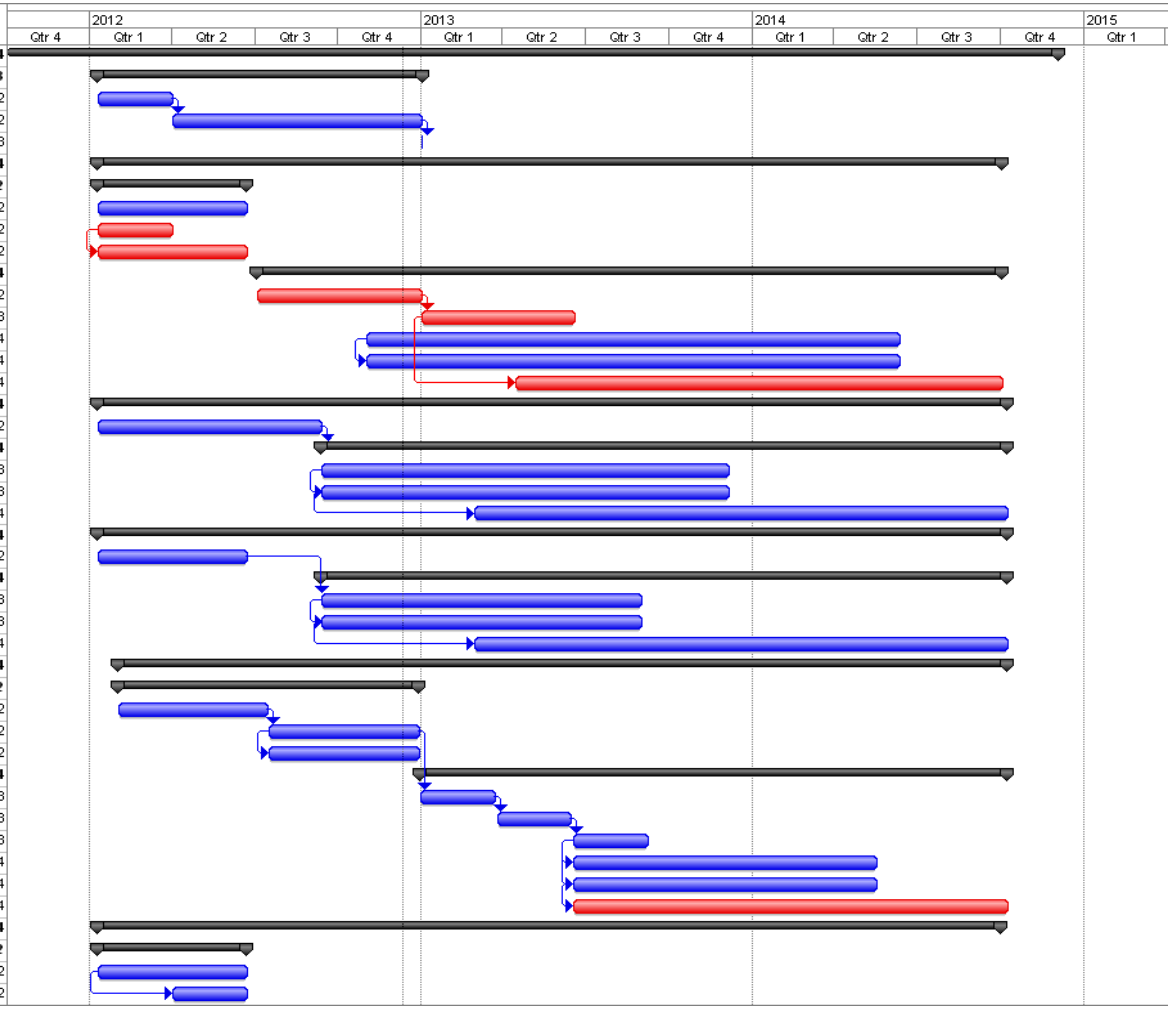
7	WP 1.2	Increased visibility of the network through enhanced monitoring may actually erode anticipated headroom.	This will be part of the project to fully understand the available headroom.	Greater knowledge of headroom will improve risk management and reinforcement prioritisation for the network, protecting 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. Initial workshops with internal users have shown a positive attitude from the staff who will be subject to the changes.
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 already running efficiently or that there are diminished returns associated with the use	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 technology for a range of representative topologies and characteristics.	No change.

		of this network technology.			
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.

11.Project Plan

Updated project plan:

ID	Task Name	Start	Finish
1	**Work Packages**	**Thu 01/09/11**	**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 specifications	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**	**Tue 07/10/14**
30	**Engineering Design**	**Wed 01/02/12**	**Fri 28/12/12**
31	Test case design methodology	Wed 01/02/12	Fri 13/07/12
32	Functional and Integration specifications	Mon 16/07/12	Fri 28/12/12
33	Installation methodology	Mon 16/07/12	Fri 28/12/12
34	**Technology Deployment**	**Mon 31/12/12**	**Tue 07/10/14**
35	Equipment procurement	Mon 31/12/12	Fri 22/03/13
36	Installation	Mon 25/03/13	Fri 14/06/13
37	Testing and Verification	Mon 17/06/13	Fri 06/09/13
38	Software development	Mon 17/06/13	Fri 16/05/14
39	Procedure development	Mon 17/06/13	Fri 16/05/14
40	Testing and Validation	Mon 17/06/13	Tue 07/10/14
41	**Work Package 2.2**	**Mon 09/01/12**	**Tue 30/09/14**
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 specifications	Sun 01/04/12	Thu 21/06/12

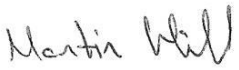


12.Accuracy assurance statement

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