
# Low Carbon Network Fund Project Progress Report December 2011

# LV Network Templates for a Low-carbon Future

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| **Version:** | V1.0 |
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**Western Power Distribution**

**LV Network Templates for a Low-carbon Future**

**Reporting period: June 2011 – November 2011**

# 1. Executive summary

## 1.1. Project Background

The Network Templates LCNF Tier 2 project is designed to provide data on the low voltage (LV) distribution network. Currently, the final stage of monitoring is on the outgoing 11kV feeders in a primary substation, where current and voltage is measured. The real-time loading of the distribution substations, located along the 11kV feeders, is not recorded or visible remotely, and can only be obtained by visiting site to read a maximum demand indicator, which has variable and poor accuracy across the loading range. This project will provide remote monitoring of current and voltage at 975 distribution substations, through the addition of monitors and communication infrastructure. In addition, voltage monitors will be installed in houses at the end of low voltage feeders, to allow voltage profiles to be developed.

Collecting this data now is important is due to the forecast increases in loading and voltage stresses on the network arising from expansion in the numbers of low-carbon equipment to be connected into the low voltage network, including photo-voltaic generation, heat pumps and electric vehicles. Better understanding of the time of day loading and voltage "headroom" currently available on different types of LV network and customer is crucial to planning the network of the future. This project will develop statistically sound network templates for different types of LV network, comparing traditional networks with those including low-carbon technologies.

## 1.2. Project Progress Highlights

During the second reporting period (June 2011 – November 2011) the Network Templates project has continued through the construction and deployment phase, with all key milestones remaining on target. The following is a summary of the key activities completed during the first reporting period.

### 1.2.1. Customer communications

Communication with customers affected by this project has continued in line with the strategy agreed with Ofgem earlier this year. Customers affected by shutdowns have been given the necessary letter informing them of the date and time of the shutdown.

Letters have begun to be sent to customers to obtain consent to be part of the project, by having a voltage monitor in their home. The volume of this correspondence is increasing quickly, with hundreds of letters sent to date.

#### 1.2.2. CT installation

Installations of current transformers (CTs) began at the end of April 2011. As of the end of November, CTs had been installed in 610 of the 725 ground-mounted substations, and all of the pole-mounted substations. The estimated completion date for all CT installations is the end of January 2012.

#### 1.2.3. Communications infrastructure

Work with the communications provider (GE) has developed during this period. A proof of concept test was completed, proving the communications paths. Invaluable lessons were learned during this period, helping to modify designs where necessary. The first batch of communication enclosures is to be delivered the second week of December 2011, with further batches up to the middle of March 2012. WPD and GE have gone through the JRC in order to obtain licensed frequencies from Ofcom. The JRC will complete their detailed frequency allocation for the final area in early January 2012.

#### 1.2.4. Voltage monitor installations

The installation of voltage monitors in customers' homes began in November 2011, and to date 150 monitors have been installed.

#### 1.2.5. Project partner and stakeholder engagement

There has been continued communication with the key project partners and stakeholders associated with this project, including GE, the University of Bath, Npower and the Welsh Government. Contracts are expected to be signed with the University of Bath and Npower in the third week of December 2011.

## 2. Project Manager's report

The report below gives a summary of the main areas of work undertaken during the second six month period of this project.

### 2.1. Identification of households for the installation of voltage monitors

This project will install over 7,000 voltage monitors in domestic properties, which will be located at the phase ends of the LV mains fed from the 975 substations in this project. This will allow voltage profiles of the LV feeders to be developed. Identifying these customers

has been a very time-consuming task. A spreadsheet has now all but been completed of a pool of customers at every feeder end, a total of about 23,000 customers (for WPD internal use only). Of these, 11,500 customers have had the phase of their connection identified, in order to ensure there is at least one customer monitored per phase. Customers from this list have begun to be contacted to obtain consent to install a voltage monitor in their property. The customer response rate is not high for various reasons. One of the reasons is that at this time of the year, people are not willing to have a 30-minute power outage to fit the voltage monitor. This lack of customer response is a risk, and discussions are taking place to improve the response rate (e.g. improving the letter and offering incentives) and to look at alternative arrangements for collecting the voltage at the end of LV feeders (e.g. voltage monitors in enclosures on LV poles or in street pillars).

### 2.2. Installation of household voltage monitors

The installation of the household voltage monitors started in November, following the delivery of the first 2,000 GPRS monitors. To date, 150 monitors have been installed, with the number of fitters and installations being ramped up in December. In some properties that have been visited, space restrictions close to the existing household meter position mean that it has not been possible to fit the voltage monitors. In these cases, near-by properties will be contacted in order to find properties with suitable space.

### 2.3. Installation of distribution substation monitoring devices

The installation of the CTs began in April 2011 in the ground-mounted substations, following a review of operational procedures. By May, five fitting teams were employed on the task, four for ground-mounted substations and one for overhead substations. For the overhead substations, a separate enclosure was constructed in WPD's Plant Centre, to keep the CTs in a weather-proof environment. As mentioned above, over 80% of CT installations have been completed so far. The fitting time per substation for the ground-mounted substations has been longer than expected, so the installation of the CTs is anticipated to finish by the end of January 2012, although this work is not on the critical path.

Considerable effort has been made to communicate well with the customers who experience a shutdown during the installation of the CTs. Shutdown letters are sent out well in advance, and customers with any questions are able to use a dedicated telephone number to talk to the team office.

The fitting of the CTs was separated from the fitting of the communication enclosures, to allow the maximum time possible for the installation of the CTs. This has proved to be a sensible decision, as the delivery of the communication enclosures has been later than

expected. The first batch of enclosures arrived in the second week of December, with further batches arriving up to early March 2012. Due to delays in receiving exact radio frequencies for particular areas, and to ensure the milestones are met, WPD will be assisting GE by programming some of the radios at their Plant Centre. Batches of enclosures arriving from January 2012 onwards will be fully programmed.

The installation of the enclosures will be much faster than the fitting of the CTs, and fixing brackets were installed during the CT installations. It is anticipated that up to eighty enclosures can be installed per week with the five teams that will be allocated to the task.

Following a detailed on-site review of the suitability of the substations, the final number of substations in which communications enclosures will be installed is 975.

### 2.4. Delivery of communications infrastructure

Work has progressed with GE during this second phase of the project to develop and deliver the communications infrastructure. The first achievements have been the installation of various trials.

The first trial was to test the power line carrier (PLC), which is the communications technology to be used to communicate between 150 of the distribution substations and the voltage monitors in the properties at the end of the LV feeders. Four ground-mounted substations (with underground cable networks) were chosen and three voltage monitors were installed at the end of a feeder from each substation. This test proved that the PLC technology would work best with feeder lengths less than 250m, so this result has modified the installation programme, with 150 substations chosen for PLC, each with feeder lengths less than 250m. A PLC trial on the overhead LV network was also successful.

The second trial installation was a proof of concept demonstration, proving end to end communications of the entire system. The backhaul communication path on WPD's WAN, owned and operated by WPD's telecoms company Surf, was routed into an office in Bristol, and links to a communications gateway at Llantarnum, near Cwmbran, Wales. A radio and antenna was installed in Llantarnum, which links to a communications enclosure in Parrett Road distribution substation. The radio link was successful, and data was collected in Bristol from the substation monitor in Parrett Road. From Parrett Road, the PLC technology was able to detect the voltage monitors in the three properties at the end of the feeder. Data has been collected from these monitors.

In order for the proof of concept trial to work, a new server had to be installed to act as the 'head end system' for the PLC equipment (the STIP system). In addition, WPD's ENMAC network control system needed to be configured such that a new virtual Front End Processor (FEP) server was created. Both STIP and the FEP were given firewall access to allow them to communicate with the 'outside world' and contact the substation and voltage monitors.

A trial was also undertaken on the GPRS voltage monitor to be supplied by GE, to integrate into the SMOS head end system. Whilst this trial proved successful, subsequent manufacturing issues meant that GE was no longer able to provide these monitors (about 6,500 units). A replacement monitor has been sourced and WPD now have about 6,000 in stock, with more available on a short lead time if required. GE has successfully integrated this monitor into their SMOS system. GE has also delivered all 1,100 PLC nodes and associated voltage monitors.

Site survey works for the radio links began in July, with GE and WPD working closely together in order to complete the surveys. Considerable preliminary work had been necessary, which involved the installation of about 25 antennas in various primary substations and communications sites. Surveys were completed for approximately 75% of the sites, and the rest of the sites will use propagation models to determine the received signal strengths.

Licensed radio frequencies are necessary for this project, in order for the distribution substations to communicate to the associated access point (normally a primary substation), and for the access points to communicate to the gateway sites, which in turn connect into WPD's WAN. WPD has now purchased 6 pairs of UHF frequencies and the JRC has issued detailed frequency allocations for approximately 25% of the sites so far.

GE has now shipped the first batch of 78 enclosures to WPD's Plant Centre in Ty Coch, near Cwmbran. Approximately 220 more enclosures will arrive with WPD before the end of 2011, with the remaining 675 arriving between early January 2012 and mid-March.

### 2.5. Monitoring of FIT generation installations

WPD is partnering with the supplier Npower in this project to identify any customers in the South Wales area covered by this project, where customers have installed small scale embedded generation (SSEG) under the feed-in-tariff (FIT) arrangement, having regard to the confidentiality and data privacy protocols set in place. Npower has indicated that there

are approximately 60 operational FIT installations in the general postcode areas where the 975 distribution substations are located, all of them photo-voltaic (PV). Initial thoughts were that these PV generators will have to be fed from the distribution substations being monitored in this project in order to be included. However, the view is now that all Npower FIT installations in the general project area will be monitored, subject to consent, to provide as much data as possible on the output of domestic PV generation. WPD and Npower have now signed a contract for this work.

WPD requested the University of Bath, as part of their work for this project, to undertake a 'sample size' calculation, in order to determine how many PV installations need to be monitored to provide a statistically robust data set. Their initial results from this piece of work have indicated that about 250 PV installations will need to be monitored. WPD will therefore need to monitor other PV sites in addition to the ones registered with Npower. Letters have been drafted in order to start the consent process.

### 2.6. WAG Arbed initiative

WPD has received an updated spreadsheet from the Welsh Government containing the information on the Arbed installations. This spreadsheet shows, to full postcode level but not to individual properties, the energy saving initiatives put in place through the Arbed scheme, such as external wall insulation, solar water heating, air source heat pumps, etc. This data will be aggregated to substation feeder level and passed to the University of Bath, in order to refine the analysis work they will be undertaking.

### 2.7. Statistical analysis by the University of Bath

WPD and the University of Bath have now signed a contract for this work. The jointly funded PhD student is now employed, and the advertisements for the two post-doctorate research assistants (PDRAs) will be issued early in the New Year. Considerable work has been completed with Bath over data formats, in conjunction with GE. Key steps in 2012 and 2013, regarding the analysis of the data and the production of the templates, have been agreed, with various intermediate reports and dissemination activities.

### 2.8. Key steps in the next six months

The next six months will see the completion of the installation phase and the ramping up of the data analysis phase. These are summarised below.

#### 2.8.1. Installation of the CTs

All CTs installations will be completed by the end of January 2012, with most finished by the end of 2011.

#### 2.8.2. Manufacture, delivery and installation of the communication infrastructure

GE has already delivered a small number of communication enclosures, and by the end of the year WPD will have received approximately 300 enclosures. Some of these will require actual frequencies to be programmed into the radios in WPD's Plant Centre. If the radios can be programmed early enough, some of the enclosures will be installed on site before the end of the year. Deliveries of the enclosures will be complete by mid-March 2012, to leave enough time for installation. The enclosures will be able to collect data from after they are commissioned at the time of installation. Should manufacturing or shipping be delayed for any reason, WPD has identified an alternative solution that can be deployed quickly, in order to meet the milestones.

The household voltage monitors will continue to be installed up to the first week of April 2012. If predicted consent levels are lower than required, WPD will be required to implement alternative arrangements, which are currently being discussed. The PV monitors will also be fitted by the first week of April 2012, with the assistance of Npower in gaining consent from the customers.

#### 2.8.3. Provision of network data to the University of Bath

Some example data has already been sent to Bath from the proof of concept installation, and more will be sent as the bulk of the substation enclosures begin to be installed at the end of this year.

#### 2.8.4. Analysis and dissemination

The University of Bath will produce an interim report in the next six months, and WPD will give the other DNOs a chance to comment on the initial findings, to ensure that the final report will be of real value to all DNOs.

## 3. Business case update

No changes to the business case have been forecast at this stage.

An ongoing assessment is being made of risks and issues that could affect benefits realisation, as detailed in section 10 of this report. Should forecast risks be realised, an up to date benefits assessment will be conducted.

## 4. Progress against plan

### 4.1. Installation of CTs

All overhead CTs have been installed, and 610 of the 725 ground-mounted substations have been completed.

The installation of the CTs causes customer interruptions, as recognised by Ofgem in a letter to the WPD Company Secretary dated 5 April 2011. This letter, and the amendment to the Project Direction (also dated 5 April 2011), set out that Ofgem will provide protection against customer interruptions (CIs) and customer minutes lost (CMLs) up to the level of 115,173 CIs and 15,834,60 CMLs. Up to the end of November 2011, the interruptions are as follows:

Customer Interruptions – 59,406
Customer Minutes Lost – 10,473,919

### 4.2. Communications infrastructure

The manufacture, delivery and installation of all communications equipment will be complete by the end of March 2012, as per the plan. The bulk of substation enclosure installations has started later than anticipated, due to delays in obtaining suitable licensed radio frequencies. This caused a knock-on delay in the manufacturing process. However, sufficient resource is available to manufacture and install all the equipment by the required date. Household voltage monitor installations will be affected by the number of customers providing their consent.

### 4.3. Collection of data

Some initial data has been collected and passed to the University of Bath, with more to be delivered as soon as the next communication enclosures are installed.
The Welsh Government has provided an update spreadsheet of the Arbed installations. A further update will be obtained during 2012.

### 4.4. Network templates reports

The reports to be produced have been discussed with the University of Bath, ensuring that the data collected is sufficient to produce statistically sound results. There are various steps in the next six months to ensure that the initial data provided to Bath is sound, and that the initial templates produced look functional and appropriate.

## 5. Progress against budget

See the table below for the progress against budget.

| Budget identifier | Item | Total budget | Expected spend to date | Actual spend to date | Variance £ | Variance % |
|---|---|---|---|---|---|---|
| | **Box 6 (Employment costs)** | **£1,347,000** | **£708,281** | **£647,569** | **-£60,712** | **-8.6%** |
| 6.1 | Substation monitor fitters | £414,000 | **£310,500** | **£326,926** | £16,426 | 5.3% |
| 6.2 | Planning Manager | £187,000 | **£67,031** | **£68,250** | £1,219 | 1.8% |
| 6.3 | B2B External Relation Manager | £112,000 | **£39,375** | **£17,877** | -£21,498 | -54.6% |
| 6.4 | B2B Manager | £112,000 | **£33,750** | **£33,077** | -£673 | -2.0% |
| 6.5 | Project Manager | £187,000 | **£61,875** | **£60,782** | -£1,093 | -1.8% |
| 6.6 | Project Management Team (3 staff) | £300,000 | **£180,000** | **£127,658** | -£52,342 | -29.1% |
| 6.7 | Call centre staff | £35,000 | **£15,750** | **£13,000** | -£2,750 | -17.5% |
| | **Box 7 (Equipment costs)** | **£5,301,000** | **£4,495,699** | **£2,114,570** | **-£2,381,129** | **-53.0%** |
| 7.1 | Data concentrator at substation | £200,000 | **£200,000** | **£70,203** | -£129,797 | -64.9% |
| 7.2 | ENMAC updates | £100,000 | **£75,000** | **£35,101** | -£39,899 | -53.2% |
| 7.3 | Message switching/hub software | £150,000 | **£112,500** | **£52,652** | -£59,848 | -53.2% |
| 7.4 | Enhanced FEP software | £95,000 | **£71,250** | **£33,346** | -£37,904 | -53.2% |
| 7.5 | Data concentrator/substation monitoring | £1,190,000 | **£1,124,786** | **£667,011** | -£457,776 | -40.7% |
| 7.6 | Data comms hub | £150,000 | **£112,500** | **£52,652** | -£59,848 | -53.2% |
| 7.7 | Data comms using meshed radio type technology | £735,000 | **£551,250** | **£257,996** | -£293,254 | -53.2% |
| 7.8 | Data comms using PLC technology | £867,000 | **£649,913** | **£304,330** | -£345,583 | -53.2% |
| 7.9 | LV end voltage monitors | £1,765,000 | **£1,560,000** | **£624,079** | -£935,921 | -60.0% |
| 7.11 | LV FIT meter installs | £49,000 | **£38,500** | **£17,200** | -£21,300 | -55.3% |
| | **Box 8 (Contractor costs)** | **£1,293,000** | **£741,978** | **£294,140** | **-£447,838** | **-60.4%** |
| 8.1 | Monitor fitter contractors / appointment booking contractors | £727,000 | **£525,000** | **£209,038** | -£315,962 | -60.2% |
| 8.2 | Project management / consultancy | £160,000 | **£51,200** | **£50,000** | -£1,200 | -2.3% |
| 8.3 | Bath University analysis | £306,000 | **£70,778** | **£0** | -£70,778 | -100.0% |
| 8.4 | Radio site survey contractors | £80,000 | **£80,000** | **£28,081** | -£51,919 | -64.9% |
| 8.5 | System testing / analysis contractors (SCADA) | £20,000 | **£15,000** | **£7,020** | -£7,980 | -53.2% |
| | **Box 10 (Other costs)** | **£1,074,000** | **£60,732** | **£30,000** | **-£30,732** | **-50.6%** |
| 10.1 | IT costs | £106,000 | **£26,500** | **£20,000** | -£6,500 | -24.5% |
| 10.2 | Contingency | £820,000 | **£0** | **£0** | £0 | 0% |
| 10.3 | Public engagement/learning dissemination | £148,000 | **£34,232** | **£10,000** | -£24,232 | -70.8% |
| | | **£9,015,000** | **£6,006,690** | **£3,086,278** | | |

The original payment profile changed as a result of the consultation into current sensors requested by Ofgem, resulting in a delayed start for some line items, and a change in payment profile for others. The Expected Spend to Date column in the table above is based on this new profile (the same profile was used in the previous report).

The following items show a variance of more than 5%:

- Item 6.1. The cost of the CT installations has been slightly higher than anticipated, but the final figure is not expected to be more than 5% higher than the budget.
- Item 6.3. This relates to the fitting of the voltage monitors, which was delayed starting, due to issues with monitor delivery.
- Item 6.6. Through working efficiently, the project team has been able to keep costs below the budget.
- Item 6.7. Work for the Call Centre staff in assisting with the shutdowns has been less than expected.
- Items 7.1 to 7.11, 8.1, 8.4 and 8.5. These items were delayed from starting due to

equipment delays. The final figures are not expected to show more than a 5% variance.

- Item 8.3. Delays in installing monitoring kit have delayed the started of the work by the University of Bath.
- Item 10.1. The cost for installing the first server was less than expected.
- Item 10.3. Learning and dissemination work has been delayed due to the delay in obtaining data.

Some of the contingency fund (Line Item 10.2) is expected to be allocated to part of the communications infrastructure, although no cost has been incurred to date. A hosted GPRS data collection service needs to be procured from GE. This will cost approximately £300k over the life of the project.

The final project spend in each box is not anticipated to be greater than the 110% limit set in section 6 of the Project Direction.

## 6. Bank account

A copy of the bank statement to the end of November 2011 is included in Appendix 1. No withdrawals have yet been made from the project bank account, as contracts have only recently been signed with Npower and the University of Bath, as stipulated in section 3 of the Project Direction. Money will be drawn from the account in January 2012 up to the value of work completed on the project to date.

## 7. Successful delivery reward criteria (SDCR)

See the sub-sections below for a summary of progress made towards meeting the delivery criteria.

### 7.1. Provision of six-monthly report (target date 17/06/11)

Completed by issuing the first six-monthly report in June 2011

### 7.2. Communications path to sensors proven (target date 14/09/11)

A proof of concept demonstration with GE proved the communications path throughout the system. Firstly, the WAN connection (owned and operated by Surf, WPD's telecoms company) was established from an office in Bristol through to a communications site in Llantarnum, near Cwmbran, Wales. Second, a new UHF radio connection was established between Llantarnum and Parrett Road distribution substation. Third, a power line carrier connection was established from Parrett Road substation to a customer's property at the

end of the LV feeder. Fourthly, a new server was installed on the WPD system to allow the PLC node in the customer's property to be polled from within WPD's corporate network. Fifthly, the monitor in the Parrett Road substation was polled from an ENMAC system loaded onto a laptop and connected in the Bristol office. The trial was successful by the deadline in all aspects, expect that the voltage monitor in the customer's property would not communicate to the PLC node, due to a wrongly-sized capacitor installed in the monitor during manufacturing. The monitor has since been replaced.

**7.3. Data transfer to Bath University (target date 25/10/11)**

The proof concept demonstration allowed some voltage data to be collected which was sent to the University of Bath by the date agreed above. Further data will be sent from the Parrett Road substation after some configuration changes to the substation monitor have been undertaken. More extensive data sets will be sent from early 2012, following the installation of the first large batch of enclosures.

**7.4. Provision of live generation data to National Grid (target date 19/12/11)**

This work is progressing as a Tier 1 project. WPD, with the assistance of GE, has made some modifications to some ENMAC equipment in order to make this happen. GE and WPD have been in contact with National Grid, and it is anticipated that National Grid will be able to make their changes in time to meet the target deadline.

**7.5. Deployment of all data concentrators complete (target date 31/03/12)**

The installation of the CTs and wiring is anticipated to be complete by January 2012. The delivery of the enclosures has been delayed, but the new delivery schedule from GE, combined with the resource available in WPD, means all installations will be complete by the target date.

**7.6. All voltage sensors deployed (target date 07/04/12)**

Installation of the household voltage monitors has started and will continue up to the target deadline. There is concern over the number of customers granting consent for installation, and some installations are physically not possible due to space restrictions. Other options are being considered to obtain voltage readings from the end of all the LV feeders.

**7.7. Identification of the effects of low-carbon stresses (target date 01/05/13)**

No data has yet been produced in order to start this analysis. The University of Bath will be undertaking this work in 2012 and 2013.

**7.8. Report on the ability to use proxy FIT meters (target date 01/05/13)**

No data has yet been produced in order to start this analysis. The University of Bath will be

undertaking this work in 2012 and 2013.

**7.9. Report on network templates (target date 01/07/13)**

No data has yet been produced in order to start this analysis. The University of Bath will be undertaking this work in 2012 and 2013.

**7.10. Share learning with partners and interested parties (target date 31/07/13)**

WPD was able present progress on this project at the national ENA organised LCNF Conference in Gateshead in July 2011. Information has been posted on WPD's website, with further modifications to the website due early 2012. Any raw data collected so far will be made available to third parties. The University of Bath will be undertaking this work in conjunction with WPD. In April or May 2012, WPD is hoping to be able to hold a briefing session with any interested DNOs, to share the current project findings and to obtain feedback to improve the development of the network templates.

## 8. Learning outcomes

The key learning outcomes from this project will be included in the reports produced by the University of Bath at the end of the project. The aim of this project is to collect and analyse data to develop LV network templates that can be used across the country. There will be supplementary learning about the methods of data collection and other learning about running similar projects. To date, there has been no significant quantity of data collected, so no comment can yet be made about the network templates themselves. By the time of the next 6-monthly report in June 2012, preliminary templates will be available.

As mentioned in the previous report, there have been significant lessons learned in terms of the installation of the CTs. Lessons have been learned in the following areas:

- organising the shutdowns and sending the shutdown letters to the correct people at the correct time
- developing the correct installation procedures and understanding the length of time required to complete the work
- understanding that some substations are not suitable to install CTs, due to space restrictions and due to interactions with customer metering equipment

Lessons have been learnt, and are still being learnt, in terms of identifying suitable customers for the voltage monitor installations and gaining consent for information:

- it was not easy to identify particular groups of customers at the end of feeders. This had to be done manually, by using the mapping system and populating a spreadsheet
- the phase connection of each customer needed to be known, as one customer per phase at

the end of every feeder is required. This is labour intensive field work and requires access to properties, which can prove difficult.

- The response rate of customers to letters and telephone calls is low. Early indications are that the response rate for customers giving their consent is 5% of all customers contacted. However, of the customers who responded to date, half have given consent. Methods of incentivising customers are being considered.
- Space restrictions in customers' premises mean that it is not always possible to install a monitor.

The issue of obtaining licensed radio frequencies has continued to be a long process. During the first six months, the decision was taken not to use radio for the voltage monitors, which left only the substations to use radio frequencies. These frequencies have now been obtained, but the processes could be improved by going to the radio planning authorities at an earlier date. The radio planning procedures used in the UK, coupled with a high spectrum utilisation, mean that detailed radio architecture needs to be presented to the radio planning authorities at the earliest convenience. Clarity of design is essential, as UK policies are not always the same as those used overseas.

## 9. Intellectual Property Rights (IPR)

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

## 10. Risk management

The final LCNF submission identified 15 key project risks which have all been monitored during the project so far. The table below gives a summary of these risks.

| Risk description | Summary of risk progress |
|---|---|
| GE capacity to meet DNO demand | GE was providing three key product areas. The first was the PLC-connected voltage monitors, associated nodes and head-end system, which have now been delivered. The second was the GPRS-connected voltage monitors and head-end system. Unfortunately, due to manufacturing issues, GE has been unable to deliver any of these monitors. WPD has therefore sourced an alternative product and has received 6,000 monitors. GE has integrated this monitor into their head-end system. The third product area was the communication enclosures for |

| | |
|---|---|
| | the substations. Due to the delay in obtaining the licensed radio frequencies, the manufacturing has been delayed. However, GE is now well into manufacturing and the first enclosures have started arriving. The last batch of enclosures will arrive at the beginning of March 2012. Should there be any unforeseen delays, WPD has an alternative substation monitoring solution to deploy, if necessary. |
| Monitor specification not meeting requirements | GE and WPD have entered into a contract, including technical specifications, indicating satisfactory technical specifications. |
| Integration with NG systems not tried before | This is reliant on the work of a third party, namely National Grid. |
| Skills shortage of monitor fitters | WPD has agreed to use WPD's Smart Metering team to install the voltage monitors and a schedule of prices has been agreed. Any staff shortfall will be met with external agency resource, combined with appropriate training. |
| Project outcomes not conclusive or disseminated | Key outcomes will be delivered by reports from the University of Bath. A contract has been signed. |
| Cost of CI/CML hits prove prohibitive | Ofgem has provided protection for an agreed level of CIs and CMLs (see section 4.1 above). |
| Cost of components increases over project lifetime | Most raw materials have now been purchased for this project, so there is only a small risk of price increases. |
| Funding from external collaborators falls through | Contracts have been signed with the University of Bath and Npower. Regular meetings with all project stakeholders ensure that good relationships are maintained. |
| Non-cooperation at micro-gen sites, perhaps due to contractual breakdown | A contract has been signed with Npower, ensuring their engagement in the project. However, there is no guarantee that the residents will agree to a monitor at their premises. |
| Non-starting of WAG schemes, reducing data quantity | The Welsh Government has provided an updated list of all Arbed installations. |
| Wide-scale customer refusal of FIT/voltage monitor installations | Recent customer response figures put this in the high-risk category. WPD is looking at possible incentive mechanisms, and also alternatives to installing in customer's premises. |
| University of Bath does not produce suitable modelling from data | There are on-going discussions with the University of Bath to ensure that the provision of data is in the correct format to aid the modelling. |
| Non-availability of WAG/Arbed | The Welsh Government has provided an updated list of all |

| | |
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| data on potential projects | Arbed installations. |
| Two internal support teams (Records and Customer Contact) not ready for go-live | The project went live in early 2011 and all teams within WPD have responded exceptionally well to this project. |
| Management unsupportive of on-going project value | Both Network Services management and Design and Development management are supportive of this scheme. This project puts considerable resource pressure on many areas of the business, especially during this time of business change following the acquisition of Central Networks, but the management are fully aware of the importance of the project and are fully committed to its delivery. |

## 11. Other

### 11.1. Tier 1 current sensors project

A result of the DNO consultation exercise on current sensors (undertaken in early 2011) was that Ofgem asked WPD to undertake a Tier 1 LCNF project to compare various types of current sensors that do not require a shutdown to install. An initial announcement of the project was made via the ENA website, with responses from a number of suppliers. This project was described during the July 2011 LCNF conference, which prompted UKPN to join with WPD to undertake a joint Tier 1 project. This project has been developing jointly since then, and WPD and UKPN will soon be making an application for this project. A tender exercise has already been undertaken, as well as the development of a collaboration agreement and supplier agreement.

## 12. Accuracy assurance statement and sign-off

This report has been recommended by Paul Jewell (Policy Manager for WPD and Principle Project Manager of the Network Templates project) and approved by Nigel Turvey (Design and Development Manager, WPD).

**Appendix 1 – project bank account statement**

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