

Flexible Urban Networks – Low Voltage

Project Progress Report: January – June 2014



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1. Executive Summary

1.1 Project Overview

The Flexible Urban Networks LV (FUN-LV) Low Carbon Networks Fund (LCNF) project has been awarded £6.528 million as a 2013 Tier 2 project. The project started in January 2014 and runs through to December 2016.

The overarching aim of this project is to explore the use of power electronics to enable deferral of reinforcement and facilitate the connection of low carbon technologies and distributed generation in urban areas, by meshing existing networks which are not meshed, and by removing boundaries within existing meshed networks. It will do this by trialling three different types of power electronics or three methods (Methods 1, 2 and 3) across 36 trial sites, 24 in London and 12 in Brighton.

1.2 Progress to date

In this reporting period, the project has focused on resolving a supplier issue regarding Method 1, mobilising the delivery teams, identifying potential trial sites and finalising the FUN-LV Partner Collaboration and Project Agreements.

During the bid phase of the FUN-LV project, UK Power Networks were made aware that TE Connectivity no longer planned to manufacture the LV circuit breaker and link box switches and were looking to sell the product line. The project team worked closely with TE Connectivity and tracked the sales process. The project met with Ofgem to raise the issue and discuss a number of options for resolving and supplying equipment for the Method 1 trials. Whilst the issue was being resolved, FUN-LV agreed with Ofgem to keep project spending to a minimum. In April EA Technology Ltd (EATL) signed a licencing agreement with TE Connectivity to enable EATL to manufacture the LV circuit breakers and link box switches. FUN-LV is currently working with EATL to agree the additional development required to use the equipment on interconnected networks and sign a contract to supply the equipment.

Since the resolution of the Method 1 equipment issue, progress has been made on the design of Method 2 & 3 equipment. Detailed specifications have been approved within UK Power Networks for the power electronics devices and have formed part of the supplier contracts that are being placed for both methods. Turbo Power Systems have signed the contract for Method 3 and commenced work on the multi terminal power electronics prototype device. Intellectual property, technical specifications and warranties have been agreed with Alstom for Method 2 and we are discussing final clauses around liabilities between UK Power Networks and Alstom. The outstanding issues are not specifically related to the technology or its LCNF funding, but will require Director-level sign-off on the part of both Alstom and UK Power Networks. Whilst some time has been lost, when compared to the original project plan but the team are working to ensure that the delays due to resolving the Method 1 issue do not impact the project's delivery of the Successful Delivery Reward Criteria (SDRC).

Mobilisation of the core project team has been completed with all workstreams (WS) now resourced. Appropriate governance and control processes have also been developed, documented in the FUN-LV project handbook and implemented. They are based on those used by existing UK Power Networks' LCNF projects, for consistency. This is designed to facilitate a focus on ensuring effective technical and commercial solutions to meet learning outcomes, as well as an effective structure for ensuring the solution is delivered on time, budget and to the appropriate quality

The second workstream around network planning tools and SCADA integration has made good progress, engaging the UK Power Networks Information Systems (IS) architecture team and ensuring compliance with UK Power Networks' IS governance is maintained. The requirements phase has been initiated, and a number of workshops carried out with input from all project partners. This has resulted in completion of the end-to-end business process workflow for the solution and development of the high-level requirements specification for the FUN-LV project.

Excellent progress has been made identifying potential trial sites using wireless transformer temperature monitoring devices. 25 Sites in London and 13 sites in Brighton have been evaluated and selected for further evaluation using the

network modelling tool DPlan provided by our partner CGI. Site selection continues through 2014 to ensure a good range of trial locations with the required load profiles are available to the project.

Use cases have been created that identify the different users of the power electronics devices and the way they will interact with the equipment. The use cases tell the story from the user's perspective, how they would benefit from the use of power electronics devices and identify engineering design requirements for the power electronics devices.

Work commenced during June to verify the cost-benefit analysis activities that are planned to start in 2015 once devices are on the network and to plan the project's approach to deliver these activities. The business case was re-evaluated during the negotiations to agree the revised Method 1 product costs following increases to the manufacturing costs of the LV circuit breakers and link box switches. The equipment was evaluated against equivalent and emerging technology and incorporated the additional system development required to use these alternative options. This work ensured that the equipment remains viable as an alternative to traditional reinforcement methods.

An external learning event is currently being planned to publicise the learning from the site election process and the publication of SDRC 9.1 (successful completion of design and planning for power electronics devices)

1.3 FUN-LV Risks and Issues

1.3.1 Procurement Risks and Issues

The main issue faced during this reporting period have been associated with the procurement of Method 1 Low Voltage circuit breakers and link box switches.

TE Connectivity notified UK Power Networks that they would no longer be manufacturing the equipment developed as an IFI project and demonstrated as part of the Smart Urban Low Voltage Networks Tier 1 project. After exploring a number of options including the sale of the technology, TE Connectivity signed a licence agreement with EATL on 17 April 2014 to enable them to manufacture the equipment. The project has now entered into negotiations with EATL to supply the necessary equipment for the Method 1 trials and support warranties on the orders placed under other projects. These negotiations are at an advanced stage and are expected to be completed early in the next reporting period. EATL has invested a significant amount of time ensuring its staff are fully conversant with the equipment and ready to support FUN-LV as the equipment is developed further to cater for the requirements of the Method 1 trials. There is a risk that the new supplier may take additional time to become familiarised with the equipment and EATL and FUN-LV are working together to monitor and mitigate this risk.

A reserve option has been identified to supply the project with alternative Method 1 trial equipment, and a second reserve option was progressed but is currently on hold.

1.3.2 Installation Risks and Issues

Resolving the Method 1 issue outlined above resulted in delays to signing supplier agreements/contracts for the Method 2 and 3 trial devices. The project also wanted to ensure, as requested by Ofgem, that they only spent minimal project funds while the Method 1 issue was resolved. This resulted in the project signing a contract to design, manufacture and externally test the Method 3 prototype and delaying the contract for the supplying the trial equipment for Method 3. The supply contract is expected to be signed during the next reporting period. The contract for the Method 2 power electronics device is expected to be signed in the coming weeks and includes the supply of the prototype and the trial devices.

The delay in starting both suppliers developing their prototypes will result in a delay in the external testing of the devices on the Power Networks Demonstration Centre (PNDC) test network. This delay is not expected to impact the delivery of SDRC 9.4 Successful and safe installation, commissioning and operation of power electronics devices in London and Brighton by 30 June 2015.

1.3.3 Recruitment and Other Risks and Issues

FUN-LV has not identified any recruitment risks associated with the project as customer recruitment is not required to deliver the learning from the FUN-LV project.

1.4 FUN-LV Learning

Across this first reporting period, FUN-LV has already captured what is believed to be unique learning. The main contributions from this period are summarised below:

- Using simple external temperature monitors on transformers to identify candidate trial locations;
- Using temperature monitors to predict cable loadings; and
- Trial sites have been identified for Brighton and London and are currently being verified using current planning tools.

As part of workstream 5, which is dedicated to learning capture, dissemination and stakeholder engagement, a Knowledge Dissemination Roadmap has been developed and is available on request. A 'living' document outlining the strategy and timetable for learning capture and dissemination, this roadmap will continue to be developed and updated during the lifecycle of the FUN-LV project.

The roadmap is already being implemented and has driven the following dissemination activities which have focussed on raising the profile of the project and securing stakeholder buy-in to support project delivery and adoption:

- Web pages outlining the aims and objectives of the project was added to the UK Power Networks' Innovation website in January (www.ukpowernetworks.co.uk/innovation)
- Partner 'kick-off' meeting held on the 10 January 2014, to recap the aims and objectives of the project, project timeline, key risks, and introduced the project handbook to the partners.
- The Future Networks team held an externally focussed event on 15 January 2014 to publicise UK Power Networks' portfolio of innovation projects and the FUN-LV project was introduced to a wide range of external stakeholders.
- A core group of internal UK Power Networks' stakeholders were invited to a meeting held on 28 February 2014 to publicise FUN-LV and ensure the availability of key business resource to assist in the design approval process and support the implementation of recommendations into 'business as usual' activity.

From an internal perspective, knowledge dissemination activity over the coming months will concentrate on strengthening links between the project and the core group of internal stakeholders mentioned above. This will be accompanied with activity to increase the awareness and understanding of the project's aims and objectives to a wider group of key internal stakeholders through a range of communication channels.

External knowledge dissemination activity targeting external stakeholders will include the first major exposure of the project at the 2014 LCN&I Conference in October. As part of SDRC 9.1 a guidance document will be produced covering the planning considerations necessary for selecting, designing and installing power electronics devices and a learning event will be planned to share its contents.

2. Project Manager's Report

The FUN-LV project aims to demonstrate the benefits of using power electronics devices on the LV distribution network to facilitate deferring costly network reinforcement and enabling faster connections of low carbon technologies. The FUN-LV project started on 1 January 2014 and is due to complete on 31 December 2016.

This section describes the progress made on the FUN-LV project in the reporting period January 2014 through to June 2014, including the key milestones and deliverables met, any issues encountered, and provides a high level outlook into the next reporting period through to December 2014.

2.1 Initiation, Mobilisation and Governance

Within this first period of the project, the initial focus following the funding award was to address the Method 1 supplier issue. This issue was raised as a risk during the bid phase but was escalated to an issue in January after TE Connectivity failed to identify a party willing to purchase the technology outright. When this issue was escalated to Ofgem the project was instructed to maintain minimum project spending until a suitable resolution of the issue was available.

The project explored a number of options to resolve the Method 1 issue. These included TE Connecting signing a licensing agreement with another company to manufacture the LV circuit breakers and link box switches, procuring similar LV circuit breaker and link box switch equipment from another manufacturer and a solution to design a three phase circuit breaker to be installed in a footpath enclosure.

All options were evaluated using the same cost model FUN-LV used in the bid submission. The project also identified and included the additional costs required to develop the systems needed to visualize the new equipment to identify the funding gap. The project also reviewed the commitments FUN-LV had made in the bid submission and whether each solution would deliver those commitments.

A number of options were evaluated and the best option identified was for a supplier to manufacture the equipment under licence from TE Connectivity. TE Connectivity held discussions with EA Technology Ltd and agreed to sign a licence agreement to manufacture the equipment and support warranties on the orders placed under other projects. The increase in equipment costs will be funded from the FUN-LV contingency. The project are working closely with EA Technology Ltd to agree the specification for the additional development of the equipment required for the FUN-LV Method 1 trials and ensure they are up to speed with the circuit breaker and linkbox hardware and software.

During this period of uncertainty and the request to maintain minimum project spending, the project delayed the signing of the Collaboration and Project Agreements and only signed a contract to build the prototype multi terminal device with Turbo Power Systems.

The project has now appointed and mobilised the core project delivery team. The team structure developed in the bid phase has been reviewed and a suitable team mobilised to ensure the project is delivered efficiently, on time, within budget and to the required quality.

The roles and responsibilities of the FUN-LV project team partners have been documented in the FUN-LV Project Handbook. The project's reporting and governance cycles have also been detailed for clarity. The FUN-LV Project Handbook is available on request.

Where possible, individuals from the FUN-LV project bid team were transitioned into permanent full-time or part-time roles on the project from January 2014, including the Project Lead. This has ensured some stability and continuity of project knowledge during the project set-up phase.

The remaining project roles have been filled through external recruitment into UK Power Networks, and have resulted in one new member of staff in the project team as well as two external contractors. Supporting roles have been mobilised through the appointment of existing UK Power Networks' employees as part of their existing business unit activities; for example support from legal and subject-matter-experts (SMEs) in Asset Management and IT.

The Workstream 3 Manager's role is being managed by the project team with assistance from PPA Energy.

The following organisation chart, *figure 1*, shows all the allocated resources within the FUN-LV project structure as of June 2014.

Flexible Urban Networks – Low Voltage
Overall Project Structure v0.3

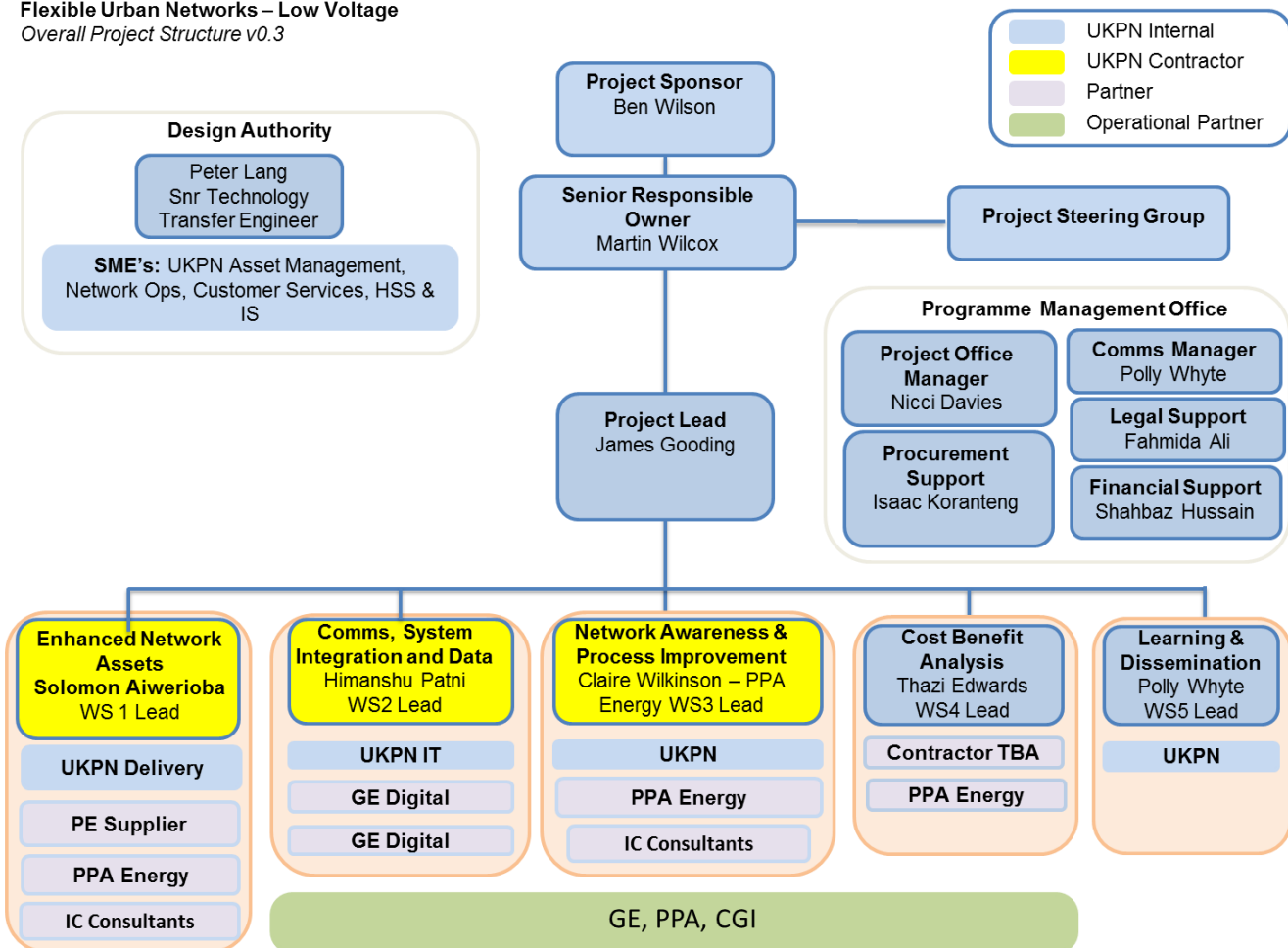


Figure 1 FUN-LV organisation chart

The table below shows the current status of the FUN-LV Partner Project and Collaboration Agreements. The collaboration agreement re-iterates and provides working practise around Intellectual Property, re-iterates the terms of the Project Direction issued by Ofgem, and agrees governance structures for the project. The partner agreements

agree individual scope, milestone and payment schedules for each partner. Good progress has been made to date by all partners to ensure the Agreements are ready to be signed.

Partner	Collaboration Agreement Status	Project Agreement Status	Target Date
CGI UK Ltd	Agreed – awaiting signature	Agreed – awaiting signature	30 June
PPA Energy	Agreed – awaiting signature	Agreed – awaiting signature	30 June
IC Consultants Ltd	Agreed – awaiting signature	Agreed – awaiting signature	30 June
IGE Digital	Agreed – awaiting signature	Under review	30 June

The table below shows the current status of the FUN-LV supplier contracts and the outstanding target dates for signature. These contracts will also be approved by the UK Power Networks Contract Governance Meeting (CGM) prior to both parties signing.

Supplier	Supplying	Supplier Contract Status	Target Date
EA Technology Ltd	LV circuit breaker and link box switches	Awaiting CGM approval	30 June
Alstom	Dual terminal power electronics device	Final terms being negotiated	31 July
Turbo Power Systems	Multi terminal power electronics device	Prototype contract signed	Signed
TBC	Substation monitoring equipment	Invitation to tender issued	31 August

The project office focus for the next reporting period will be as follows:

- Ensure all equipment supplier contracts are in place;
- Deliver SDRC 9.1 Design and Planning for Power Electronics: Successful completion of design and planning for power electronics; and
- Validating the revised project plan and associated finances.

2.2 Workstream 1 – Enhanced Network Assets

This workstream is responsible for the approval, procurement, installation and commissioning of all equipment required to demonstrate the benefits of flexible urban LV networks using power electronics devices.

The key stages for this workstream are:

- **Approval and Procurement:** To approve and procure power electronics devices for use in the FUN-LV trials.
- **Prepare sites:** To implement wireless transformer temperature sensors and LV network sensors.
- **Test, Install and Commission:** To test, install and commission power electronics devices for use in the FUN-LV trials.

- **Demonstrate:** To operate the devices, measure the impact and calculate benefits for customers using substation monitoring and the power electronics devices.

Set out below are:

- the approach adopted to successfully deliver WS 1's objectives;
- a progress report on WS 1 activities; and
- challenges encountered so far and how they have been managed.

2.2.1 The Approach

In order to successfully achieve the objectives of this workstream, the WS 1 team has been working with internal UK Power Networks technical, operations, procurement and legal personnel, along with the project's partners and suppliers to ensure that all the key stages within the workstream are delivered on time and in a safe and efficient manner.

The defined workstream lifecycle, as illustrated in *Figure 2* below, highlights the key phases.



Figure 2 Workstream 1 Key Phases

2.2.2 Progress Report

In this reporting period, extensive progress has been made in the recruitment and formation of the WS 1 team. Workstream-specific and project coordination meetings, involving key members of the other workstreams, were held in April 2014. In the workstream meetings held so far, roles, responsibilities and project deliverables were discussed and agreed. A workshop was held in the UK Power Networks' Training Centre at Sundridge and attended by workstream leads, workstream team members and Project Partners to provide technical appreciation of the FUN-LV project and the challenges envisaged in the course of delivering WS 1. A kick-off meeting with Turbo Power Systems (TPS), one of the suppliers of the Power Electronics Device (PED) was held in Newcastle in April 2014. TPS have since commenced preliminary design works for Multi terminal PED to ensure early delivery.

The WS 1 team has made good progress with respect to finalising all Supplier Contract Agreements with the three equipment suppliers for the three Methods planned to be deployed in the project. So far, the Supply Contract Agreement for 'Method 3' (Multi-terminal PED) has been agreed with TPS while the 'Method 2' (Dual Terminal PED) Supply Contract is currently being finalised with Alstom.

Key learning outcomes from other LCNF projects relating to FUN-LV are currently being collated by the WS 1 team to ensure that valuable technical, operational and commercial lessons learnt are adopted in the course of delivering the workstream's objectives. The WS 1 team has also taken over delivery of the Smart Urban Low Voltage Network (SULVN) Project, a IFI/Tier 1 project currently being delivered by UK Power Networks, due to the similarity in the technology and hardware deployed for this project and the 'Method 1' solution of the FUN-LV project. It is envisaged that lessons learnt from the design, planning, procurement, installation and commissioning of the Circuit Breakers, Remote Terminal Units, Link Box Switches and Controllers in the SULVN project would be adopted.

A visit by the WS 1 team to the Power Networks Demonstration Centre (PNDC) at Cumbernauld, Scotland took place in May 2014. PNDC is the centre where the prototype Dual and Multi-Terminal PEDs, developed by our suppliers, will be tested in a controlled environment. The purpose of the visit was to understand their facilities and discuss the various tests that would be carried out on the devices. The outcomes were very positive and details of testing and costs are currently being worked through to contract stage.

To conclude, good progress has been made in mobilising the project team, the project partners and suppliers towards achieving a successful project in a safe, timely and effective manner. In the next reporting period the WS 1 team expect to have rounded up the design of the PEDs, publish guidance document on planning considerations for selecting, designing and installing the PEDs as well as identifying and sharing key learning and planning considerations necessary to demonstrate the benefits of PEDs.

2.2.3 Key Issues Encountered

During this reporting period, a number of issues were encountered. The main issues are stated below;

- A delay in concluding contractual agreement with one of our suppliers is currently being addressed. Although further delay beyond the reporting period may place the workstream on the critical path. The WS 1 team is confident that this issue will be resolved on time to ensure SDRC 9.1 is met.
- The site selection process for Method 3 (Multi-Terminal PED) could be more onerous than expected due to the proposed size of the Multi-Terminal PED cabinet. The design of the multi terminal PED requires the devices to be installed in existing substations where space can be an issue. The workstream 1 team is currently liaising with the device manufacturer to ensure that the size of the cabinets is reduced to an acceptable size enabling the Multi-Terminal PED to be installed where it delivers greatest customer benefit.

- At the bid submission the project assumed that one of each of the Method 2 & 3 trial power electronics devices would go to Power Networks Demonstration Centre for testing. In discussions with the manufacturers one prototype of each method will be built for testing and 12 will be deployed on the network. The additional costs have been covered by the project.

2.3 Workstream 2 – Communications, System Integration, Data management (CSID)

This workstream will bring together various data repositories in the business in order to carry out the new tasks of

- 1) Assessing the performance of the LV network in greater detail prior to installation, and predicting results
- 2) Measuring the impact of the power electronic devices and collecting power electronic data for analysis later, including health data from the units and
- 3) Forecasting other network areas which may benefit from power electronic devices, and reconciling these with the wider business case. This will be achieved through the combination of historic load data, temperature data, cable route records and equipment ratings

The Key stages for this work stream are:

- **Initiation:** To formalise the delivery contracts for this Workstream and award work to the project partners and suppliers. Once the contracts are agreed to agree on team structure.
- **Design:** To describe existing architecture ('as is') and data flows for LPN and SPN required for this trial. To complete design (including approval) of architecture for system integration, and design for visibility and with the end-user in mind.
- **Development:** To start the development of the agreed architecture including creation of LV connectivity models for trial zones in LPN and SPN by CGI and delivery of the shadow control system comprising PowerOn Fusion licenses by GE. Test and validate these systems against defined key success criteria and provide training to relevant UK Power Networks' staff and project partners involved for business case development.
- **Testing:** To test the sample deployment of each Method from each area.
- **Deployment:** Prior to the deployment phase, perform final preparation and checks of system, users and relevant circumstances before the system goes into operational phase. Start using the system for the remainder of the trial; with continuous feedback by users and for system improvement and learning and dissemination

2.3.1 The Approach

The project life cycle for WS 2, showing the key phases to deliver the CSID IT solution has been defined and is illustrated in *Figure 3*. UK Power Networks' WS2 lead will plan, manage and facilitate the delivery of each CSID phase.



Figure 3 Workstream 2 key phases

Throughout the lifecycle, for any valid reason, this WS 2 model (as shown in *Figure 3*) will allow modification to any component through a predefined change control and/or fault management process. However, once the change has been agreed it will follow the same WS 2 lifecycle through to implementation into live service. This approach will help to ensure a robust understanding of the solution design amongst all stakeholders, and a mechanism to prevent changes in the scope of requirements and development delays.

In this reporting period, the WS2 team, involving UK Power Networks' IT Solution Architects, other subject-matter experts and project partners have been fully mobilised. A kick-off meeting was held in April 2014 where the team agreed roles and responsibilities, discussed the above approach and the plan for designing, developing and deploying the WS2 solution. The requirements phase has also been initiated and several workshops have been carried out in order to successfully define an end-to-end business process workflow for the WS2 solution, and the high-level requirements specification.

The business process workflow has been agreed by the WS 2 team and has been used as the scope and basis for the requirements definition. The output is grouped by the following four product categories, and is shown in *Figure 4*:

- **Converted Data** – Data will be extracted from multiple legacy UK Power Network systems, validated and merged to create new information and insight (network awareness) that was not possible before when using single sources. The combined data will be used to prepare the network diagrams in the PowerOn Fusion ADMS system. The data will be loaded into DPlan and will be used to study the network at the trial locations and validate the performance of the power electronics devices.
- **Modified PI Historian** – The modified PI Historian would be required to store additional voltage, current and direction information to be stored so as to facilitate the studies and simulation to be conducted in other work streams.
- **Modified ADMS** –The ADMS system, which is part of GE's PowerOn Fusion suite, requires modification to accommodate the new 2 terminal & 3 terminal power electronics devices for the network trials. The system will manage the integration of LV monitoring and power electronic SCADA data, model integration and visualisation. The project will create and load new topology models, additional data points and symbols to facilitate the real time control of the devices along with detailed network analysis.

- **Modified DPlan** – The modified DPlan is required to model the Method 2 and 3 devices for PE. These new devices and the studies require new symbols to be created to demonstrate the controllability from remote locations. Appropriate changes also need to be done so that these symbols created can be linked together to the analog values and placed at right place in PowerOn fusion.

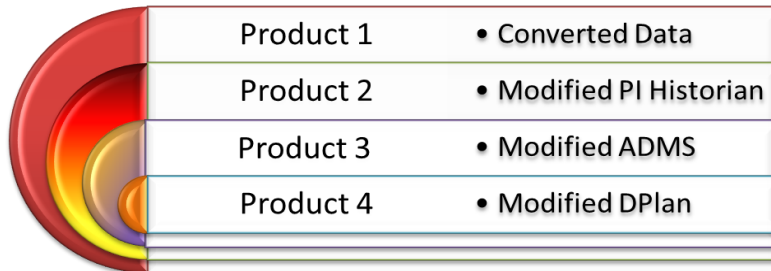


Figure 4 Workstream 2 phases and deliverables

In future workshops, multiple unique low level requirements would be defined and captured across each actor on the workflow. Each low-level requirement would be detailed such that it can be assigned to only one owner within the team. The owner of each requirement will in turn develop design products covering the IT infrastructure and software functional specifications for the requirement. Currently, these high-level requirements are being analysed further by the team and are being used to drill down to define the detail-level requirements.

As illustrated in *Figure 4*, these design products, once reviewed and approved by the FUN-LV Design Authority, will be used as inputs for the development phase to produce the software solution. The overall specification and design is on track to be shared as part of SDRC 9.3 at the end of November 2015.

2.3.2 Key Issues Encountered

The main issues encountered in this reporting period have been:

- A slight delay in establishing Project Agreements has meant that resource availability has been somewhat restricted. This has contributed to not all team members being able to be involved in the development of all the high-level requirements. This is not however expected to delay the development phase and publishing of the CSID designs as part of SDRC 9.3 at the end of December 2015.
- There has been a review in respect of the use of DPlan as the strategic planning tool for UK Power Networks. Agreement has now been reached between the enterprise architecture team, IS Projects, and the FUN LV to continue using DPlan as the preferred solution for the project.

2.3.3 Key Deliverables

In this reporting period, the following progress has been made within WS 2:

- **CSID Business Process Workflow** – A business workflow diagram defining the full end-to-end scope of the CSID IT solution grouped by different functional area, which is shown in *Appendix A*.
- **High Level Requirements Specification** – A document specifying all the high level functional and non-functional requirements for the CSID IT solution. Each requirement is uniquely numbered and mapped to one process or data item on the business process workflow. The specification will feed into SDRC 9.3.

2.4 Workstream 3 – Network Awareness and Process Improvement

This workstream has the role of selecting the areas and demonstrating user acceptance and technical benefit from the power electronic devices (distinct from the economic benefit that is achieved).

The Approach:

The workstream has been developing use cases, as they help us understand what the user will want, and therefore what we are aiming to produce.

The benefits of using use cases in the delivery of the FUN-LV project are:

1. They tell the story from the end user's perspective
2. They improve communication among project team members
3. They identify stakeholders and users of the power electronics devices in a BAU situation and how they will engage with the devices
4. They encourage common agreement about system requirements
5. They expose what belongs outside project scope
6. They identify areas of process improvement and system automation

Use cases are about the whole system, not just about one component.

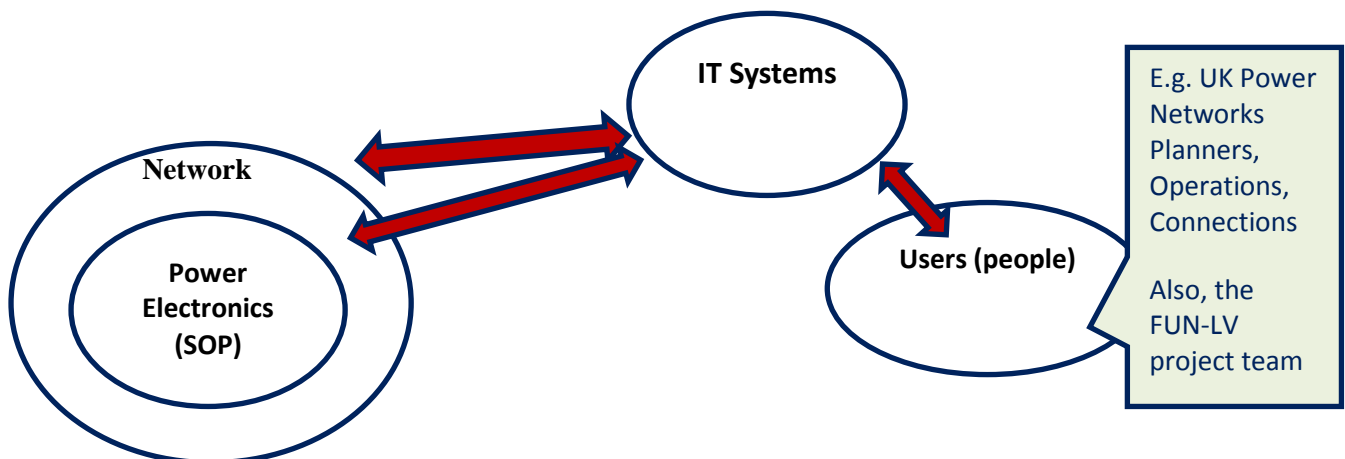


Figure 5 Use case relationships

These use cases and storyboard are being used to engage internal stakeholders and help them understand how FUN-LV will impact their work. The storyboard introduces the project, describes the project structure, use cases, site selection process, technical details of the Methods, soft open point (SOP) operational requirements and software and communication elements. The storyboard is a living document which will be enriched with learning and used as a dissemination device.

Progress

In LPN, secondary transformer demand has been collected for a number of years. This is now more easily available and manipulated using the Distribution Network Visibility (DNV) software tool developed as part a LCNF Tier 1 project. Using the DNV application heavily loaded substations with different demand profile shapes have been quickly identified. Neighbouring substation pairs and triplets have been selected for further analysis. In SPN, only the

transformer maximum demand is recorded in the asset database. To determine the demand profile shapes, wireless temperature monitors have been installed in over 60 substations recording the demand over several months. The demand profile has been analysed using a time lag algorithm to select suitable candidate sites for the trials. Pairs and triplets have been selected for further analysis in Brighton.

Excellent progress has been made identifying potential trial sites. 25 sites in London and 13 sites in Brighton have been evaluated and selected for further evaluation using DPlan. Site selection continues through 2014 to ensure a good range of trial locations with the required load profiles are available to the project. A further consideration for the next reporting period will be progressing discussions where necessary with local authorities to brief them on the installations.

Advanced SOP operating modes and capabilities have been modelled assisting in the development of SOP control algorithms which will be shared with the Methods 2 and 3 suppliers.

Key Issues Encountered

The main issues encountered in this reporting period have been:

- Lack of early clarity of Method 1 technology that will be used by FUN-LV
- Lack of demand data from distribution substations in Brighton

2.5 Workstream 4 – Cost Benefit Analysis

The aim of this workstream is to present the financial case for adopting the applications trialled during the FUN-LV project for use in business as usual network growth scenarios. An important part of the project is to demonstrate the viability of power electronics methods to maximise the economic value of the LV network. The business as usual case will be used to inform the key benefit of the power electronics to release network capacity as an alternative solution to traditional methods and when the selection of each power electronic device (PED) is appropriate.

- **Cost Benefit Analysis Planning and Business Case Development:** Confirmation of the Cost Benefits Analysis Plan used at bid submission against the project trial findings.
- **Confirmation of the Benefits:** Use of case studies to demonstrate the benefits of power electronic devices, based on operational data, and to confirm whether the expected benefits have been realised within UK Power Networks and can be replicated across GB as an alternative to traditional reinforcement.
- **Produce Business Case Document:** Summarise the business case for deploying SOP on LV networks.

Work commenced in June to determine how the project plans to deliver the cost benefit analysis of the power electronics devices when compared to the traditional methods for providing additional capacity. Early activities identified to complete the analysis include:

- Confirm the BAU planning solutions for increasing capacity at the trial substations.
- Provide detailed costs of the BAU planning solutions
- Identify the approach for the cost benefit analysis incorporating learning from Low Carbon London
- Prepare tender documentation
- Issue invitation to tender
- Decide on the use of UK Power Networks or external resource to complete the CBA
- Review and assess proposals
- Prepare, review and agree contract for CBA (if the project selects an external resource)

2.6 Workstream 5 – Knowledge Dissemination

This workstream is dedicated to sharing the learning and knowledge generated from the other workstreams. The framework for this activity is contained within the Knowledge Dissemination Roadmap. This document defines the project's key stakeholders or target audience, outlines the knowledge to be shared from other workstreams, proposes appropriate communication channels and sets out the timetable for knowledge dissemination activities. The roadmap is a 'living' document that will be continuously reviewed and updated throughout the lifecycle of the project.

In addition to the development of the roadmap, during these first six months of the project the focus of learning dissemination activity has been to start to raise awareness about the project's aims and objectives and to define who the key stakeholders are, both internal and external, with particular emphasis on securing internal buy-in to support the delivery of the project. Below is a summary of activity that has taken place between January and June 2014:

- **Website:** introductory pages launched in January and structure developed for the project on UK Power Networks Innovation website – www.ukpowernetworks.co.uk/innovation
- **Partner communications:** initial meeting held in January with representatives from all project partner organisations enabling the re-cap of the project's aims and objectives, the sharing of timelines and the introduction of the project handbook.
- **Internal stakeholders:** key people identified and meeting held in February to share information about the project and explore the best approach to ensure engagement going forward. The continued engagement of this group will be essential to support the technical design approval process and ensuring adoption into 'business as usual'.
- **External audience:** FUN-LV was used as an example to highlight UK Power Networks' portfolio of innovation projects at a key external event held in London in January.

Activity planned for the coming six months includes:

- **Internal stakeholders:** strengthening links between the project and the core group of internal stakeholders through meetings and workshops. Further briefings and engagement will also be arranged for a wider group of internal stakeholders to increase the awareness and understanding of the project's aims and objectives.
- **Key messages:** we will start to develop some key messages and FAQs from the project to inform all product communication products including brochures, reports, webpages, videos etc. These will continue to be reviewed and developed during the lifecycle of the project.
- **LCN&I Conference:** in October will provide the first major exposure of the project and will enable us to share information with key external stakeholders including other DNOs, Ofgem and DECC.
- **SDRC 9.1:** a guidance document will be produced covering the planning considerations necessary for selecting, designing and installing power electronics devices and a learning event will be planned to share its contents.

Work will continue to identify any further opportunities to increase awareness of the project and to share any early learning and all will be evaluated and acted upon if considered appropriate and timely.

3. Consistency with Full Submission

The FUN-LV project is on track to deliver the learning consistent with the full submission.

The following details are noted to have changed since full submission:

- The Method 1 supplier has changed from TE Connectivity to EA Technology Ltd who is manufacturing the LV circuit breakers and link box switches under licence.

4. Risk Management

FUN-LV has established a rigorous and proactive risk management process, as described in the FUN-LV Project Handbook. It allows for the recording, communication and escalation of key risks and issues within the project. It also defines where decisions will be made and how this will be communicated back to the WS level where the risk or issue has arisen. Risks are reviewed regularly at WS level and monthly at project level by the Project Board. Key project decisions are documented in a decision paper or internal change request. This was the approach taken, for example, in tackling the alternative possibilities for the supply of the Method 1 equipment.

4.1 Full Submission Risks – Update

Ref No	RAG Status	Risk and Impact Description	Mitigating Actions	Update
Installation				
R029	A	Permitted development is not allowed requiring Planning permission to be granted, prevents installation of PE at chosen sites, resulting in delays.	Determine whether permitted development is sufficient.	Operational Properties & Consents (OP&C) staff have been engaged to advise on areas that could present problems.
R012	G	When shipping the power electronics device from the manufacturer to site the device is damaged beyond repair causing delays.	Use proven safe methods of shipping. Consult insurance manager to ensure appropriate levels of insurance are in place.	Transport and Installation is being considered at an early stage by suppliers.
R009	G	The power electronics fails with severe consequences after commissioning, resulting in limited confidence in the device, so it is disconnected until all tests have been completed.	A full set of quality tests to be completed before installation, with the design and operation meeting the UK Power Networks requirements. Ensuring full confidence in the equipment installed. Monitor defects and issue reports supplied by power electronics device manufacture for existing installs.	Testing schedules have been discussed with the PNDC. Method 2 and 3 specifications have been approved. The method 1 specification is going through the approval process.
R035	G	The circuit breakers and link box switches from TE Connectivity may not be available to be procured.	UK Power Networks are working with TE Connectivity to resolve the situation.	EATL are now able under licence to produce the products and a supplier agreement is being drawn up between EATL and UK Power Networks.

Ref No	RAG Status	Risk and Impact Description	Mitigating Actions	Update
R002	A	Equipment suppliers do not produce designs acceptable to UK Power Networks' Asset Management team, which will result in re-design and delays.	Asset Management team were involved in the tendering process. Power electronics device manufacturers will design a prototype that will be tested at the PNDC before production units are built.	This risk has been reworded from Power Electronics manufacturers to reflect the risks of procurement as a whole, and not particular providers. Functional specifications have been produced and approved. These specifications include the tests to be carried out at the PNDC.
Installation				
R005	G	PE device manufacture reliance on single factory source resulting in delays in delivery.	UK Power Networks are monitoring the situation.	Regular contact with the suppliers to identify issues.
R006	G	The power electronics device manufacturer goes out of business before any payment has been made for the power electronics device, leading to project delays.	Carry out full financial due diligence checks in line with approved standards of practice and the UK Power Networks procurement procedure(s). Identify alternative supplier(s).	CGM approval has been obtained for Methods 1 and 3 and includes checks on financeability of suppliers. There are no financeability concerns with the remaining supplier of Method 2.
R008	G	The power electronics device manufacturer goes out of business after the power electronics device has been paid for and delivered, resulting in lack of continuity and covers should the unit fail.	Carry out full financial due diligence checks in line with approved standards of practice and the UK Power Networks procurement procedure(s). Arrange a software escrow and novation of liabilities to OEMs.	As above. Software escrow has been included in the contracts and contract drafts.
R010	G	The power electronics device is not commissioned on time causing project delays.	Regular progress meetings/reports to track progress against the plan.	First high level design will be reviewed in June
R001	Closed	Final funding may not be awarded Therefore the project would not be able to be carried out in 2014	Ensure quality bid submission through regular review, clear differentiation and stakeholder engagement	Funding awarded and risk closed

Ref No	RAG Status	Risk and Impact Description	Mitigating Actions	Update
R034	G	IT integration requires further development not proposed in the bid stage.	Engage with UK Power Networks IS Solutions Architect and Partners to ensure IT integration requirements are documented	Integration requirements are being identified in workstream meetings and addressed in the project plan.
R004	G	Operational and Health and Safety procedures are not approved for use of the power electronics device, so UK Power Networks' staff are unable to operate the equipment.	Engage with UK Power Networks' Health, Safety Sustainability and Technical Training (HSS&TT) team to design suitable and approved policies and procedures.	HSS&TT representative has been engaged to advise on the required policy and procedure changes. CDM-Coordinator has been engaged to advise the project
R013	A	The system integration platform cannot be delivered in time, causing delays.	Regular progress meetings/reports to track progress against the plan.	UK Power Networks IT Solution Architect has been engaged. The workstream 2 lead is engaging all relevant partners and stakeholders to ensure the design approval process remains on track.
R016	G	The system integration platform does not perform to specification.	UK Power Networks specialists have reviewed the specification during planning and preparation	The high level requirements have been agreed and the data flows documented. The low level requirements are currently being validated.
R019	A	The lack of available technical and project resources results in delays in project delivery.	Resourcing plan completed identifying the required project resources.	Project team is engaging with Partners to ensure staff are available during design and delivery phases.
R023	G	During the project delivery stage the appropriate UK Power Networks staff do not engage adequately or in a timely manner with the project. Resulting in poor engagement and delays.	All relevant governance panels informed and have authorised the work. Additional stakeholder events to be held in Q3 2012.	The installation will be delivered from UK Power Networks' existing delivery team for projects on the LV and 11kV network. Representatives are already engaged.
R021	G	The network configuration changes, preventing full benefits of PE not being demonstrated.	Ensure trial sites are selected in accordance with criteria.	The project will Liaise with Distribution Planning once the sites have been verified to ensure they are protected during the trials

Ref No	RAG Status	Risk and Impact Description	Mitigating Actions	Update
R011	G	The power electronics device does not perform to specification, so not all benefits are realised.	Regular design meetings/ reports. Key stakeholder engagement to ensure specification can comply with UK Power Networks design policies and procedures.	Method 3 high level design has been submitted for approval
Procurement				
R032	G	There is a risk that the learning is not disseminated effectively to all stakeholders because different parties will have different interests and learning styles. This risks leads to some of the learning getting lost.	Ensure Dissemination workstream engages with technical project leads early on in project. Ensure learning from other LCNF projects for dissemination is included.	The Knowledge Dissemination Roadmap has been developed. It is a living document and will be used as the basis for engaging all FUN-LV stakeholders.
R0031	G	Project partner(s) withdrawing their participation at the start of the project, leading to delays.	Asset Management were involved in the tendering process. Early stakeholder engagement, including the power electronics device manufacturer sessions are planned for Q4 2013 to ensure the design(s) are acceptable and meet all requirements.	Majority of partnership and collaboration agreements are in the final stages of completion. The Project Lead is in discussion with the Project Partners Account Managers, UK Power Networks Legal and Procurement Teams. GE are currently reviewing the Partner agreement to move the agreements forward.

4.2 Risks raised in the current reporting period

Ref No	RAG Status	Risk and Description	Impact	Mitigating Actions	Update
Installation					
R036	G	The system integration platform is not delivered to specification.		The Workstream 2 manager will work with UK Power Networks IT and the Project Partners to ensure the platform is correctly specified	IT Solution Architect has been engaged.
R037	G	Equipment is stolen or vandalised.		Locate in well-lit areas.	Site selection process is being developed. Further sites will need to be identified in order to be able to reject any sites presenting a risk.
R017	G	The installed power electronics technology fails and needs to be disconnected from the network. Delays whilst being repaired or replaced.		Close collaboration with the power electronics device manufacturer to ensure the design meets UK Power Networks' specification and standards through robust testing (maintenance & training delivered by the power electronics device manufacture). Replacement parts are to be made easily available. Regular maintenance cycle.	Testing schedules have been discussed with the PNDC. Specifications are in place for Methods 2 & 3. The Method 1 specification is currently being prepared for approval.
R027	G	Sites get selected that cannot be easily modelled in DPlan because the network data is not available.		Collect the necessary data or find other locations.	Sites are excluded if they do not have data in the repository of load data (Pi) or have not been able to be fitted with temperature sensors to measure and infer loading.
R028	A	Due to delay in signing contracts with partners, some of the planning aspects and requirements capturing might not involve all the partners. This might require re-baselining and reworking adding further delays to delivery.		Expedite the contractual and legal process with partners.	CGI, GE and the Information Systems department within UK Power Networks have all been working together prior to contract signature.
Procurement					

Ref No	RAG Status	Risk and Impact Description	Mitigating Actions	Update
R007	G	The power electronics device manufacturer goes out of business after payment has been made for the power electronics device, but has it not been delivered, leading to project delays and lost money.	Carry out full financial diligence checks in line with approved standards of practice and the UK Power Networks procurement procedure(s). Negotiate the transfer title of the device.	As above.
R003	A	Cost of installation works are significantly higher than expected.	Method 1 may require a link box to be changed and Method 2 requires ground works for jointing.	Colleagues in the delivery team have been mobilised, the project will have further dialogue with the LPN and SPN Programme Delivery Managers over the next reporting period.
R024	G	There is a risk that EATL decide to terminate the licence agreements they have with TE Connectivity and UK Power Networks and not supply the Method 1 equipment.	The project will monitor EATL and TE Connectivity closely to ensure all parties remain committed to the respective agreements.	Contract has a 12-month notice period or 'sunset' clause.
R025	G	There is a risk that TE Connectivity decide to terminate the licence agreement they have with EATL, preventing EATL from supplying the Method 1 equipment.	The project will monitor EATL and TE Connectivity closely to ensure all parties remain committed to the respective agreements.	Contract has a 12-month notice period or 'sunset' clause.
R026	G	There is a risk that the project is unable to procure Method 1 equipment as laid out in the bid submission.	The project has prepared a solution that provides a three phase circuit breaker to be located at the normal open point.	The project has prepared an "option 3" that provides a three phase circuit breaker to be located at the normal open point.
Other				
R022	A	There is a risk that the business case is undermined by emerging new technology that reduces either cost or installation time of traditional reinforcement methods.	Design Authority (DA) to monitor reinforcement developments emerging from Asset Management.	DA to monitor reinforcement developments emerging from Asset Management.
R030	G	Increase in cost may lead to drop in a few software components included in initial plans.	To be covered with partners while undertaking commercial discussions.	All Partners have agreed to deliver all their deliverables for the cost submitted in the bid submission.

Ref No	RAG Status	Risk and Impact Description	Mitigating Actions	Update
R039	G	There is a risk that the new supplier may take additional time to become familiarised with the equipment leading to delays in delivery of trial equipment	FUN-LV working with Supplier to ensure they are familiar with the equipment and fully understand the development requirements for the circuit breakers and link box switches	Method 1 equipment specification has been prepared defining the additional development required so the equipment can be used in the trials.

5. Successful Delivery Reward Criteria

SDRC	Criteria	Evidence	Progress	Date:
9.1	Successful completion of design and planning for power electronics	<ul style="list-style-type: none"> Published guidance document on planning considerations for selecting, designing and installing power electronics devices using the traditional planning systems and approaches currently used by UK Power Networks; Identification of key learning and planning considerations necessary to demonstrate the benefits of power electronics devices and shared through the project website; and <p>A list of identified substations, selection criteria and expected benefits.</p>	<ul style="list-style-type: none"> Temperature sensors have been used as a proxy to current sensors to determine the shape of the demand curve at candidate sites. Coordination meetings have been held with one of the PED suppliers to discuss and progress PED design works. The substation identification criteria have been developed. The methodology involves a set of preliminary measurements using load profile, unbalance and harmonic data from Remote Terminal Units and wireless temperature sensors fitted to transformers and LV cables. Followed by network feasibility studies. For the current set of identified sites, “best case scenario” load transfer through the SOP has been estimated based on historical time series load data (past 12 months). A set of proposed initial sites has been produced . These have been documented in a report, and various presentations. The recommendations are in the process of being converted into a standard format for review by the Design Authority. 	By 31 December 2014

SDRC	Criteria	Evidence	Progress	Date:
9.2	Successful and safe installation, commissioning and operation of LV switches and circuit breakers on LV networks	<ul style="list-style-type: none"> • LV switches and circuit breaker device approvals for application on UK Power Networks' LV networks; • Published guidance document on the safe and appropriate installation of LV switches and circuit breaker devices; • LV switches and circuit breakers electrically connected to LV networks; • Automated reconfiguration of radial networks is demonstrated; • Remote and automated switching between interconnected substations is demonstrated; and • Demonstration of other available modes of operation, where relevant. 	<ul style="list-style-type: none"> • LV switches and circuit breakers specification for FUN-LV has been prepared and is currently being reviewed with the EATL. 	By 30 June 2015
9.3	Integration of IT systems to facilitate the planning and operation of LV networks	<ul style="list-style-type: none"> • A description of FUN-LV's IT architecture including the interfaces between control systems, geospatial databases and planning and visualisation tools that enable planning and operation of a flexible LV network; • A report describing how increased levels of awareness have improved planning processes and network operations; • Models of power electronics devices to allow benefits to be determined; • Data transfer between the power electronics devices and the data historian; and • Data transfer between UK Power Networks systems and DPlan to build network models. 	<ul style="list-style-type: none"> • Business Process Workflow – A business workflow diagram defining the full end-to-end scope of the IT solution grouped by different functional area. • High Level Requirements Specification – A document specifying all the high level functional and non-functional requirements for the IT solution. • Licence purchased for DPlan and software installed. 	By 30 November 2015

SDRC	Criteria	Evidence	Progress	Date:
9.4	Successful and safe installation, commissioning and operation of power electronics devices in London and Brighton.	<ul style="list-style-type: none"> • Dual and multi-terminal power electronics device approvals for application on UK Power Networks' LV network; • Guidance document on the safe and appropriate installation of dual and multi-terminal power electronics devices on the LV network, which will be shared as learning; • Dual and multi-terminal power electronics device installed on a test network to demonstrate functionality in a controlled environment; • Dual and multi-terminal power electronics device electrically connected to the LV network; • Autonomous power transfer between connected substations is demonstrated; • Power electronics device performance and reliability data; • Distribution network monitoring data; and • Additional LV monitoring data installed for the purpose of the trials. 	<ul style="list-style-type: none"> • Coordination meetings have been held with one of the PED suppliers to discuss and progress PED design works. • Initial multi terminal designs have been reviewed by the Design Authority. • Dual and multi terminal equipment specifications have been approved by UK Power Networks' Asset Management. 	By 30 June 2015
9.5	Successful demonstrations of enhanced modes of operation of power electronics devices	<ul style="list-style-type: none"> • Documentation of various enhanced modes of operation of power electronics devices; with comparisons of early modes of operation with those proposed by Imperial Consultants; • Provision of the required inputs for the Cost Benefit Analysis to the WS4 contractor; • Provision of demand profiles and other measured analogues to the WS4 contractor; and <p>A report detailing how power electronics actively manages fault current, delivers voltage control and indications of device losses under operational conditions.</p>	<ul style="list-style-type: none"> • SOP functions are covered in the Use Cases. This includes the "standard" SOP function of load transfer, as well as a series of "enhanced functions", including controlling voltage within a meshed network; controlling fault level of a meshed network; balancing phases; and making other Quality of Supply improvements. • Examples of typical substation time series data for 3 phase voltages, power P & Q and harmonics have been extracted by PPA and converted into Sequence Component Formats by Imperial who have commenced detailed modelling of SOP control options and responses. 	By 31 July 2016

SDRC	Criteria	Evidence	Progress	Date:
			Imperial Consultants are investigating the data input requirements (i.e. what a power electronic device will need to receive from neighbouring substations) to achieve these enhanced functions, as well as considering requirements of the SOP hardware.	
9.6	Full evaluation of the benefits realised by power electronics devices on the LV network.	<ul style="list-style-type: none"> • Completion of Dissemination of learning for the operation of power electronics devices on LV network architectures and for network performance; • Completion of Cost Benefit Analysis fully quantifying the benefits for various scenarios and types of customer (case studies). The case studies will be based on site specific examples and operational data available during the trials. The business as usual approach will be compared with the FUN-LV methods; • Report including cost of installation and operation of power electronics devices on the network; • Demonstration of the benefits realised (financial and non-financial) and the capacity released. Multiple benefits will be evaluated for each case study; a primary benefit (i.e. the driver for the method deployment) and secondary benefits; • Assessment of the Cost Benefit Analysis; and • Analysis of Power electronics device performance and reliability data. 	<ul style="list-style-type: none"> • Roadmap complete. • Business case updated to reflect change in Method 1 costs. 	By 31 December 2016

6. Learning Outcomes

6.1 Summary of key learning

Within this first reporting period the project has captured the following learning:

1. **Business Process Workflow** – A business workflow diagram defining the full end-to-end scope of the IT solution grouped by different functional area,
2. **High Level Requirements Specification** – A document specifying all the high level functional and non-functional requirements for the CSID IT solution.
3. **Engineering Design Standard 08-0039** Multi Terminal Power Electronics Device approved by UK Power Networks Asset Management
4. **Engineering Design Standard 08-0040** Dual Terminal Power Electronics Device approved by UK Power Networks Asset Management
5. **Engineering Design Standard 08-0041** LV circuit breakers and link box switches has been prepared and is being reviewed by the equipment manufacturer

The following learning continues to be developed further and will be detailed in the delivery of SDRC 9.1 at the end of 2014 along with the next project progress report:

- Using transformer temperature monitors to identify candidate trial locations
- Using temperature monitors to predict cable loadings
- Identification of trial sites for Brighton and London which are currently being verified using current planning tools

6.2 Approach to capturing the learning and disseminating

The project has reviewed the lessons learnt from UK Power Networks tier 2 projects and identified the need to capture learning as soon as it occurs. To facilitate this requirement the workstream leads capture lessons learnt as part of the weekly reporting and this is then stored centrally in the project's lessons log. The learning captured will then be evaluated and using the project's knowledge dissemination roadmap along with stakeholder analysis identify the target audience for the learning and the best method of ensuring the learning is well publicised.

6.3 External dissemination activities

During this reporting period the external dissemination activities has been minimal. This enabled the project to maintain focus and ensure there was a credible solution available for supplying Method 1 equipment. The project was featured in a UK Power Networks' Future Networks after work 'drop-in' public event held in London in January that publicised the varied portfolio of innovation projects currently being undertaken.

During the next reporting period knowledge dissemination activity targeting external stakeholders will include the first major exposure of the project at the 2014 LCN&I Conference in October. As part of SDRC 9.1 a guidance document will be produced covering the planning considerations necessary for selecting, designing and installing power electronics devices and a learning event will be planned to share its contents.

6.4 Internal dissemination activities

UK Power Networks' stakeholders were invited to a meeting held on 28 February 2014 to publicise FUN-LV and ensure the availability of key business resource to assist in the design approval process and support the implementation of recommendations into 'business as usual' activity.

Internal knowledge dissemination activity over the coming months will concentrate on strengthening links between the project and the core group of internal stakeholders mentioned above. This will be accompanied with activity to increase the awareness and understanding of the project's aims and objectives to a wider group of key internal stakeholders through a range of communication channels.

The project has also recruited a number of key business experts to the project Design Authority and they will be used to ensure the learning from the project is disseminated into their relevant business areas.

7. Business Case Update

The FUN-LV project seeks to explore the way in which power electronics devices connected to LV networks can respond faster and with more flexibility to the increased demands of our customers when compared against traditional network reinforcement methods. FUN-LV will also assess the suitability of power electronics devices to defer network reinforcement and for how long.

The project will also assess the use of the three trial methods at different stages to cater for increase of network load during the deferred time period before traditional reinforcement must be implemented.

EATL have agreed to supply the project with circuit breakers and link box switches at the same cost per unit UK Power Networks recently agreed with TE Connectivity. The project explored a number of options for supplying Method 1 equipment but decided that using EATL to supply the equipment would be the most successful outcome for the following reasons

1. This option would only require £208k of project contingency
2. The integration of the equipment into PowerOn has been completed as part of another project
3. The equipment is already under test on the SULVN project

This is the equipment identified in the full submission for use in the Method 1 trials. The overall business case for carrying out the project remains strong. At a GB scale, the benefits have fallen slightly from £112.8m to £90.2m but are significant. This will be validated further during the workstream 4 cost benefit analysis activities.

8. Progress against Budget

This section is provided in *Appendix B*

9. Bank Account

This section is provided in *Appendix C*

10. Intellectual Property Rights (IPR)

During this reporting period Turbo Power Systems have acknowledged the following foreground IPR has been developed for the multi terminal power electronics device based on modifications to background IPR:

- The control card (background ref: 100619)
- The implementation of the control card software (background ref: TPS353), this would include the software and firmware
- Diagnostic & Monitoring Card (modified existing PTE software to fit this contract)
- Configuration and Setup files for the PTE.

12. Accuracy Assurance Statement

We hereby confirm that this report represents a true, complete and accurate statement on the progress of the Flexible Urban Networks – Low Voltage Project in the six-month period from Jan 2014 – June 2014 and an accurate view of our understanding of the activities for the next reporting period.

Signed Ben Wilson
Date 17/6/14

Ben Wilson
Director of Strategy & Regulation and CFO
UK Power Networks

13. List of Appendices

Appendix A: WS2 Business Process Workflow
(Follows after this list)

Appendix B: Progress against Budget (CONDIDENTIAL)
(see separate document)

Appendix C: FUN-LV Bank Statement (CONDIDENTIAL)
(see separate document)

14. Documents available on request

FUN-LV Project Handbook

FUN-LV Knowledge Dissemination Roadmap

Appendix A: WS2 Business Process Workflow



CSID Plan FUN-LV – WS2

