Scottish and Southern Energy Power Distribution

New Thames Valley Vision

PROJECT PROGRESS REPORT

Project Number	SSET203
DNO	Southern Electric Power Distribution Ltd
Reporting Period	July 2015 to December 2015

Bracknell Forest Council

ea technology

DNV·GL

Honeywell

University of Reading

1 Executive Summary

Ofgem guidance: Executive Summary (This section should be no more than 4 pages) This section should be able to stand alone and provide a clear overview of the project's progress and any significant issues over the last period. All stakeholders, including those not directly involved in the project, should be able to have a clear picture of the progress. The DNO should describe the general progress of the project and include any notable milestones or deliverables achieved in the period. The Executive Summary should also contain two subsections: one for the key risks and one for the learning outcomes.

New Thames Valley Vision (NTVV) is a Low Carbon Network Fund Tier 2 project selected by Ofgem, the UK's energy regulator, during the 2011 competitive selection process. This five year project is focussed on the Low Voltage (LV) network and aims to demonstrate how electricity distribution networks can better serve their customers by understanding, anticipating and supporting their energy use as they move towards low carbon technologies. The project explores a mixture of analytic, technological and commercial solutions.

The project has met all Successful Delivery Reward (SDRC) criteria milestones since inception and during this report period. During the past six months the technology trials using the commissioned systems have continued and, within this reporting period, the following equipment has been deployed: cold thermal storage devices and energy storage technology. Initial trials of the cold thermal storage devices and the Energy Storage and Management Units (ESMUs) have been completed and reported on in SDRC reports. A short summary of the delivery achievements against each of the core learning outcomes is provided below:

Learning Outcome: Understanding

The project continues to collect energy use data from customers and substations and has now gathered over two years of energy usage data giving an improved view of how energy is used and generated on the LV network. The project has collected over two years' worth of data for all customers and this has been used to provide input(s) to the Network Modelling Environment (NME). For substation monitoring the focus has moved to maintaining monitors in reliable working order; rather than deploying more equipment.

Learning Outcomes: Anticipating and Optimising

During this reporting period aggregation and forecasting of energy usage profiles has enabled forecast scenario studies to be run within the NME. This has enabled the genetic buddying algorithm to be used to purposefully assign base load profiles to the model. This has allowed the process to be refined with regard to handling large volumes of real data.

A significant amount of work has taken place over the past six months to ensure that the reporting outputs from studies run within the NME provide relevant statistical comparisons between different circuits and substations.

This ensures that the impact of additional low carbon technologies and additional loads are more easily identified on specific circuits. Many studies have been run based on forecast scenarios to facilitate the evaluation of technical impacts from low carbon promotions, as reported in SDRC 9.8b 3 Technical Impact Evaluation (delivered in November 2015).

During this reporting period the Distribution Management System (DMS) has been utilised to: 1) Ensure that the substation monitoring equipment is operational and continues to provide data on the LV distribution network, 2) Support the commissioning of ESMUs, 3) Enable trials of the ESMU devices to deliver the required energy storage SDRC reports, 4) Enable testing of the interface between the DMS and the Demand Response Aggregation Server (DRAS) and 5) Complete initial testing to ensure that instructions for the deployed ESMU devices, generated in the smart control environment, can be communicated to the devices in the field.

Learning Outcome: Supporting Change

Supporting change on the NTVV project includes the following technologies: ADR, ESMUs including smart control, hot thermal storage and cold thermal storage.

The below bullet points summarise the progress during this reporting period:

- **ADR:** Load shed events with ADR participants have continued within this reporting period. In addition the commercial agreements for incentivized ADR trials has been written and **sent to all ADR participants for agreement**. The load shed plan for the next reporting period has been completed.
- **ESMU:** The 25 ESMU devices have been installed and trials have been completed and reported on. Within this reporting period three ESMU SDRC reports have been delivered. Trials of these devices with smart control are scheduled to be completed within the next reporting period.
- **Hot thermal:** Customer engagement has continued to identify further participants and a number of new Energy and Micro-generator MAnager (EMMA) units have been installed.
- **Cold thermal:** The three cold thermal energy storage devices have been installed; commissioned and initial trials have been completed and reported on in a SDRC report. Further cold thermal energy storage trials are scheduled to be completed in the next reporting period.

Learning Outcome: Knowledge Dissemination

During this reporting period the project team has delivered seven SDRC reports as listed in Section 1.2. In addition, the first revision of SDRC 9.8c (3) for the Low Carbon Community Advisory Centre Evaluation has been completed and is expected to be delivered in the next reporting period, which is ahead of the scheduled delivery date of November 2016.

Work has also continued to be completed to develop the framework for the policies / procedures and training package of work. The first draft of a number of high level policy documents has been completed and these documents will continue to be developed in the next reporting period.

The project team has continued to disseminate the learning from the NTVV project through the publication of SDRC reports on the project website, presentations at the LCNI conference, and presentations both internally and externally to SSEPD. A full list of dissemination activities is provided within the main body of this document.

1.1 Risks

Ofgem guidance: The risks section reports on any major risks and/or issues that the DNO encountered, including any risks which had not been previously identified in the Project Direction. The DNO should include a short summary of the risk and how it affects (or might affect) delivering the project as described in the full submission. When relevant, the DNO should group these key risks under the following headings:

a. recruitment risks – describe any risks to recruiting the numbers of customers to take part in the project as described in the full submission and how these will impact on the project and be mitigated;

b. procurement risks – describe any risks to procuring the equipment and/or services needed for the project, as described in the full submission, and how these will impact on the project and be mitigated;

c. installation risks – describe any risks to the installation of the equipment (including in customers' homes, and/or large scale installations on the network) and how these will impact on the project and be mitigated; and

d. other risks.

Project risk management is considered in detail in Section 5 of this report; a high level summary is provided below:

Risk Description (Category & specific activity)	**Further details and impact**	**Controls**
Recruitment Hot thermal storage installation	Recruitment for the installation of 100 hot thermal storage devices remains challenging. To date 49 devices have been installed; the aim is to install up to 100 devices.	Engagement with additional potential participants in a wider geographic area has been completed and further recruitment is planned.
Installation Energy Storage and Management Units	Whilst the 25 ESMUs have been installed further development is required on active harmonics. Additional equipment is also required to deliver the parallel PEU functionality and the level of storage outlined in the change control documentation.	Close third party management to ensure the deployed devices deliver the functionality specified in the ESMU requirements documentation and this functionality meets the specified bid and change control criteria.
Installation Collection and use of smart meter data from 1,000 Southern Electric	Delays have been encountered in getting data from 1,000 smart meter installations from Southern Electric. This data is required to inform the smart analytics data analysis tasks being completed by the NTVV academic partners.	Engagement with Southern Electric to ensure the data is acquired within the timescales required to add benefit to the NTVV project.

In addition to the risks outlined above on 7th December 2015 SSEPD was informed that the supplier of the hot thermal storage devices went into liquidation. The impact of this on the hot thermal storage trials and the on-going deployment schedule for these devices will be assessed by the project team and an appropriate plan of action will be put in place in the next reporting period.

1.2 Learning Outcomes

Ofgem guidance: The learning section reports on the learning outcomes outlined in the Full Submission. This section should include, but is not limited to:

a. a summary of the key learning outcomes delivered in the period;
b. a short overview of the DNO's overall approach to capturing the learning;
c. the main activities towards third parties which have been undertaken in order to disseminate the learning mentioned in a.; and
d. the DNO's internal dissemination activities.

Please note that these two subsections should only give an overview of the key risks and the main learning. They should not replace the more detailed information contained in the "Learning outcomes" and "Risk management" sections of the progress report.

Approach to learning capture

The NTVV project consists of a number of Packages of Work (PoW) which directly map to core learning outcomes and learning dissemination methods. Each PoW consists of number of components, where a component is defined as a:

Deliverable – defined activity with clear stages of implementation and completion;

Trial – aspects which require investigation and/or experimentation; or

Report – produced to formalise project outcomes, to enable the sharing of learning and outputs related to a deliverable or trial, or to address a specific evidence requirement of a SDRC.

The principal mechanism for formalised learning capture draws on the methodical testing strategy and analysis within each project trial.

Summary of Third Party targeted dissemination

A summary of both internal and external dissemination events over this reporting period can be found in section 7.4.

Key learning outcomes

During this reporting period the project team has delivered the following SDRC reports:

- **SDRC 9.4c:** Install 25 LV connected batteries as defined in 9.4a;
- **SDRC 9.8a (4):** Cold thermal storage performance;
- **SDRC 9.8a (4):** Energy Storage and Management Unit performance;
- **SDRC 9.4d:** Produce learnings from energy storage and power electronic deployment to assess the hypothesis as defined in 9.4a;

- **SDRC 9.8b (1):** Low Carbon Fuel Poor Evaluation;
- **SDRC 9.8b (2):** Housing Associations and Low Carbon Promotions; and
- **SDRC 9.8b (3):** Technical Impact Evaluation.

The key learning outcomes, during this reporting period, are outlined in the above SDRC reports. All of the above reports have been published on the NTVV project website.

Summary of Third Party targeted dissemination

A summary of both internal and external dissemination events over this reporting period can be found below (for further details please see section 7.4):

- Seven SDRC reports have been delivered and published on the NTVV website;
- Two presentations were delivered at the LCNI conference;
- Interviews were completed Housing Associations for low 'carbon solution providers';
- Thames Valley Chamber of Commerce Event - Sustainable Buildings. NTVV ADR project participant (data centre) discussed his experience to date on the TVV ADR package of work.
- A presentation on NTVV was delivered to the occupants of one of the buildings where the cold thermal storage technology has been installed;
- Project participant update and GRID IQ Demonstration Centre visit in Bracknell;
- DNV GL and SSEPD interviews with commercial customers to understand the potential market in the UK for Ice Bears;
- The Universities of Reading and Oxford came second in the Global Energy Forecasting Competition (GEFCom2014);
- Substation monitor data has been made available for download on the NTVV website. The data is from 5 substations, is averaged over 30 minute time periods and covers November 2013 to November 2014 inclusive;
- Visit to Wycombe High School to disseminate NTVV project information to A-level Geography; and
- Bracknell Forest Council (councilors) Grid IQ tour and NTVV presentation.

DNO Internal targeted dissemination

A limited amount of DNO internal targeted dissemination has been completed in this reporting period. This is mainly due to the large number of SDRC reports delivered within this reporting period. The key internal dissemination events are as follows:

- An overview of NTVV and the wider SSEPD innovation projects was provided to SSE Retail.
- Direct learning from NTVV fed into the SSEPD Constrained managed Zones (CMZ) open tender process; and

- Internal presentations and demonstrations of the NME and the DMS were delivered to the IT Transformation and IT architecture teams.

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3 Project Manager's Report

Ofgem guidance: The project manager's report should be a more detailed version of the Executive Summary. This section should describe the progress made in the reporting period against the project plan. Any key issues should be drawn out and described in detail, including how these issues were managed. The DNO should also include details of deliverables and/or events, referring where necessary to other sections of the PPR. This section should also provide an outlook into the next reporting period, including key planned activities. It should describe any key issues or concerns which the project manager considers will be a major challenge in the next reporting period.

The New Thames Valley Vision (NTVV) project consists of a series of related Packages of Work (PoW) which directly map to the core learning outcomes and learning dissemination methods outlined in the full bid submission. Having established the majority of the proposed hardware and systems, the project has successfully identified and reported on the associated key findings. The project is in the process of completing technical trials that will continue to test and evaluate the relative advantages and/or dis-advantages of the deployed technologies and systems. Plans and resources are in place to finalise the installation of the technology to ensure the commitments in the full bid submission are met.

The project team is keen to share the learning from the project. During this reporting period it has held or actively participated in a number of dissemination events, as outlined in section 7.4.

The NTVV project has implemented all activities in accordance with the Project Direction and is progressing to plan. The Successful Delivery Reward Criteria (SDRC) for this reporting period have been met, details of which are included in Section 6. The following summary outlines the progress to date for each PoW and key activities in the next reporting period.

3.1 End Point Monitoring

(Core learning outcome: Understanding)
End point monitoring equipment records half-hourly energy usage at individual properties and securely transmits this data for analysis on a daily basis. The project has collected over two years data for all customers and this been used to provide input(s) to the Network Modelling Environment (NME).

In total 287 end point monitoring devices have been deployed. This total number consists of end point monitoring devices from two manufacturers. A total of 250 EDMI devices have been deployed and a total of 37 Senical devices have been deployed. All these devices were installed before this reporting period. Further Senical devices may be deployed in 2016 (subject to customer consent).

The Senical devices have mostly been installed in customers' homes on substation feeders targeted for high density monitoring, and some for customers that have accepted the installation of an EMMA device.

The pressure to obtain high density end point monitoring data remains high as this provides validation for the buddying and aggregation activities. A number of non-domestic customers have also been targeted to give representative data in the NME.

In addition, to the end point monitor data collected from the deployed devices, the project will also collect data from 1,000 smart meters from Southern Electric. The collection of this data is dependent upon the smart meter roll-out. Further progress will be made, in the next reporting period, to ensure this data is provided to the NTVV project team.

3.2 Substation Monitoring

(Core learning outcome: Understanding)
A total of 318 substation monitoring devices have been installed as part of the NTVV project. For substation monitoring the focus has moved to maintaining monitors in reliable working order, as well as fitting a few new installations. Modifications to antennas and upgrading of firmware have dominated site activities and this has proved beneficial in ensuring that the data is continuously available.

Consideration has been given to the operational uses for the data, and examples exist of operational teams being able to reference the data during the early stages of managing real network faults where decisions were made directly based on the data. Specific examples include the assessment of backfeeds, and the sizing of temporary generators to be deployed. The management of large volumes of substation data in an operational environment remains an area for development during the next reporting period.

3.3 Characterisation

(Core learning outcome: Understanding)
As planned, no further work in this area has been carried out in this reporting period. If required further characterisation work may be completed in the next reporting period.

3.4 Network Modelling Environment

(Core learning outcome: Anticipating)
A significant amount of work has taken place over the past six months to ensure that the reporting outputs from studies run within the NME provide relevant statistical comparisons between different circuits and substations. This ensures that the impact of additional low carbon technologies and additional loads are more easily identified on specific circuits. The resulting reports are intended to allow the planning functions to make optimal investment decisions with regard to the location, timing and scale of the network problems to be rectified; solutions could include the deployment of energy storage device(s), implementation of a load reduction strategy or implementation of a reinforcement option.

Many studies have been run based on forecast scenarios to facilitate the evaluation of technical impacts from low carbon promotions, as reported in SDRC 9.8b 3 Technical Impact Evaluation (delivered in November 2015). Eleven substations have been included in the study area; the data for these substations was checked and improved where necessary to ensure that the NME study outputs are meaningful, and this has informed the work that remains in progress to prepare a batch of 100 substations for similar studies during the next reporting period.

Looking further forward work will continue on the NME to support the delivery of SDRC 9.8c (1) University of Reading Smart Analytic and Forecasting Evaluation in November 2016.

3.5 Distribution Management System

(Core learning outcome: Anticipating)
The Distribution Management System (DMS) takes the principles of SCADA management and control from the HV network and applies it to the LV network. As previously reported, the DMS has been built and the LV network imported from the NME and an interface using the Common Information Model (CIM) has been implemented.

In this reporting period the DMS has:

- Been used to ensure that the substation monitoring equipment is operational and continues to provide data on the LV distribution network;
- Been used to support the commissioning of the Energy Storage and Management Units (ESMUs);
- Been used to enable trials of the ESMU devices to deliver the required energy storage SDRC reports within this reporting period;
- Been configured to enable testing of the interface between the DMS and the Demand Response Aggregation Server (DRAS). When tested this will enable the Control Engineer to instigate Automatic Demand Response (ADR) requests directly from the DMS for all 30 ADR participants; and
- Been used to complete initial testing to ensure that instructions for the deployed ESMU devices, generated in the smart control environment, can be communicated to the devices in the field.

During the next reporting period the DMS will continue to be utilised to support the on-going technology trials.

3.6 Aggregation and Forecasting of energy profiles

(Core learning outcome: Anticipating)

The running of forecast scenario studies as described in Section 3.4 has enabled the genetic buddying algorithm to be used to purposefully assign base load profiles to the model. This has allowed the process to be refined with regard to handling significant volumes of real data. Further work is required in the next reporting period to gain additional insight into the impact of seasonality and duration of data that optimises the buddying process.

As for buddying, the long term forecasting algorithms have been run for Low Carbon Technology (LCT) take up scenarios for electric vehicle charging, solar panel connections, heat pump deployments and energy efficiency (LED bulb replacement). This has drawn on significant real data, allowed increased focus on the algorithm itself and the selection and handling of appropriate LCT profiles. In the next reporting period these will be re-tested with a larger dataset using the data collected from 100 substations. The intention is to assess the capability of the systems and algorithms when working with more realistic volumes of DNO data. For example, to identify the impact of handling data from 100 substations, compared to 10 substations, has on processing times within the NME.

Short term forecasting activities have focussed on the provision of relevant feeder forecasts for the development and testing of smart control algorithms linked to the ESMU trials that have been completed within this reporting period. In the next reporting period, similar forecasts will be required for many of the ESMUs working in parallel and this will further test the forecasts themselves as well as the handling of the data.

Probabilistic forecasts are required to gain further understanding of the confidence bounds that apply to the data used for the long term forecasts. This data has been converted into profile data within this reporting period. The NME requires these confidence bounds to provide “amber” assessments of the network. In the next reporting period the amber outputs will be assessed, and this may require further development of the probabilistic forecasts.

Medium term forecasts require several years’ worth of feeder and customer data for them to be applied and tested. Work to refine these forecasts is expected to increase in the next reporting period.

3.7 Automatic Demand Response (ADR)

(Core learning outcome: Supporting)

The ADR system provides a machine to machine interface for triggering DNO initiated demand reduction events as agreed with the customer. To date over 700 load shed events have been completed as part of the NTVV project.

The project has agreed all 30 of the required ADR installations in Bracknell and the associated equipment has been installed, however, 4 sites require final commissioning. Commissioning for the final 4 participants is scheduled to be completed in the next reporting period.

During this reporting period technical issues have been encountered with the installations at 6 buildings. These technical issues have meant that 3 participants do not appear online due to data connectivity issues and that final commissioning could not be completed at 3 properties due to issues relating to meter readings. It is not anticipated that these technical issues will have a significant impact on learning generated by the project. The project team are working closely with the relevant project partners and ADR participants to resolve these technical issues within the next reporting period.

A supplementary commercial agreement that complements the existing commercial arrangements has been completed and sent out to all 30 ADR participants. The incentivised load shed strategy has been developed and the incentivised load shed programme started on 30th November 2015. In the next reporting period the focus will be on signing off all the commercial agreements for the incentivised load shed strategy with the ADR participants and implementing the incentivised load shed strategy. The incentivised load shedding strategy includes ADR events with a duration of up to 4 hours and the duration of 'no notification' ADR events will be increased from 30 minutes to one hour. The strategy targets network peak demand based on substation demand profiles and will run intensive 'load shed weeks' where there will be a load shed every day, across the five day working week for each participant.

3.8 Energy Storage and Management Units

(Core learning outcome: Supporting)

The deployment of the 25 ESMUs has remained challenging throughout this reporting period. However, the project team has worked well with the supplier for these devices and installation staff; to ensure that the learning required to deliver the 3 energy storage SDRC reports could be collated.

During this reporting period the following ESMU SDRC reports have been delivered:

- **SDRC 9.4c, Install 25 LV Connected Batteries:** Details the successful installation and connection of 25 ESMUs on the LV network around Bracknell. This report was delivered in July 2015;
- **SDRC 9.8a(4), LV Network Storage - ESMU Trials:** Provides the results from initial trials of the ESMUs, utilising the test deployment plan outlined in SDRC 9.4a as a baseline. This report was delivered in October 2015; and
- **SDRC 9.4d, ESMU Learning:** Provides the results from further trials of the ESMUs and outlines the overall learning from ESMU deployment to assess the hypothesis defined in SDRC 9.4a. This report was delivered in November 2015.

The following key points should be noted regarding the deployment of the ESMUs:

- During this reporting period 17 of the 25 ESMU devices have been fully commissioned. The commissioning of the remaining 9 ESMU devices is scheduled to be completed in the next reporting period;
- A number of warranty issues have been identified with the installed devices as part of the commissioning process. The project team is working closely with the supplier of these devices to ensure these warranty issues are resolved as soon as possible;
- To date the ESMU trials have been completed using 3 commissioned devices and have been supervised by suitably trained staff. Full type testing of the deployed devices is required from the supplier in order to complete automated smart control trials (See Section 3.9 for further information). It is expected that this type testing documentation will be received in the next reporting period; and
- In order to support automated trials on all the deployed devices ADSL (hard line communications) will need to be installed at a number of locations.

3.9 Smart Control

(Core learning outcome: Supporting)
The NTVV project has developed a new software system to manage the ESMU devices in the field using the smart control algorithms derived and developed by the project team. This smart control system is known as Active Distribution Device Management (ADDM).

During this reporting period the development of the ADDM environment has been finalised and integration testing is currently being completed. The outputs provided from the testing of this environment enabled the supervised smart control trials to be completed as reported in SDRC 9.4d ESMU Learning.

During the next reporting period the integration testing of this environment is scheduled to be completed and the ADDM will be moved from a ‘proof of concept environment’ to a ‘production environment’. The ADDM system deployed in the production environment will be utilised to drive automated smart control trials in 2016.

3.10 Hot Thermal Storage

(Core learning outcome: Supporting)
The NTVV project is exploring the use of Energy and Micro-generator MAnager (EMMA) units to divert peak solar power into customer hot water tanks; as an efficient way to support the connection of large volumes of solar panels onto the existing network. During this reporting period the project team has:

- Engaged with the Council covering Windsor and Maidenhead. This engagement enabled the project team to send out 250 letters to potential participants with PV installations. This engagement resulted in 55 responses, 53 surveys and installation of EMMA devices in 17 homes. This brought the total number of EMMA installations to 49.
- Completed a mail drop in Windsor and Maidenhead, this had limited success as a large number of the targeted properties were housing association properties. In total 5 homes were surveyed as part of this process and the Housing Association responsible for these properties has agreed to trial EMMA devices in 2 homes.
- Sent out 300 letters to potential participants in Bracknell, Wokingham, Reading and Newbury. This engagement resulted in 65 responses, as of 21st November, 27 surveys have been completed, of which, 11 have passed. Where possible EMMA units will be installed in these homes.
- Engaged with Bicester Town Council to identify how the EMMA device could alleviate excess demand on the network as a result of the Eco-town that is under construction. It is anticipated the council will be able to provide support in terms of customer engagement to enable SSEPD to target these homes. A meeting with the Council has been arranged on 2nd December.

A programme is in place to replace all third generation EMMA units with fourth generation units. To date 27 out of a total of the 29 third generation units have been swapped out. This replacement programme enables all participants to benefit from the improved power quality characteristics of the fourth generation devices.

The SSEPD project team will continue to engage with potential customers and install further EMMA devices, within the next reporting period, to meet the bid commitment to deploy up to 100 EMMA devices.

3.11 Cold Thermal Storage

(Core learning outcome: Supporting)

The NTVV project is exploring the use of ice cooling storage units to defer the peak daytime demand. During this reporting period three ice cooling storage units have been installed, commissioned and trialled. The results of the summer trials, for these devices, has been published in SDRC 9.8(a) 4 Cold Thermal LV Network Energy Storage (delivered in September 2015). This SDRC report outlines the effect ice cooling storage units has on the LV network within different customer premises, in technical, geographical and in turn climatic conditions not previously trialled; and the value to commercial customers in terms of energy savings and economic payback.

During the next reporting period the ice cooling storage units will continue to be trialled and further learning will be collated by the NTVV project team.

3.12 Low Carbon Promotions

(Core learning outcome: Supporting)

During this reporting period the NTVV project has assessed how a selection of customer based LCTs can impact the local LV network and what, if any support a DNO can give to the promotion of these technologies, appropriate to the role and obligations of a DNO. The learning from this assessment has been published in SDRC 9.8b 2 Housing Associations and Low Carbon Promotions, delivered in November 2015.This SDRC report presents the learning generated from the NTVV project relating to the promotion and take up of Low Carbon Technologies (LCTs) in local communities and from engaging with housing associations.

No further work is scheduled to be completed in the next reporting period.

3.13 Local Authority

(Core learning outcome: Supporting)

This PoW is complete. No further work is scheduled to be completed in the next reporting period.

3.14 Industry Governance & Analysis of Commercial Impacts

(Knowledge dissemination)

During this reporting period initial work has been completed to re-run the LRIC charges and equivalent EDCM tariffs using just Bracknell data sets to create a set of NTVV specific DNO tariffs. It is expected that this work will be completed in the next reporting period.

Further work is scheduled to be completed in the next reporting on this PoW to inform the longer term SDRC deliverables.

3.15 Low Carbon Community Advisory Centre and Stakeholders

(Knowledge dissemination)

Although the Low Carbon Community Advisory Centre (LCCAC) has closed the project continues to engage with the community and stakeholders via a variety of means. The NTVV project employs a variety of channels to engage with stakeholders and disseminate knowledge, including the www.thamesvalleyvision.co.uk website and social media channels to promote knowledge dissemination. Over this reporting period the NTVV project has completed a number of dissemination activities as outlined in Section 7.4. The website continues to be a key mechanism for the project to provide updates and learning to wider stakeholders.

During this reporting period SDRC 9.8c (3) for the Low Carbon Community Advisory Centre Evaluation has been drafted and is currently being finalised for submission ahead of the scheduled delivery date of November 2016. It is expected that this SDRC report will be finalised and submitted in the next reporting period.

3.16 Transition into 'Business as Usual' – Development of Policies and Training Materials

(Knowledge dissemination)

During this reporting period the project team has continued to develop the framework for the policies / procedures and training PoW. In total four of the five Tier 2 policy documents have been drafted and reviewed by the project team. As planned no work has been completed on the training material.

During the next reporting period work will continue to develop the policies/procedure document set and initial work is scheduled to be completed to start developing the relevant training material. This will ultimately enable SDRC 9.8 3 DNO Training and Policies Review to be delivered in November 2016.

In addition to the above the project team has completed policy documentation, for example in the form of work instructions, for the ESMU devices these documents will ultimately form part of the policies PoW.

3.17 Learning & Dissemination

The outputs of activities in association with this PoW are covered in detail in section 7.

3.18 Project Governance

The Project Partner Review Board and Project Steering Group[1] met on:

- 25th June 2015 - NTVV Project Partner Review Board;
- 10th July 2015 - NTVV Project Steering Group;
- 30th July 2015 - NTVV Project Partner Review Board;
- 14th August 2015 - NTVV Project Steering Group;
- 27th August 2015 - NTVV Project Partner Review Board;
- 11th September 2015 - NTVV Project Steering Group;
- 24th September 2015 - NTVV Project Partner Review Board;
- 12th October 2015 - NTVV Project Steering Group;
- 4th November 2015 - NTVV Project Partner Review Board;
- 13th November 2015 - NTVV Project Steering Group;
- 3rd December 2015 - NTVV Project Partner Review Board; and
- 4th December 2015 - NTVV Project Steering Group.

[1] The Project Steering Board meets as part of an overall SSEPD Innovation Steering Board

4 Consistency with Full Submission

Ofgem guidance: The DNO should confirm that the project is being undertaken in accordance with the full submission. Any areas where the project is diverging or where the DNO anticipates that the project might not be in line with the full submission should be clearly identified. The DNO should also include, where appropriate, references to key risks identified under "Risk Management".

The NTVV project is being delivered in accordance with the NTVV full bid submission and associated change control documentation. To ensure all commitments from this submission are completed in a timely and efficient manner, the project has developed a comprehensive PoW structure with clear linkages to the text of the NTVV full bid submission.

No change requests have been submitted during this reporting period (July 2015 to December 2015). The following variance(s) is currently being monitored:

No.	Task	Variation & Mitigation
1a	Other	The project budget is projected to achieve savings related to land. The land budget was assigned £160K to pay for the land needed to install the ESMUs. As a result of extensive design collaboration by SSEPD and the manufacturer, a unit size has been achieved which has allowed the ESMUs to be installed on the public highway and/or community owned land with minimal access costs. Whilst a proportion of the budget will be spent on landscaping certain sites after liaising with the local community, the majority of the budget will be returned to customers at the end of the project.
1b	Equipment	The project budget is projected to achieve savings related to HV network Monitoring. The HV network monitoring budget was assigned £157K to install additional monitoring equipment on certain HV supplied customer sites. This has not been necessary as the project has integrated satisfactory measurements from existing half-hourly meter readings and SCADA telemetry without the need for further network hardware. As such the project can return these funds back to customers at the end of the project by finding efficient measures of obtaining data at the required frequency and quality.
1c	Payments to Users	The project budget is projected to achieve savings related to ADR incentives. The incentivised ADR load shed programme for 2016 has been planned. The total ADR incentives budget was assigned £377k, however, it is expected that not all this budget will be needed to generate the learning required from the incentivised load shed programme. The budget that is not used for ADR incentives will be returned to customers at the end of the project.

5 Risk Management

Ofgem guidance: The DNO should report on the risks highlighted in box 26 of the full submission pro forma, plus any other risks that have arisen in the reporting period. DNOs should describe how it is managing the risks it has highlighted and how it is learning from the management of these risks.

The project risk register is a live document designed to identify actual and potential barriers to the satisfactory progress of the NTVV project. The risk register is used to target resources and to develop control measures and mitigations. The NTVV risk register is a single log of risks as identified by SSEPD, GE, The Universities of Oxford and Reading, Honeywell, DNV GL, EA Technology and Bracknell Forest Council. The register is reviewed at the monthly Project Partner Review Boards with key risks reported to the SSEPD Innovation Strategy Board. Risks are assessed against their likelihood and impact, where the impact considers the effect on cost, schedule, reputation, learning, the environment and people. Risks are scored before (inherent) and after (residual) the application of controls. Risks which are closed are removed from the live register, with any learning captured through the Learning Moments and Project Trials described in section 7.

Increased focus is placed on risks with amber or red residual scores and also on all risks with a red inherent score (to ensure there is no over-reliance on the controls and mitigation measures). At present**,** there are three risks that fall into this category.

		Inherent								Residual							Inherent	Residual
		Impact								Impact								
No.	Risk Description	Cost	Schedule	Reputation	Learning	Environment	People	Likelihood	Risk Control/Mitigation Actions	Cost	Schedule	Reputation	Learning	Environment	People	Likelihood	Score	Score
U1 Understanding: End points																		
U1-e	Smart meter installation programme (by others) delayed. Suppliers unable/unw illing to share data	2	3	3	3			5	1. Regular engagement w ith supply companies - though all project-level requests declined to date - often on the basis of resources fully deployed to achieve UK roll-outs. Note: at least one supplier remains very engaged but has had minimal deployment in target area to date. 2. Escalate the level of request to all suppliers highlighting the shared benefits of combined use of data. 3. Mitigate impact on learning and schedule by targeting end-point monitoring to support analysis 4. Support through access to existing data flow s Note: w ith project deployed monitoring already in place and a plans to increase this degree of monitoring underw ay, the impact on learning is restricted to reductions in granularity and depth of analysis.	2	1	3	3			4	15	12
S3 Supporting: ESMUs																		
S3-k	ESMU supplier fails to deliver on all aspects of the supply of energy storage devices/functionality (parallel PEU, AHM and 6 x ESUs).		4	4	4			4	1. Regular (w eekly) engagement w ith the supplier 2. Functionality required outlined in the Agenda for all meetings 3. Engagement w ith senior management w ithin Electrovaya and SSEPD		4	3	4	1		3	16	12
S4 Supporting: Hot Thermal Storage																		
S4-a	Customer particpation 30 (low density) installed (SDRC Mar' 14), w ith further 70 (low density) to be installed.		5	3	4			5	1. Engagement plan draw n up 2. Draw on multiple communication channels 3. Incentivise partipcation as appropriate High densities cannot be installed in the primary Bracknell target Zone. Therefore low density strategy is to be follow ed, w ith further monitoring by the installation of Senical unit(s)		3	3	3			4	25	12

6 Successful Delivery Reward Criteria (SDRC)

Ofgem guidance: The DNO should provide a brief narrative against each of the SDRCs set out in its Project Direction. The narrative should describe progress towards the SDRCs and any challenges the DNO may face in the next reporting period.

Eight Successful Delivery Reward Criteria (SDRC), were identified in the NTVV full bid submission, which span both the objectives and the lifecycle of the project. Each SDRC is split into a number of sub-components and each component has defined criteria, evidence and a target date for completion. The following tables list the individual SDRC components in chronological order and detail the project's progress towards their achievement for those due to be completed in this reporting period, up to December 2015, and to project completion in April 2017.

	Completed (SDRC met)		Emerging issue, remains on target		SDRC completed late
	On target		Unresolved issue, off target		Not completed and late

SDRC	Due	Description	Status
SDRC 9.4c	31/07/2015	Install 25 LV connected batteries as defined in 9.4a	Completed
SDRC 9.8a (4)	30/09/2015	Cold thermal storage performance	Completed
SDRC 9.8a (4)	30/09/2015	Energy Storage and Management Unit performance	Completed
SDRC 9.4d	30/10/2015	Produce learnings from energy storage and power electronic deployment to assess the hypothesis as defined in 9.4a	Completed
SDRC 9.8b (1)	30/11/2015	Low Carbon Fuel Poor Evaluation	Completed
SDRC 9.8b (2)	30/11/2015	Housing Associations and Low Carbon Promotions	Completed
SDRC 9.8b (3)	30/11/2015	Technical Impact Evaluation	Completed

Beyond the next reporting period, the following table lists the remaining SDRCs in chronological order:

SDRC	Due	Description
SDRC 9.8c (1)	30/11/2016	University of Reading Smart Analytic and Forecasting Evaluation
SDRC 9.8c (2)	30/11/2016	Low Carbon Community Advisory Centre Evaluation
SDRC 9.8c (3)	30/11/2016	DNO Training and Policies Review
SDRC 9.8d	30/04/2017	Close Down Report
SDRC 9.8d	30/04/2017	Hold a project review seminar to discuss the learning from the project. Attendees will be invited including Customers, Ofgem, DNO's, product suppliers and other stakeholders to discuss the way forward

7 Learning Outcomes

Ofgem guidance: The DNO should briefly describe the main learning outcomes from the reporting period. It should update Ofgem on how it has disseminated the learning it generated as part of the project over the last six months

The principle aim of the NTVV is to demonstrate that understanding, anticipating and supporting changes in consumer behaviour can help DNOs to develop an efficient network for the low carbon economy. The NTVV is structured around five Learning Outcomes (LOs) which act as the defining research questions to be answered by this project.

LO-1: **Understanding** - What do we need to know about customer behaviour in order to optimise network investment?

- LO-1.1 What is the optimum level and location of network monitoring?
- LO-1.2 To what extent can customers be categorised in order to better understand their behaviour?

LO-2: **Anticipating** - How can improved modelling enhance network operational, planning and investment management systems?

- LO-2.1 How could network headroom change as customers react to low carbon stimuli?
- LO-2.2 How can modelling outputs be fed into operational systems and processes in a meaningful manner?
- LO-2.3 How can modelling outputs be fed into planning systems and processes in a meaningful manner?
- LO-2.4 How can modelling outputs be fed into investment systems and processes in a meaningful manner?
- LO-2.5 How can network modelling outputs be fed into town planning systems and processes and vice-versa?
- LO-2.6 What changes are required to industry governance and documentation to facilitate a modelling based approach to network monitoring?

LO-3: **Optimising** - To what extent can modelling reduce the need for monitoring and enhance the information provided by monitoring?

- LO-3.1 To what extent can modelling be used in place of full network monitoring?
- LO-3.2 How might modelling assumptions change over time?

LO-4: **Supporting Change (technologically)** - How might a DNO implement technologies to support the transition to a Low Carbon Economy?

- LO-4.1 How could distributed solutions be configured into the DNO environment
- LO-4.2 How could a network management solution integrate with building management systems
- LO-4.3 How can the DNO best engage with customers to encourage demand reduction, and where on the network is each most effective
- LO-4.4 How would network storage be used in conjunction with demand Response

LO-5: **Supporting Change (commercially)** - Which commercial models attract which customers and how will they be delivered?

- LO-5.1 Large commercial
- LO-5.2 Light commercial (SMEs)
- LO-5.3 Domestic

7.1 Approach to learning capture

Packages of Work aligned to Learning Outcomes

The NTVV project consists of a number of PoW which directly map to core learning outcomes and learning dissemination methods. Each PoW consists of number of components, where a component is defined as a:

> **Deliverable** – defined activity with clear stages of implementation and completion;
> **Trial** – aspects which require investigation and/or experimentation; or
> **Report –** produced to formalise project outcomes, to enable the sharing of learning and outputs related to a deliverable or trial, or to address a specific evidence requirement of an SDRC (Successful Delivery Reward Criteria).

The principal mechanism for formalised learning capture draws on the methodical testing strategy and subsequent analysis within each project trial. The 'Packages of Work' (PoW) summary documents have now been reviewed by the leads on each PoW.

Learning Moments

Ad-hoc or 'process' learning from project staff continues to be captured using a learning log which partners are requested to contribute to on a monthly basis. New entries on the log for each month are discussed as 'Learning Moments' at the Project Partner Review Board. This provides an opportunity to share lessons across the different project activities, raising awareness of pitfalls to avoid/learning points to take into account and allows partners to provide advice/insights in relation to the learning.

7.2 Formal Learning Capture

The formal learning from the NTVV project is captured in the formal SDRC deliverable which are available from the project website: http://www.thamesvalleyvision.co.uk/project-library/published-documents/.

7.3 Learning Moments

The following 'Learning Moments' have been recorded during this reporting period.

ESMU: In terms of future development it is expected that the physical size of the ESMUs could be reduced, the number of individual cabinet components could be reduced and the number of software protocols could be rationalised. Making these improvements could provide the following benefits: aid installation, reduce the visual impacts of the devices, reduce costs, improve the software reliability and streamline maintenance activities.
ESMU: LV energy storage devices need to be CE certified and contain the relevant protection devices to enable connection to a DNOs LV network. When deploying LV storage systems approved processes and procedures need to be put in place to ensure safe operation of the devices. The devices must be installed, commissioned, operated and maintained by suitably trained personnel.

ESMU: An 'Active Distribution Device Management (ADDM) environment' is required for the automated operation of energy storage devices. The Control Engineer is required to provide a supervisory role looking out for alarms, and overseeing network electrical parameters.
ESMU: ESMU devices require maintenance on a six monthly basis as defined in 'Work Instruction WI-PS-1184'. Any future ESMU design specification should seek standard component designs that can be multi-sourced, to further de-risk the asset service life.
ESMU: As expected the maximum impact of the ESMU devices is on the LV distribution feeders. Although high level analysis has shown that the ESMU devices could also provide benefits to secondary substations.
Customer Satisfaction: Talking to customers prior to, during and at the end of an installation 'project', whether ESMU or EMMA. Ask customers for feedback whether 'good' or 'bad'. This has led to 'a lot' of happy customers, specifically during the EMMA 3G replacement programme.
Cold Thermal Storage: The Ice bear unit is an 'off the shelf' product. For this reason, the time to install an Ice Bear is relatively minimal; it is customer engagement and determining a site that are likely to be the largest barriers to deployment.
Cold Thermal Storage: Whilst the initial trials have shown that the Ice Bears do not provide clear cost savings in the UK there may be specific case-studies whereby Ice Bears do have a viable business model, for example an area of the network may be: particularly costly to reinforce, denoted by a high density of commercial customers and with a significant (preferably summer) peaking in demand of approximately 3 hours or less.
Hot Thermal Storage: Customer recruitment - mail drops targeted with customers names are by far the most efficient way of engaging customers around this technology and gives a far better response rate than "dear sir/madam". In addition it will facilitate door knocking to engage customers as they are often already familiar with the device. With regards engaging housing associations they are (if at all) only willing to trial a very small number of devices before rolling any out on a scale that would bring any benefit to the network.
Policies & Procedures: Effective new policies for sustainable networks will not only relate to new technologies and new ways of working but will link these to the expected benefits and objectives in the host company's business plan.
Policies & Procedures: As DNOs strategies become more and more customer-centric, the introduction of a specific customer engagement policy makes a lot of sense.
NME: You cannot just use average load data for network capacity planning. Fifty percent of the time you will be wrong. On top of average demands therefore, one needs to add a demand that relates to the potential variability of estimated load. In TVV this additional demand is referred to as confidence data. It is postulated that a 90% confidence level is appropriate for economic network design. This is in line with acceptable design practice using statistical methods in use today i.e. that described in ACE49.
NME: It is recognised that for any new LV planning and design tool, such a TVV NME, it is sensible to use data structures that will be suitable to use smart meter data when it becomes available and economically viable.

Energy Profiles: To establish the modelling of the low voltage network all customers within the model have to have energy profiles assigned to them, and for the project this has been achieved using "buddying" where data from 250 monitored customers is applied to the remaining (approximately) 30,000 customers. There are several algorithms that can be applied to achieve this buddying, two of which are being actively trialled on the project, these being the Simple algorithm and the Genetic algorithm. The Simple algorithm draws on quarterly metered data for each customer to identify a mean daily demand and compares this with the mean daily demand of monitored customers, allowing a matching buddy to be selected. The Genetic algorithm seeks to match the aggregated load profile of a selected set of buddies for the feeder to the load profile of the feeder as recorded using substation monitoring, potentially requiring many iterations to achieve an optimum buddy selection. Initial observations are that the outputs achieved when running studies in the NME are similar, when comparing the two algorithms, and based on a sample of 11 substations. Further work is in progress to assess the difference more accurately and to scale up the sample size to be more representative of a large DNO network. The Simple algorithm is not dependent upon substation monitoring and is computationally efficient, so it follows that a learning outcome suggesting that while it may be statistically less accurate, ease and cost of deployment may become key factors in any end of project recommendation, rather than accuracy alone.
Short Term Demand Forecasting: ESMU trials involved injecting and absorbing power in the feeder and consequently changed the "typical" power profile at the substation. Using historical demand aggregated at the feeder busbar to generate the forecasts would incur a greater error due to previous ESMU activity. To reduce the error, the previous ESMU activity must be subtracted from the corresponding historical demand or forecasts have to aggregate from the forecasts of individual customers using buddying method. More analysis is required to compare the degree of error forecasts from both methods.

7.4 Dissemination Activities

A dissemination log is maintained to capture details of activities project staff have undertaken to share learning from the project. Staff members are encouraged to record details of outcomes and recommendations from the activities they participate in. The dissemination log is reviewed at monthly Project Partner Review Boards in the same way as the learning log. The table below shows the main dissemination activities which have been completed in this period and highlights are noted for some activities to give an overview of dissemination impacts:

Leading Partner	Date(s)	Description
SSEPD	July 2015	SDRC 9.4 (c) Evidence Report Install 25 LV Connected Batteries. Delivered and published on the NTVV website.
SSEPD	July 2015	Project participant update and GRID IQ demonstration centre visit in Bracknell.

SSEPD	July 2015	Meetings held with facilities managers of commercial buildings to gain further information on the potential take up of cold thermal storage.
SSEPD	July 2015	Thames Valley Chamber of Commerce Event- Sustainable Buildings. NTVV ADR project participant (data centre) discussed his experience to date on the TVV ADR PoW.
SSEPD	August 2015	Internal presentations and demonstrations of the NME and the DMS were delivered to the IT Transformation and IT architecture teams.
SSEPD	August 2015	DNV GL and SSEPD interviews with commercial customers to understand the potential market in the UK for Ice Bears.
SSEPD	August 2015	An overview of NTVV and the wider SSEPD innovation projects was provided to SSE Retail.
UoR / UoO	August 2015	The Universities of Reading and Oxford came second in the Global Energy Forecasting Competition (GEFCom2014).
SSEPD	September 2015	9.8a (4) LV Network Storage – Cold Thermal. Delivered and published on the NTVV website.
DNVGL / SSEPD	September 2015	Interviews were completed Housing Associations for low 'carbon solution providers'.
SSEPD	September 2015	A presentation on NTVV was delivered to the occupants of one of the buildings where the cold thermal storage technology has been installed.
SSEPD	October 2015	9.8a (4) LV Network Storage – ESMU Trials. Delivered and published on the NTVV website.
SSEPD	October 2015	Bracknell Forest Council (councillors) Grid IQ tour and NTVV presentation.
SSEPD	September 2015	Substation monitor data has been made available for download on the NTVV website. The data is from 5 substations, is averaged over 30 minute time periods and covers November 2013 to November 2014 inclusive.
SSEPD	November 2015	SDRC 9.4d Evidence Report Produce learnings from energy storage and power electronic deployment. Delivered and published on the NTVV website.
SSEPD	November 2015	SDRC 9.8 (b) 1 Low Carbon Fuel Poor Evaluation. Delivered and published on the NTVV website.
SSEPD	November 2015	SDRC 9.8 (b) 2 Housing Associations and Low Carbon Promotions. Delivered and published on the NTVV website.
SSEPD	November 2015	SDRC 9.8b (3) Technical Impact Evaluation Impact on DNO Network from Low Carbon Promotions. Delivered and published on the NTVV website.
SSEPD	November 2015	LCNI Conference Presentation - New Thames Valley Vision - Benefits of modelling the low voltage network

SSEPD / UoR	November 2015	LCNI Conference Presentation - New Thames Valley Vision - Facilitating low carbon energy and new connections
SSEPD	November 2015	Visit to Wycombe High School to disseminate NTVV project information to A-level Geography

In addition to the above filming will commence on a 2 minute Ice Bear video to be disseminated at conferences and online and the six monthly project participant update will be sent out in December 2015.

7.5 NTVV Website

Web traffic for the website during this reporting period (27/06/15 – 23/11/15) was as follows:

Total visits:	2,004
Unique visitors:	1,294
Page views:	5,733
Pages per visit:	2.86
Average visit duration:	00:02:48
% New Visits:	61.4

The website statistics shown above have decreased significantly in comparison to the previous reporting period. Work is scheduled in the next reporting period to boost the website traffic.

8 Business Case Update

Ofgem guidance: The DNO should note any developments or events which might affect the benefits to be gained from the Second Tier project. Where possible the DNO should quantify the changes these developments or events have made to the project benefits compared to those outlined in the full submission proposal.

SSEPD's core purpose is to provide the energy people need in a reliable and sustainable way. To achieve this, our delivery priority is to deliver upgraded electricity transmission networks, operational efficiency and innovation in electricity and gas distribution networks as they respond to the decarbonisation and decentralisation of energy. Through its learning outcome approach NTVV has been designed to feed into and update this business plan by:

- In the short term providing a benchmark network in which the implications of disruptive technologies can be assessed and scaled.
- Allow us to cost and plan the monitoring of our network with the optimal level of low cost equipment and communications infrastructure taking full account of the longer term input from Smart metering data.
- Allow us to produce short, medium and long term models of investment requirements for a range of disruptive technology penetration levels
- Provide us with an evaluation (technical, economic and commercial), of a range of innovative network management tools releasing capacity on the network.
- Provide a template into which solutions from other SSEPD and other DNO projects can be fed to allow comparative evaluation and inform solution selection for inclusion in our business plan.
- Quantify and define resource requirements including staff and contractor skill sets to support the roll out of the business plan.
- Generate new processes, standards and procedures that are required to implement the NTVV approach as business as usual.

Our experience shows us that whilst individual technical and commercial solutions may be challenging, the real challenges emerge when these solutions are scaled up. This is the driver behind the creation of a network operations and planning environment, which in essence performs three critical functions:

- Creates the environment in which planners, operational staff and business systems will interact with the data derived from and solutions implemented in the project.
- Allows the flow of information from DNO legacy systems to the new solutions to reap the benefit of existing system information e.g. connectivity, circuit ratings, system operational state.
- Seamless integration of new solutions into core business and real time system allowing control alongside traditional systems using the same staff infrastructure e.g. control rooms, planning tools.

SSEPD has not noted any developments or events which might affect the wider business case outlined above and as detailed in the full submission proposal but as an individual project, focussed on delivering learning outcomes, SSEPD has not at this stage identified any direct financial benefit likely to be gained through delivery of this specific project.

9 Progress Against Budget

Ofgem guidance: The DNO should report on expenditure against each line in the Project Budget, detailing where it is against where it expected to be at this stage in the project. The DNO should explain any projected variance against each line total in excess of 5 per cent.

Project expenditure is within the budget defined in the Project Direction. The table below details expenditure against each line in the Project Budget and compares this with planned expenditure to date. Projected variances are also listed for changes >5%.

	Budget	**Expenditure ITD (£K)**	**Comparison with expected expenditure**	Value (£K)	%age
LABOUR	**5,932.76**	**4,780.83**	**-3.6%**	**160.00**	**2.7%**
Project and ICT management	1,236.45	1,245.51	20.0%	0.00	0.0%
Project engineering (monitoring, energy management and network design)	1,387.60	1,633.17	25.1%	0.00	0.0%
Network Field Resources	610.00	242.48	-40.0%	0.00	0.0%
Customer, commercial and knowledge management	826.10	691.94	-7.6%	160.00	19.4%
ICT architecture	358.13	245.47	-27.0%	0.00	0.0%
ICT field resource	1,514.48	722.26	-35.9%	0.00	0.0%

CONTRACTORS	**8,710.71**	**7,126.91**	**-10.3%**	**153.15**	**1.8%**
LV network monitoring installation	718.00	479.13	-23.9%	0.00	0.0%
HV network monitoring equipment	65.00	0.00	-	0.00	0.0%
Battery storage installation	458.00	206.90	-62.6%	0.00	0.0%
Communications	100.00	99.63	-12.8%	0.00	0.0%
Smart analytics	1,926.80	1,302.49	-9.3%	0.00	0.0%
Integration of monitoring, modelling and management	3,844.07	4,031.52	0.4%	171.35	4.5%
Automatic demand response	333.88	290.43	15.0%	-18.20	-5.5%
Learning dissemination, website and low carbon community centre	203.00	161.10	-0.9%	0.00	0.0%
Integration activities to support DNO business as usual	785.70	303.44	-41.5%	0.00	0.0%
Real-time systems and information technology equipment	122.76	111.26	-3.6%	0.00	0.0%
Customer, commercial and knowledge management	80.00	66.91	-11.4%	0.00	0.0%
ICT field resource	73.50	74.11	0.0%	0.00	0.0%

EQUIPMENT	**4,526.44**	**3,657.82**	**-5.5%**	**-219.92**	**-4.9%**
LV network monitoring equipment	1,318.92	1,337.26	-1.5%	114.05	8.6%
HV network monitoring equipment	111.20	0.00	-	0.00	0.0%
Communications	417.00	154.68	-37.7%	-55.00	-13.2%
Battery storage equipment	1,100.00	924.71	-16.0%	0.00	0.0%
Integration of monitoring, modelling and management	435.75	234.99	0.0%	-200.76	-46.1%
Automatic demand response	755.87	646.44	15.0%	-53.21	-7.0%
Thermal storage	80.00	74.42	-9.4%	0.00	0.0%
Real-time systems and information technology equipment	307.70	285.31	0.1%	-25.00	-8.1%

IT	**4,043.53**	**3,097.48**	**-3.9%**	**288.99**	**7.1%**
Integration of monitoring, modelling and management	2,650.37	2,001.50	0.0%	217.59	8.2%
Automatic demand response	909.44	723.02	0.0%	71.41	7.9%
Learning dissemination, website and low carbon community centre	1,432.97	93.20	-39.4%	0.00	0.0%
ICT Field Resource	328.92	279.76	-18.6%	0.00	0.0%

TRAVEL & EXPENSES	**335.22**	**48.64**	**3.1%**	**-222.22**	**-66.3%**
Integration of monitoring, modelling and management	222.22	0.00	-	-222.22	-100.0%
General	113.00	48.64	3.1%	0.00	0.0%

PAYMENTS TO USERS	**591.00**	**0.05**	**-77.8%**	**0.00**	**0.0%**
Payments to Users	591.00	50.31	-77.8%	0.00	0.0%

DECOMMISSIONING	**392.00**	**0.00**	**-**	**0.00**	**0.0%**
Network field resources	50.00	0.00	-	0.00	0.0%
LV network monitoring decommissioning	332.00	0.00	-	0.00	0.0%
Customer, commercial and knowledge management	10.00	0.00	-	0.00	0.0%

OTHER	**988.38**	**432.06**	**-16.7%**	**-160.00**	**-16.2%**
Land	160.00	0.71	0.0%	0.00	0.0%
Learning dissemination, website and low carbon community centre	272.60	187.44	-18.9%	0.00	0.0%
Real-time systems and information technology equipment	423.03	193.78	-15.9%	-160.00	-37.8%
ICT field resource	132.75	50.14	-11.2%	0.00	0.0%

Notes:

1. A review on costs to date for the Labour budget has been completed. The costs associated with the following tasks have been re-apportioned due to misallocation during the invoicing process: "project and ICT management", "project engineering", "network field resources", "ICT architecture" and "ICT field resource" tasks. Cost transfers have been arranged which reflect correct task/cost allocation and will be completed in the next reporting period.

2. A number of tasks under each category have a variance in excess of 5%. This reflects the actual costs to date in comparison with the phased budget at project inception. Variations in the actual spend against the phased budget at inception will continue to be monitored and reported on in future project progress reports, however the project does not expect any variance over budget at project completion.

10 Bank Account

Ofgem guidance: The DNO should provide a bank statement or statements detailing the transactions of the Project Bank Account for the reporting period.
Where the DNO has received an exemption from Ofgem regarding the requirement to establish a Project Bank Account it must provide an audited schedule of all the memorandum account transactions including interest as stipulated in the Project Direction.

Transaction details for the NTVV Project Bank account during this reporting period are listed in the Appendix. This extract has been redacted to protect the financial details of transacting parties; the full, un-altered copy has been submitted in a confidential appendix to Ofgem.

A summary of the transactions to date are shown in the table below:

From	Jun-Nov 15
NTVV Project Spend	-1,657,269.54
NTVV Interest	9,441.44

11 Intellectual Property Rights (IPR)

Ofgem guidance: The DNO should report any IPR that has been generated or registered during the reporting period along with details of who owns the IPR and any royalties which have resulted. The DNO must also report any IPR that is forecast to be registered in the next reporting period.

In commissioning project partners to commence project activities, the NTVV has applied the default IPR treatment to all work orders (as defined in the Low Carbon Networks Fund Governance Document v.5, Section 2). This will ensure IPR which is material to the dissemination of learning in respect of this project is controlled appropriately.

No Relevant Foreground IPR has been generated or registered during the July 2015 to December 2015 reporting period. It is anticipated that in the next reporting period Foreground IPR relating to the creation of the smart control application for the optimised use of energy storage and management units will be registered.

The NTVV intends to gather details of IPR through the structure of individual project trials. Specifically, in concluding a project trial the following details will be gathered: 1) components required for trial replication and, 2) knowledge products required for trial replication. Likewise in configuring the overall system architecture and underlying business processes to enable the NTVV, a methodology to use conventional Business Process Mapping approaches to reveal IPR artefacts is being explored.

12 Other

Ofgem guidance: Any other information the DNO wishes to include in the report which it considers will be of use to Ofgem and others in understanding the progress of the project and performance against the SDRC.

No further details.

13 Accuracy Assurance Statement

Ofgem guidance: DNO should outline the steps it has taken to ensure that information contained in the report is accurate. In addition to these steps, we would like a Director who sits on the board of the DNO to sign off the PPR. This sign off must state that he/she confirms that processes in place and steps taken to prepare the PPR are sufficiently robust and that the information provided is accurate and complete.

This Project Progress Report has been prepared by the Project Manager and reviewed by the Project Delivery Manager before sign-off by the Director of Engineering, who sits on the Board of SEPD.

This report has been corroborated with the monthly minutes of the Project Steering Group[2] and the Project Partners Review Board to ensure the accuracy of details concerning project progress and learning achieved to date and into the future. Financial details are drawn from the SSE group-wide financial management systems and the project bank account.

Prepared by:	Richard Potter	Project Manager
Reviewed by:	Alex Howison	Project Delivery Manager
Approved by:	Andrew Roper	Director of Distribution

[2] The Project Steering Board meets as part of an overall SSEPD Innovation Steering Board

Appendix - Redacted copy of bank account transactions

Bankline

RBS
The Royal Bank of Scotland

Statement for account ********** from 01/06/2015 to 30/11/2015

Short name:	SEPD PLC-TVV PROJECT	Currency:	GBP
Alias:	SEPD PLC-TVV PROJECT	Account type:	SPECIAL INT BEARING
BIC:	**********	Bank name:	NATIONAL WESTMINSTER BANK
IBAN:	**********	Bank branch:	READING MKT PLACE

Date	Narrative	Type	Debit	Credit	Ledger balance
	CLOSING BALANCE				**5,989,965.20Cr**
26/10/2015	SOUTHERN ELECTRI NTVV COSTS	EBP	211,980.60		5,989,965.20Cr
30/09/2015	30SEP-GRS 90252721	INT		4,474.29	6,201,945.80Cr
22/09/2015	SOUTHERN ELECTRI NTVV COSTS	EBP	338,027.75		6,197,471.51Cr
02/09/2015	SOUTHERN ELECTRI NTVV COSTS	EBP	657,818.24		6,535,499.26Cr
28/07/2015	SOUTHERN ELECTRI NTVV COSTS	EBP	449,442.95		7,193,317.50Cr
30/06/2015	30JUN-GRS 90252721	INT		4,967.15	7,642,760.45Cr
	OPENING BALANCE				**7,637,793.30Cr**
Totals			**1,657,269.54**	**9,441.44**	