Scottish and Southern Energy Power Distribution

New Thames Valley Vision

PROJECT PROGRESS REPORT

Project Number	SSET203
DNO	Southern Electric Power Distribution Ltd
Reporting Period	December 2014 to June 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.

The 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 for this report period. During the past six months the trials using the commissioned systems have continued and the delivery of additional monitoring and energy storage technology continues in preparation for the 2015 and 2016 trials. A short summary of delivery achievements against each of the core learning outcomes is given 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 produced on the LV network. For domestic customers the data gathered from end point monitoring has been utilised to begin to create buddied and forecasted load profiles for customers without monitoring equipment installed. Data collected from 31 customers with hot thermal storage devices installed has been analysed and extrapolated to create custom photovoltaic load profiles for the anticipating trials utilising the modelling environment to inform the technical impact of low carbon promotions on a Distribution Network Operator (DNO). The smart cut out fuse monitor has passed all internal and external electrical testing and information security tests and is being installed in customers' properties and into street furniture. The project has now commissioned three hundred substation monitors to continue collecting data to support the buddying of customer profiles based on total substation loadings. To support wider knowledge transfer and research activities, anonymised half hourly consumption data has been made available for download from the website (www.thamesvalleyvision.co.uk)

Learning Outcomes: Anticipating and Optimising

During this period the project has been utilising the commissioned Network Modelling Environment (NME) to deliver the trials and studies to begin to identify how low carbon technologies may affect local networks based on varying levels of uptake. The main area of focus for the trials has been on the cleansing of the wider network area's to enable the trials based on the planned uptake of photovoltaic (PV) generation, air source heat pumps and energy efficiency measures. This will ensure that the trials are conducted on data sources that have been manually checked to rule out any additional margins of error from the results. The project team has also been gathering data from a variety of sources to ensure that the generation profiles for PV and additional loads associated with EV can be modelled based on actual recorded data from true scenarios. During this period the Distribution Management System (DMS) has been utilised for the first sixteen field trials of LV control using a LV control engineer with delegated authority. The full set of activities needed to perform the 'buddying' of customers in Bracknell is understood with the detailed system in place to ratify the efficacy of the buddying methodologies being trialled to inform the most effective mechanism to buddy customers.

Learning Outcome: Supporting Change

The project has deployed 15 of the Energy Storage and Management Units (ESMU) onto the LV network in Bracknell to begin the trials to identify how the units can address the technical standards of voltage and thermal performance in the most efficient manner possible. Two of these installations have been tactically deployed to a single 11kV High Voltage (HV) feeder to understand how this technology can support LV constraints but also give additional support to the HV network and primary substation constraint. An additional two units have been installed within substation locations on the LV networks for additional cyclic trials. The demand side response for commercial load reduction programme has continued with additional participants being installed and coming on stream in the event schedule. The trials for the 2015 load shedding strategy have been produced and introduce some new variables to understand how receptive customers are to varying load shed events and notice periods. The new strategy looks to vary the day and time of events to coordinate with system and customer peaks. The new strategy also looks to reduce the notice period for some events and to increase certain load sheds to up to three hours. The total load shed capacity of the trials to date has shown a load reduction of the first nine customers over the April 2014 to April 2015 load shedding programme of over 14 MWh. The installation of 30 hot thermal storage units has proved a success and the project is moving to install the technology in additional properties in the Thames Valley area and initial engagement has been positive, particularly on the Royal Borough of Windsor and Maidenhead. The project has engaged with three customers and is in the process of putting agreements in place for the installation of the cold thermal storage units. The IceBear units have been modified for the UK market and have been shipped from the manufacturer in the United States of America for installation.

Stakeholders

The project continues to engage with the community through the series of low carbon promotions and regular updates on project progress to participants via the six monthly postcards. The project team continued the engagement and recruitment of the customers needed for the cold thermal storage installations. In addition the project invited all of the Automated Demand Response (ADR) customers to a breakfast workshop where the project team gave the insights from the 2014/2015 load shedding trails. The session as also used to gather feedback from project participants in the trial and present on the load shedding strategy for the 2015/2016 ADR programme.

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 10 of this report; a high level summary is given here:

Risk Description (Category & specific activity)	**Further details and impact**	**Controls**
Recruitment 'High-density' end-point monitoring	A revised recruitment approach to engage a high proportion of customers on an LV feeder has been trialled in six locations. This has increased the number of participating customers but has not, to date, reached the 80% target level. The highest density reached to date is 56% which reduces the statistical confidence in the analysis of load aggregation methods.	A locally responsive recruitment approach is ongoing - consistent with the Customer Engagement Plan As areas with less than 80% density have been formed, the project is seeking to create more areas at lower densities as an alternative approach to this analysis.
Procurement	None	None

Installation Energy Storage and Management Units	The Energy Storage and Management Unit installation programme is to schedule with the 25 units on track to be installed by July 2015 as per the SDRC. The commissioning of the installed units remains a risk until the full commissioning programme, combining the remedial actions on the ABB inverters has been scheduled with the ESMU supplier and ABB engineers.	Close third party management to ensure the commissioning plan and remedial actions for the inverters are well understood and agreed by all.

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.

Learning outcomes are considered in detail in section 7 of this report; a high level summary of outcomes delivered in this period is shown below:

Key learning outcomes

The following piece of work has been completed in this period and represents knowledge output:

- The consent and agreement of 30 customers onto the ADR programme has been reported in SDRC 9.1c.

A description of the learning presented in this report is covered in section 7.2 below.

In addition, the following 'Learning Moments' (ad hoc and process related learning) are captured:

- The ADR trials have highlighted several areas of interest that can be used to inform business as usual deployments of load reduction. The predictability of customers is key to identifying which industry or business type offers the most predictable quantity of load reduction when requested.
- The ADR trials have also shown a correlation between the total amount of energy shed during an event and the quantity of 'bounce back' seen in the fifteen minute period following an event.
- The initial estimates on the time taken to get goods shipped from outside of the EU customs cleared were conservative and based on actual deliveries the lead time on the clearance of the goods were in practice less than 1 working day.

- The release of data, particularly customer energy consumption data, from LCN funded projects is well received by both academic institutions to validate theories using UK based datasets as well as technology companies looking to validate code and software solutions that utilise half hourly data.
- The anticipated reporting requirements of a system, particularly an integrated modelling engine, may change once the project end users and wider business colleagues see the system and the detail in the reporting system.

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 Successful Delivery Reward Criteria (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 below. (For further details please see section 7.4)

- Representatives from the Future Networks team attended a two day demand side response workshop with Ofgem where ADR was heavily referenced.
- Consumer impacts of the LCNF projects presented to the Smart Grid Forum's domestic customer workshop.
- LV monitoring knowledge sharing event was held at the National Power Laboratories. NTVV substation monitoring was presented with a view to future data exchange collaboration.
- An article was published on the 15th February in the Sunday Telegraph on the New Thames Valley Vision project and interview with Nigel Bessant.
- The final energy efficient appliances event was held at Bracknell Leisure Centre.
- A presentation was given on Intelligent Network Management – An insight to the Thames Valley Vision LCNF Project presentation to the New Energy Forum. A good round table discussion and dissemination of the project progress, challenges and potential BaU conversions.
- Baroness Verma (Parliamentary under Secretary of State for Energy and Climate Change) visited Honeywell House in Bracknell along with Charles Philips - Head of Capacity Market Design and Dan Monzani - Head of Energy Security, to learn about ADR and gain insights from the NTVV project.
- Several demonstrations of the NME have been delivered to the wider network planning department, focused on the system being utilized for new connections.
- A demonstration was held on the integrated SSEPD NTVV NME and DMS system to Iberdrola on their recent visit to Livingston.
- A direction was made to the DS2030 project (WS7 of the smart grid forum) towards the NTVV project learning on: a) ADR (information as published on NTVV website), b) harmonics using

work undertaken on the EMMA units and c) information on heat pumps by Strathclyde University.

- A presentation was given to Turkish Energy Ministry, Energy Regulator and several DSO's regarding active network management, energy storage and demand side response & ADR.
- Anonymised half hourly consumption data has been uploaded on the NTVV website.
- A presentation was given to the IET on "The data required to enable a smart grid" based on the data pre-requisites and post-capture data processing requirements to enable systems integration to occur.
- ADR Participant Stakeholder event held where project participants attended and were shown learning to date and introduced the 2015 load shed program.
- A third in the IET local Berkshire network series of events was held to provide an update on project progress and learning generated from the project to date.
- A presentation was given to a group of researchers on the challenges that University of Oxford are addressing in NTVV with regard to mathematical input into commercial energy issues.
- A presentation was delivered at the All Energy conference in Glasgow on 6 May on Energy Storage on NTVV.

DNO Internal targeted dissemination

SSEPD has taken an integrated approach to the delivery of NTVV. Other than a small group of staff dedicated to the project, the project makes use of a pool of in-house experts. This approach seeks to draw on a wide body of knowledge whilst also disseminating findings through a natural process of persistent contact. The project continues to work closely with the business to ensure any learning is passed to business transformation projects and programmes to deliver value and enhance the service offered to customers. In particular, close working with the depot team using the DMS to trial LV control has been delivered this reporting period and several demonstrations of the NME to the system and network planners to highlight how this system can be used to improve planning and connection requests.

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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) consists of a series of related Packages of Work (PoW) which directly map to core learning outcomes and learning dissemination methods. Having established the majority of the proposed hardware and systems, the project has successfully identified and reported on the associated key findings. The project has now begun a detailed phase of trials which will test and evaluate the relative advantages and/or disadvantages of these technologies and systems. The engagement for the remaining technical trials and equipment installations in nearing completion and the plans and resources for the installation of the equipment is in place.

The project is keen to share this information and during this reporting period it has held or actively participated in a number of dissemination events (as per section 7.4).

The NTVV has implemented all activities in accordance with the Project Direction and is progressing to plan. The Successful Delivery Reward Criteria (SDRCs) for this reporting period have been met, details of which are included in section 7. The following summary outlines the progress to date for each Package of Work and key activities in the next reporting period.

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 has not informed the buddying. The data has also been used to gain an insight into the correlation between both temperature and solar radiation for domestic customers.

An additional form of end point monitoring device known as the Smart Fuse by Senical has passed all electrical and safety tests and is now being deployed in customer properties and in street furniture. The head end system has been built, passed all user and operational acceptance testing. The head end system and unit has also passed the full range of penetration tests for physical and information security tests relevant to a device collecting half hourly energy usage data. This device is being installed in the high density areas necessary to validate the aggregated load profiles from the substation data. It will also be used to capture more granular data from the installed hot thermal storage units already installed and any future installations.

Substation monitoring

(Core learning outcome: Understanding)

In conjunction with the end point monitors, the first tranche of 100 substation monitors has been installed for over two years. This has given the project unprecedented insights into the use of energy at LV substations. The project has concluded the bulk installations at all sites and to date 300 devices have been installed and commissioned.

In addition to the high frequency data needed by the academic project partners to deliver the smart analytics work of aggregation and forecasting, the substation monitoring deployments have shown potential to provide support to everyday operations and maintenance. Work has continued to generate a virtual fuse blown alarm by utilising the electrical signature when a fuse blows to inform the rapid response operative which fuse has blown to ensure that the location, feeder and fuse size is known before arriving at site to perform restoration activities.

Characterisation

(Core learning outcome: Understanding)

The majority of the detailed work on the characterisation of domestic and small to medium sized enterprises (SMEs) is now complete. The work delivered under this characterisation has been utilised directly to inform the buddying of customers to create load profiles for the low carbon technology modelling activities.

Network Modelling Environment

(Core learning outcome: Anticipating)

The NME combines a Geographical Information System (GIS) Electric Office with a power flow analysis tool (Cymdist) to enable the LV network to be studied from a single interface. The effects of applying particular energy usage profiles are calculated and presented back to the user in the GIS view. The NME presents a geographical view of the LV network which can display the load flow results visually for different situations and energy usage profiles.

The impact in terms of both circuit loading (thermal constraints) and voltage can be assessed and quickly reviewed using a green, amber or red colouring on the branches (cables) or point of connection. Significant trials of the NME have been performed over this reporting period to understand how the NME can be used to support investments by customers, industry, DNOs and local government.

The majority of work carried out on the NME this period has been focussed on ensuring that the trials planned to cover the requirements for the technical analysis of low carbon technologies and energy efficiency measures on the network. The study area will encompass ten substations and the learning form the anticipated uptake of PV generation, air source heat pumps and energy efficiency measures. The ten substations have been cleansed to ensure that the substation address match accuracy is above 96%.

Another significant piece of work that has taken place over the past six months has been to ensure that the reporting outputs from studies run within the NME to improve the 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 will ensure that the planning functions can make the optimal investment decisions whether to deploy an energy storage solution, implement a load reduction strategy or implement a reinforcement option.

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. The DMS has been built and the LV network imported from the NME, and an interface using the CIM (Common Information Model) has been implemented with the following classes:

- IEC 61970 / Core: contains the core PowerSystemResource and ConductingEquipment entities shared by all applications.
- IEC 61970 / Wires: is an extension to the core package that models information on the electrical characteristics of transmission and distribution networks.
- IEC 61968 / Assets: contains the core information classes that support asset management applications.

Over the reporting period the DMS has been kept in alignment with the NME through the use of CIM data. The DMS has also been kept up to date with running arrangements in the field through the updating of the diagram by the service alteration process to ensure the project 'shadow' system reflects the actual network configuration

The DMS has been linked to the operational SCADA system by the use of a PI to PI link to obtain real status of the 11kV HV network to the shadow system. This ensures that any field trails are managed in an environment which replicates the state of the live SCADA system.

The first field trials using the DMS have commenced with the restoration team from Slough depot which cover the Bracknell and Thames Valley area. The first trial was undertaken on the 14th May 2015, with a second trial taking place on the 4th June 2015. These initial trials utilised switched schedules and each action being performed was instructed through the use of the LV SCADA system. The detailed reports of the trials are being drafted and the relevant learning will be released in due course.

The DMS has also been configured and set up with the twenty-five ESMU objects and work is underway to enable all of the controls and set points to be whitelisted objects to be triggered via a SOAP message from the Active Distribution Device Management (ADDM) smart control system.

Aggregation and Forecasting of energy profiles

(Core learning outcome: Anticipating)

Aggregation analysis allows the use of relatively sparse data from only a handful of end points to be 'buddied' with unmonitored customers to predict their energy use such that the power flows across an entire section of the LV network can be assessed – or conversely, substation level demands to be calculated where only end point level data is available. Forecasting analysis involves running a number of scenarios (varying in both timescale and application) to support forward looking power flow analysis or voltage variations based on low carbon technology uptake.

During this reporting period the buddying methodology has moved from the simple method where the quarterly meter reads of all of the customers are aligned to a customer where the project has an end point monitor to the genetic algorithm. The Genetic Algorithm (GA) requires the customers on the selected feeders to be randomly populated with end-point monitor profiles. This grouping of profiles (first generation) is scored by aggregating the customer usage and comparing it with the feeder-phase readings and by comparing the quarterly meter readings between each individual customer and its assigned end-point monitor profile. The end-point monitors which provide a good match to the quarterly meter readings are selected and merged to form new profiles, which form the second generation of profiles. This is repeated several times and the combination of end-point monitors that achieve the best score gives the buddied profiles.

The GA has been updated to include the load profiles to buddy Small and Medium Enterprises (SMEs), unmetered loads such as fibre TV, telephone and broadband kiosks and street lighting pillars. This ensures that the any losses are accounted for and the total loads across all end points tally with the substation loading. The GA has been used to 'buddy' all customers on the first nine substations. Now that the process has been proven the technique will be rolled out to the remaining substations associated with the 2015 trial programme.

Automatic Demand Response (ADR)

(Core learning outcome: Supporting)

The ADR demand response system under trial provides a machine to machine interface for triggering demand reduction events as agreed with the customer in advance and initiated by the DNO. The project has agreed all 30 of the required ADR installations in Bracknell; 20 buildings have had their ADR systems installed and commissioned with the remaining 10 being installed over December 2014 and January 2015 in line with and on track for the submission of SDRC 9.1c in April 2015.

The 30 customers have been signed up without any financial incentives and to date no payments have been made to encourage participation in load shed events. The effect of incentives on participation will commence in October 2015 in accordance with the bid submission.

The April to September load shedding strategy is underway on those customers that are fully installed and commissioned. The revised load shedding strategy has introduced some additional factors to

gauge the reactions of customers to other scenarios that will generate real learning and value over how customers respond to the amended load shed requests. The revised shedding strategy has been tailored for each customer based on the system peak of network they are served by as well as their own individual peak demand times. As highlighted in the executive summary the project is now beginning to introduce longer load shed events of up to three hours. In addition no notice load sheds of 15 to 30 minute duration are being carried out to see how effective the ADR scheme could be in a fault scenario.

Energy Storage and Management Units

(Core learning outcome: Supporting)

The NTVV project is deploying the concept of an Energy Storage and Management Unit (ESMU) which combines power electronics and energy storage to help manage voltage performance, thermal limitations, efficiency and emergency response on the LV network.

Over this reporting period the project has completed the build processes and the first units have been shipped and installed. All of the sites were granted installation acceptance by the local authority and local housing association. The local communities have been engaged and kept informed of the project and the need for the street side installations and the trials being carried out.

The delivery of the first sixteen whole units has been received and all of the Lithium-Ion cells have been shipped to the UK. The installation programme continues to meet the deadlines agreed and to date the project has installed fifteen of the units with the remaining ten scheduled for installation in June and July 2015. The units are undergoing thorough acceptance testing to ensure that the units meet the specification and functionality as defined in the bid.

The project team continues to work closely with the supplier to ensure that the devices are fully compliant with the standards defined in the Low Voltage Directive (LVD) and the Electromagnetic Compatibility (EMC) to ensure the units can be CE marked and energised to deliver the summer 2015 trials to understand how effective the units are for managing LV constraints and improving power quality both individually and aggregated.

Smart Control

(Core learning outcome: Supporting)

The NTVV project is creating a new software system to manage the ESMU devices in the field using the smart control algorithms derived and developed by the University of Reading. The smart control system is known as ADDM. The finalised architecture and code design for the ADDM is complete. The build of the Pre-Production and Production systems is underway and the necessary server and communications network hardware are in place. The ESMU Gateway code has been completed and the Instruction checks system has been implemented.

The project team are now moving onto the forecasting agents that will initially schedule the day ahead schedule for the ESMU. The team have delivered a deterministic forecast that will run and provide a rolling two day forecast of the loads on the feeder where each ESMU is installed.

The NTVV project has also been simulating the optimal running of the units by using CIM data exported from the NME to understand how to optimally schedule the ESMU both individually and aggregated by using substation loading and voltage measurements.

Hot Thermal Storage

(Core learning outcome: Supporting)

The NTVV project is exploring the use of EMMA management units to divert peak solar power into customer hot water tanks as an efficient way to enable the connection of large volumes of solar panels onto the existing network. Over this period the project team have signed off the testing and certification of the EMMA 4G unit. This unit is being deployed to replace the 30 installed 3G units. The NTVV project is also exploring other areas of the Thames Valley to identify

Cold Thermal Storage

(Core learning outcome: Supporting)

The NTVV is exploring the use of ice cooling storage units to defer the peak daytime demand associated with air conditioning units by introducing the IceBear unit to three customers buildings in Bracknell. Each IceBear unit can defer as much as 6kWh for the daytime cooling needs of the building to the overnight time segment when network loads are significantly reduced.

In response to an analysis of the current uptake of cold thermal storage in the study area and drawing on insights from successful large scale deployments in the United States of America and Canada, the project has developed a new deployment approach for cold thermal storage which modifies the quantity, size and recruitment approach. This deployment approach has been designed to ensure relevant learning is generated with regards to the coordinated installation and operation of cold thermal storage. Change Request 002 associated with the revised approach has been approved by Ofgem and the project has now mobilised to expedite the delivery of this technology to capture the learning from two summer seasons of trials.

The Ice Energy IceBear units have been modified for use within a UK context by adding motors that work with the GB frequency of 50 Hz in contrast to the North American standard of 60 Hz. The units have also been fully certified against all standards needed to certify for CE marking and are fully compliant with both the LVD and EMC.

The three units have been shipped from the manufacturer and arrived in the UK on the 6th June 2015. The UK based contractor has been assigned to perform the installations and ensure that the maintenance programme is in place to ensure that the F-Gas refrigerant is monitored.

Three project participants have been engaged and the legal consent is being agreed based on the contractual arrangements put in place. The site surveys and locations of the three units have been identified and agreed and the air cooling loads have been understood for the summer 2015 trial.

Low Carbon Promotions

(Core learning outcome: Supporting)

The NTVV is assessing how a selection of customer based low carbon technologies 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. Over this reporting period the last of the low carbon promotions was held at a local leisure centre in Bracknell highlighting the benefit of energy efficient appliances. The event also involved a raffle to win an energy efficient washing machine and dishwasher. This concludes the events and now the NTVV team are pulling the final pieces of evidence form the series of promotion events to deliver the learning report.

Local Authority

(Core learning outcome: Supporting)

Over this reporting period the engagement with the local authority has been primarily focussed on their expertise in the workshops and desktop study that has been carried out on the planned uptake of low carbon technologies in the Bracknell area. The workshop was held in London and the planned uptake of EV, PV, heat pumps and energy efficiency measures. With knowledge of any local authority specific targeted energy reduction measures being put in place the project is able to take the information and ensure the modelling scenarios are based on the most likely outcomes in the Bracknell area.

In addition, the local authority has passed the project team details of certain housing stock areas that have had external wall insulation applied. A study is being planned based on this information to correlate whether there has been any statistically significant reduction in energy usage in this area based on the substation monitoring data being gathered.

Industry Governance & Analysis of Commercial impacts

(Knowledge dissemination)

Over this reporting period the NTVV project has begun the investigations into whether the current Distribution Use of System (DUoS) pricing arrangements in GB are suitable and effective. Retrospective analysis is currently under way to find out if the Common Distribution Charging Methodology (CDCM), introduced in 2010, and the EHV Distribution Charging Methodology (EDCM), introduced in 2012, triggered a behavioural change in customers. The Universities of Oxford and Reading are helping us look at key elements of the CDCM (the time bands, coincidence factors and load factors). By looking at these elements, we will be able to establish how well Bracknell ‘fits’ with our regional assumptions, calculate Bracknell-specific price signals and also calculate ‘counterfactual’ price signals based on annualised reinforcement costs. This will help inform whether CDCM is cost reflective in the context of a local network.

In addition a contract with TNEI has been placed to re-run the LRIC charges and equivalent EDCM tariffs using just Bracknell data sets to create a set of NTVV specific DNO tariffs. This work will require a significant amount of data gathering to provide the pre-requisite data for the Bracknell area and work is anticipated on taking 16 weeks based on existing resource commitments.

Low Carbon Community Advisory Centre, www.thamesvalleyvision.co.uk and Stakeholders
(Knowledge dissemination)
Although the low carbon community advisory centre has closed the project continues to engage with the community and stakeholders via a variety of means. The NTVV 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 period the NTVV has held several stakeholder events to engage project participants to advise them on progress and recruit additional customers for the remaining two years of field trials. The website continues to draw a high number of unique visitors every month and is a key mechanism for the project to provide updates and learning to wider stakeholders.

Transition into 'business as usual' – development of policies and training materials
(Knowledge dissemination)
During this reporting period the NTVV project have taken all of the generated reports and learning to date on LV monitoring, capacity response and customer engagement to begin the framework of the policies and procedures work. The Tier1 policy documents have been drafted informed by the outputs and learning to date and have been through a first stage review with the internal project team to ensure that they meet the requirements of the business to ensure a rapid turnaround to business as usual if the business case for the technologies are made and the smart solution fits into the wider business strategy for LV network management.

Learning & Dissemination
The outputs of activities in association with this Package of Work are covered in detail in section 7.

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

- 29th January 2015 - NTVV Project Partner Review Board
- 6th February 2015 - NTVV Project Steering Group
- 26th February 2015 - NTVV Project Partner Review Board
- 6th March 2015 - NTVV Project Steering Group
- 26th March 2015 - NTVV Project Partner Review Board

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

- 3rd April 2015 - NTVV Project Steering Group
- 30th April 2015 - NTVV Project Partner Review Board
- 8th May 2015 - NTVV Project Steering Group
- 28th May 2015 - NTVV Project Partner Review Board
- 12th May 2015 - NTVV Project Steering Group

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 New Thames Valley Vision is being conducted in accordance with the full submission. To ensure all commitments from this submission are completed in a timely and efficient manner, the project has developed a comprehensive Package of Work structure with clear linkages to the text of the full submission.

The project has requested and has received approval for two change requests to the project during this reporting period.

Change Request No.	Package of Work	Change
CR002	Supporting: Cold Thermal Storage	Number of devices being installed and timeline to deliver learning reports
CR003	Supporting: ESMUs	Time to install the devices has been extended based on supply chain issues

The project is aware of an addition variance, which is currently being monitored.

No.	Package of Work	Variation & Mitigation
1	Project Management	The project budget is projected to achieve savings in two areas related to land and HV network monitoring. The land budget was assigned £160K to pay for the land needed to install Energy Storage and Management Units (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 by delivering a more efficient project. 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.

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. The 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 five risks that fall into this category, an additional further risks is also listed below which are referenced by section 4 of this report:

		Inherent								Residual							Inherent	Residual
#	Risk Description	Impact						Likelihood	Risk Control/Mitigation Actions	Impact						Likelihood	Score	Score
		Cost	Schedule	Reputation	Learning	Environment	People			Cost	Schedule	Reputation	Learning	Environment	People			
U1-e	Smart meter installation programme (by others) delayed. Suppliers unable/unwilling to share data	2	3		3			5	1. Regular engagement with 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 flows	2	1		2			2	15	4

S3-a	Availability/readiness of Energy Storage and Management Units – Ongoing design, manufacturing and testing concerns (software/hardware response and IP rating of outer housing) present actual delays.		5		2			3	1. Second Change Request defining new deployment approach agreed - July 2015 2. Weekly calls / Daily emails implemented 3. Site installation works being prepared and field installation plan being prepared 4. Delivery schedule from supplier is being prepared,although SDRC is under threat.	4	5		2			2	15	10
S3-e	Supplier doesn't manage internal costs and cannot deliver on the defined specification in the work order	4	3	3	5			4	1. Ensure supplier delivers specification as per the work order 2. minimise any additional change to the desgin 3 identify areas of scope extension that SEPD can accommodate costs for	3	3	3	3			4	20	12
S3-f	Onboard battery controller software does not meet specification as per Whitebook and interaction with SCADA system cannot be achieved	5	5	3	5			3	1. Test early. 2. Use requirements based design and build processes 3. Engage suppliers of inverter to ensure specification	3	4	3	4			3	15	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.

The NTVV has identified eight Successful Delivery Reward Criteria (SDRC) 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 table lists the individual SDRC components in chronological order and details the project's progress towards their achievement for those due to be completed in this reporting period (up to December 2014) and into the next reporting period (up to June 2015).

	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 9.1c	30/4/2015	30 Customers signed up to Automatic Demand Response (ADR) programme and host customer event-renew new arrangements	Completed
SDRC 9.4c	31/07/2015	Install 25 LV connected batteries as defined in 9.4a	On track
SDRC 9.8a (4)	30/09/2015	Cold thermal storage performance	On track
SDRC 9.8a (4)	30/09/2015	Energy Storage and Management unit performance	On track
SDRC 9.4d	30/10/2015	Produce learnings from energy storage and power electronic deployment to assess the hypothesis as defined in 9.4a	Delivery of the integrated on-board battery controller software and associated interfaces present a risk to the trials needed to deliver this report on time.
SDRC 9.8b (1)	30/11/2015	Low Carbon Fuel Poor Evaluation	On track
SDRC 9.8b (2)	30/11/2015	Bracknell Forest Homes Low Carbon Promotions	On track
SDRC 9.8b (3)	30/11/2015	Technical Impact Evaluation	On track

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

SDRC	Due	Description
SDRC 9.8c	30/11/2016	Prepare final reports on the trials carried out on the subjects listed in "Evidence 9.8" as well as an end of project report
SDRC 9.8d	30/4/2017	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 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 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

All reports available in full at http://www.thamesvalleyvision.co.uk/project-library/published-documents/

30 Customers signed up to Automatic Demand Response (ADR) programme and host customer event-renew new arrangements (as reported in SDRC 9.1a)

In March 2015 the TVV project submitted the evidence report to confirm that 30 customers had entered into agreement to participate in the ADR programme, that two significant ADR customer events had been hosted and that the project has renewed the new commercial arrangements.

The project has consented 30 industrial and commercial companies in the Thames Valley to participate in ADR. The businesses range from leisure facilities, large office space and data centres to educational establishments. Some customers have been signed up and installed onto the programme for over 12 months and have been actively participating in the early trials to inform the effect of load shedding on the network and on a variety of business types.

The project has held two significant ADR customer events since the project inception to ensure that

the customers have a forum to discuss any issues or raise requests for additional information on their particular building. The latest session held in raised some

The key commentary and learning in this area is focussed around the commercial agreement. The key lesson learnt throughout the project to date, is that it is imperative to minimise the document that requires legal sign off. In section 2.5 it is highlighted that the primary bottleneck when recruiting customers is the length of time for legal departments to achieve final sign off.

7.3 Learning Moments

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

The ADR trials have highlighted several areas of interest that can be used to inform business as usual deployments of load reduction. The analysis of the data to date has shown that there are some customers that have a very predictable amount of building load that is available at most times to participate in load shed events. In other customers this is a variable amount based on the day or time of year. In particular academic institutions ability to offer load is dependent on whether it is term time or the facility is closed for holiday. The predictability of customers is a key to identifying which industry or business type offers the most predictable quantity of load reduction when requested. This knowledge will be key to identifying the optimal industry types to target initially when looking to implement this technology to manage short term constraints.
An additional learning from the ADR trials and data analysis is the understanding of a phenomenon known as bounce-back. Bounce-back is defined as the time just after a load shedding event has been carried out on a building and a temporary peak on the building load is seen as plant that was dormant is brought back online. The analysis has shown that any bounce back event is likely to last no longer than 15 minutes. Additional analysis also shows that there is a correlation between the total amount of energy shed during an event and the quantity of 'bounce back' seen in the fifteen minute period following an event.
Some learning that has come from the import of the ESMU that has not yet been formally recorded relates to the import of goods from outside of the EU. The initial estimates on the time that would be taken to get goods shipped from outside of the EU customs cleared were conservative and set into the overall project plan at five working days. Based on actual deliveries taken and the working relationship between the shipping agents in both the UK and Canada we have shown that the goods can be customs cleared when nominated in flight in one working day.
The project has released some data sets publicly. This is the first known release of half hourly energy usage data from domestic customers in the Bracknell area from profile classes one and two. The release of this data has been very well received by both academic institutions to validate theories using UK based datasets as well as technology companies looking to validate code and software solutions that utilise half hourly data. This release has in addition led to several more data requests from organisations looking to add event more value by combining the data to the granular substation data to correlate the phase of the customers based on the correlation of the peaks and troughs in the substation data for the feeder that servers that customer.

Having built and commissioned the NME, the requirements for the output of the modelling studies were discussed and agreed. However, when then the first full scale network trials were undertaken did the project team realise that the analysis of the resulting output would prove time consuming and onerous for trials encompassing more than a single substation. As a result a significant amount of work has been undertaken to ensure that the outputs of the modelling environment can be scaled to ensure the resulting analysis is a more efficient process.
A piece of internal learning that came to the fore during the demonstrations of the LV SCADA representation of the DMS from the imported CIM data was offered by the depot team. The specific item related to link box operations on the LV network and the related to the CIM class assigned to these object. The menu options configured for the link boxes had an insert or remove links option. In reality, certain link boxes have fuses and as such insert links can be misleading to a field operative. The CIM class for a link box has just the option for a link and as such the menu options were configured accordingly. The NTVV project has decided to create site specific menu options where fused objects are installed to ensure that the DMS reflects the actual network arrangements.

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	January 2015	Representatives from the Future Networks team attended a two day demand side response workshop with Ofgem where ADR was heavily referenced as a mechanism to reduce peak demand and assist not only local constraints but has the capability of supporting the overall short term operating reserve capacity of the system.
SSEPD	January 2015	Consumer impacts of the LCNF projects presented to the Smart Grid Forum's domestic customer workshop by the Citizens Advice Bureau. This drew on a review of all of the LCN funded projects being run that interacted directly with customers and a report was produced.
SSEPD	January 2015	LV monitoring knowledge sharing event was held at the National Power Laboratories. NTVV substation monitoring was presented with a view to future data exchange collaboration of the CIM network data from the NME and the raw substation data for a selection of substations.

SSEPD	February 2015	An article was published on the 15th February in the Sunday Telegraph on the New Thames Valley Vision project and interview with Nigel Bessant. The article focussed on the problem that the NTVV project is trying to explore and some of the technologies that can be used to manage the network to support our customers exploit the benefits of low carbon technologies.
SSEPD	February 2015	The final energy efficient appliances event was held at Bracknell Leisure Centre. This was an event aimed at highlighting the energy savings that can be made by customers choosing a more energy efficient appliance when replacing or purchasing a new product. The event culminated with a raffle where a customer won an A+++ washing machine and another an A+++ dishwasher.
SSEPD	February 2015	A presentation was given on Intelligent Network Management – An insight to the Thames Valley Vision LCNF Project presentation to the New Energy Forum. A good round table discussion and dissemination of the project progress, challenges and potential BaU conversions.
Honeywell	March 2015	Baroness Verma (Parliamentary under Secretary of State for Energy and Climate Change) visited Honeywell House in Bracknell along with Charles Philips - Head of Capacity Market Design and Dan Monzani - Head of Energy Security, to learn about ADR and gain insights from the NTVV project. The event was aimed at informing DECC on the learning to date from performing a significant amount of events and on how this technology was simple to install and could be scaled up in many regions across the country.
GE	March 2015	A demonstration was held on the integrated SSEPD NTVV NME and DMS system to Iberdrola on their recent visit to Livingston. The team showed an overview of the NMS module, with emphasis on the visualisation of the secondary substation internals from imported CIM data.
SSEPD	March 2015	A direction was made to the DS2030 project (WS7 of the smart grid forum) towards the NTVV project learning on: a) ADR (information as published on NTVV website), b) harmonics using work undertaken on the EMMA units and c) information on heat pumps by Strathclyde University.
GE	March 2015	A presentation was given to several Turkish representatives from the Turkish Energy Ministry, Energy Regulator and several DSO's regarding active network management, energy storage and demand side response & ADR. The session was arranged by GE and focused on how innovation funding was driving grid modernisation in BaU. The event was mentioned the tender being run as the CMZ as the culmination of

		trials run by all DNO's thanks to the funding mechanisms put in place by the GB regulator.
SSEPD	March 2015	Anonymised half hourly consumption data has been uploaded on the NTVV website. There have been 105 downloads of the data set to date.
SSEPD	April 2015	A presentation was given to the IET on "The data required to enable a smart grid" based on the data pre-requisites and post-capture data processing requirements to enable systems integration to occur.
SSEPD	April 2015	ADR Participant Stakeholder event held where project participants attended and were shown learning to date and introduced the 2015 load shed program.
SSEPD	April 2015	A third in the IET local Berkshire network series of events was held to provide an update on project progress and learning generated from the 3 x Energy Storage techniques being trialed on the project and a detailed update on the ADR analysis and learning to date.
University of Oxford	April 2015	A presentation was given to a group of researchers on the challenges that University of Oxford are addressing in NTVV with regard to mathematical input into commercial energy issues.
SSEPD	May 2015	A presentation was delivered at the All Energy conference in Glasgow on 6 May on Energy Storage on NTVV. This was a very well attended event (70-80 seats) with standing room only. There were a wide range of presentations including James Cross from EA Technology Ltd talking about the good practice guide. There were also really interesting discussions after the event regarding moving forward

7.5 NTVV Website

Web traffic for the website during this reporting period (06/12/2013 - 26/05/2014) was:

Total visits:	6,133
Unique visitors:	4,470
Page views:	17,729
Pages per visit:	2.89
Average visit duration:	00:02:31
% New Visits:	71.94

An interesting highlight of the analytical results of the NTVV website over this period is the bounce rate of 54.66%. The bounce rate is the percentage of visitors to a site that only visit a single page. That means that a large proportion of the visitors to the NTVV website are spending a longer time on the site and browsing through multiple pages.

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[2]. Projected variances are also listed for changes >5%.

	Budget	**Expenditure ITD (£K)**	**Comparison with expected expenditure**	**Projected Variance** (at project conclusion)		
				(£K)	%	#
LABOUR	**5,932.76**	**4,268.48**	**-4.3%**	**160.00**	**2.7%**	
Project and ICT management	1,236.45	1,124.43	9.0%	0.00	0.0%	
Project engineering (monitoring, energy management and network design)	1,387.60	1,450.57	17.4%	0.00	0.0%	
Network Field Resources	610.00	197.62	-36.6%	0.00	0.0%	
Customer, commercial and knowledge management	826.10	610.89	-6.7%	160.00	19.4%	3
ICT architecture	358.13	240.83	-19.5%	0.00	0.0%	
ICT field resource	1,514.48	644.15	-30.6%	0.00	0.0%	
CONTRACTORS	**8,710.71**	**6,651.87**	**-11.8%**	**153.15**	**1.8%**	
LV network monitoring installation	718.00	448.46	-26.0%	0.00	0.0%	
HV network monitoring equipment	65.00	0.00	-	0.00	0.0%	
Battery storage installation	458.00	70.55	-86.3%	0.00	0.0%	
Communications	100.00	67.79	-32.2%	0.00	0.0%	
Smart analytics	1,926.80	1,091.78	-4.5%	0.00	0.0%	

[2] Expenditure is compared with a dynamic assessment of project phasing which reflects the nature of specific contract payments and physical delivery milestones. A comparison of expenditure with phased budget will often indicate a payment lag due to the nature of invoicing processes.

Integration of monitoring, modelling and management	3,844.07	4,015.42	0.0%	171.35	4.5%	2
Automatic demand response	333.88	252.55	-20.0%	-18.20	-5.5%	1
Learning dissemination, website and low carbon community centre	203.00	154.10	-5.2%	0.00	0.0%	
Integration activities to support DNO business as usual	785.70	303.44	-27.3%	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	62.41	-14.1%	0.00	0.0%	
ICT field resource	73.50	74.11	0.0%	0.00	0.0%	
EQUIPMENT	**4,526.44**	**3,263.75**	**-12.3%**	**-219.92**	**-4.9%**	
LV network monitoring equipment	1,318.92	1,334.41	0.0%	114.05	8.6%	2
HV network monitoring equipment	111.20	0.00	-	0.00	0.0%	
Communications	417.00	147.73	-27.6%	-55.00	-13.2%	
Battery storage equipment	1,100.00	649.84	-31.8%	0.00	0.0%	
Integration of monitoring, modelling and management	435.75	234.99	0.0%	-200.76	-46.1%	2
Automatic demand response	755.87	562.12	-13.0%	-53.21	-7.0%	1
Thermal storage	80.00	49.34	-22.6%	0.00	0.0%	
Real-time systems and information technology equipment	307.70	285.31	0.1%	-25.00	-8.1%	
TRAVEL & EXPENSES	**335.22**	**48.11**	**2.0%**	**-222.22**	**-66.3%**	
Integration of monitoring, modelling and management	222.22	0.00	-	-222.22	-100.0%	2
General	113.00	48.11	2.0%	0.00	0.0%	
PAYMENTS TO USERS	**591.00**	**0.05**	**-74.2%**	**0.00**	**0.0%**	
Payments to Users	591.00	50.31	-74.2%	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**	**431.32**	**-26.6%**	**-160.00**	**-16.2%**	
Land	160.00	0.00	-	0.00	0.0%	
Learning dissemination, website and low carbon community centre	272.60	187.44	-29.9%	0.00	0.0%	
Real-time systems and information technology equipment	423.03	193.74	-13.0%	-160.00	-37.8%	3
ICT field resource	132.75	50.14	30.9%	0.00	0.0%	

Notes:

1. Movement of cost allocations within the activity “Automatic Demand Response” to better reflect the nature of project costs/milestone payments. No substantive change in overall in cost of activity.

2. Movement of cost allocations within the activity “Integration of monitoring, modelling and management” to better reflect the nature of project costs/milestone payments. Travel & Expenses not treated as exceptional items within the performance of this activity. No substantive change in overall in cost of activity.

3. Detailed design has identified savings in some licensing costs. Budget reallocated to enhance customer experience through full-time staffing at high street outlet. No substantive change in combined cost of activities.

4. Extensive and successful LV monitoring and access to industry half-hourly data flows mean that HV monitoring is not required to fill gaps.

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:

Description	**Totals** (project inception to end of May 2015)
Electricity North West Limited	£870,000.00
Northern Electric Distribution Limited	£1,190,000.00
Yorkshire Electricity Distribution Plc	£1,710,000.00
Scottish Hydro Electric Power Distribution Plc	£560,000.03
Southern Electric Power Distribution	£5,700,000.00
Southern Electric Power Distribution (10% contribution)	£2,701,002.00
SP Distribution Limited	£1,150,000.00
SP Manweb Plc	£1,130,000.00
Eastern Power Networks Plc	£1,980,000.00
London Power Networks Plc	£1,710,000.00
South Eastern Power Networks Plc	£1,690,000.00
Western Power Distribution (Midlands East) Plc	£0.00
Western Power Distribution (Midlands West) Plc	£0.00
Western Power Distribution (South Wales) Plc	£0.00
Western Power Distribution (South West) Plc	£4,370,000.00
Interest Received	£83,426.43
Payments out of account	-£16,674,163.24
Balance	**£7,637,793.30**

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 December 2014 to June 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 Distribution, who sits on the Board of SEPD.

This report has been corroborated with the monthly minutes of the Project Steering Group[3] 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:	Gordon Hewitt	Project Manager
Reviewed by:	Nigel Bessant	Project Delivery Manager
Approved by:	Stuart Hogarth	Director of Distribution

[3] 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 01/12/2014 to 31/05/2015

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				**7,637,793.30Cr**
21/05/2015	SOUTHERN ELECTRI NTVV COSTS	EBP	591,453.94		7,637,793.30Cr
31/03/2015	31MAR GRS 90252721	INT		5,864.09	8,229,247.24Cr
26/03/2015	SOUTHERN ELECTRI NTVV COSTS	EBP	615,285.06		8,223,383.15Cr
04/03/2015	SOUTHERN ELECTRI NTVV COSTS	EBP	1,011,948.02		8,838,668.21Cr
31/12/2014	31DEC GRS 90252721	INT		6,298.91	9,850,616.23Cr
	OPENING BALANCE				**9,844,317.32Cr**
Totals			**2,218,687.02**	**12,163.00**	