



CHARGE



Network Innovation Competition

Project Progress Report
January 2023

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CONTENTS

- DOCUMENT ISSUE CONTROL2
- VERSION HISTORY2
- FINAL APPROVAL2
- CONTENTS3
- TABLES 4
- 1. EXECUTIVE SUMMARY5**
 - 1.1. SUMMARY 5
 - 1.2. PROJECT BACKGROUND 5
 - 1.3. PROJECT PROGRESS HIGHLIGHTS 6
 - 1.3.1. Method 1 – Strategic Transport and Network Planning..... 6
 - 1.3.2. Method 2 – Tactical solutions to support EV connections..... 7
 - 1.3.3. Method 3 – The development of the ‘ConnectMore’ software tool 7
 - 1.4. BUSINESS CASE 8
 - 1.5. LEARNING OUTCOMES 8
 - 1.6. KEY RISKS 8
- 2. PROJECT MANAGER’S REPORT9**
 - 2.1. PROJECT MANAGEMENT 9
 - 2.2. PROJECT GOVERNANCE 9
 - 2.3. PROJECT DELIVERY TEAM UPDATE 10
 - 2.4. PROJECT FINANCE REPORTING 10
 - 2.5. STAKEHOLDER ENGAGEMENT 10
 - 2.6. EV DRIVER ATTITUDES TO SMART CHARGING CONNECTIONS 10
 - 2.7. METHOD 1 – STRATEGIC TRANSPORT AND NETWORK PLANNING 10
 - 2.8. METHOD 2 – TACTICAL SOLUTIONS TO SUPPORT EV CONNECTIONS 11
 - 2.9. METHOD 3 – THE DEVELOPMENT OF THE ‘CONNECTMORE’ SOFTWARE TOOL 12
 - 2.9.1. Improved user interface 12
 - 2.9.1. Incorporating HV data 13
 - 2.9.2. Finalising the costing logic and website deployment..... 13
 - 2.9.3. Automating the LV data import process 13
-
-
-
-
- 7. SDRC 18**
- 8. LEARNING OUTCOMES 19**
- 9. INTELLECTUAL PROPERTY RIGHTS (IPR)..... 21**
- 10. RISK MANAGEMENT 22**
- 11. DATA ACCESS DETAILS 24**
- 12. ACCURACY ASSURANCE STATEMENT 24**



TABLES

Table 1: Project Progress against plan 15

Table 2: Project Progress against budget..... 16

Table 3 SDRC progress summary 18

Table 4 Stakeholder engagement events attended by the Charge project 19

Table 5 Learning dissemination undertaken by the Charge project team 20

Table 6: Project Risk 23





1. Executive Summary

1.1. Summary

As the Charge project nears conclusion, 2022 has seen the finalisation of many project outputs:

- The delivery of the ConnectMore Cost Estimator and subsequent release of further functionality. This tool now provides stakeholders with cost estimates for connections to the LV and HV networks. It also incorporated the Method 2 learning about Smart Charging Connections for the benefit of SP Energy Networks connection engineers.
- The refinement of the ConnectMore Heatmaps, including improvements to the user interface, and addition of en-route, HV and Planned Reinforcement functionality.
- Smart Charging Solutions Business Cases through findings from the Virtual Trials, Desktop Studies and associated Cost Benefit Assessments.
- Recommendations for establishing appropriate procedures, policies and standards for business-as-usual deployment of Smart Charging Connection.
- Requirements and methodology for delivering customer curtailment assessment studies, both DNO-led and facilitating customer in-house study (in case of Customer-Led Smart Charging Connections).
- The project team continued to participate in project dissemination, and stakeholder engagement. This has been particularly important over the last twelve months as more project findings were finalised. The end of the COVID pandemic has provided more opportunity for face-to-face activities; however, online events have remained popular, so project dissemination has maintained a 'hybrid' nature.

The Charge project has produced three important reports on Smart Charging Connections, led by project partner Smarter Grid Solutions. The reports detail different types of Smart Charging Connection, their use cases, parameters, and network suitability. This work has been incorporated into the ConnectMore Cost Estimator tool, providing SP Energy Networks Connection Engineers with the information that they may need to recommend these connection types to relevant connection customers in the future.

The full functionality of the ConnectMore Heatmaps and Cost Estimator were made available to SP Energy Networks stakeholders in December 2022. This included EV chargepoint demand scenarios for workplace, residential, destination and en-route data, LV and HV network maps and planned reinforcement data as well as functionality to receive instantaneous connection cost estimates and to express an interest in future network capacity.

1.2. Project Background

The Charge project is funded through Ofgem's Network Innovation Competition (NIC). The project commenced in January 2019. The aim of the project was to provide data in an easy-to-use manner that helps stakeholders identify appropriate locations for EV chargepoints, accelerating deployment at the lowest possible cost to GB electricity customers. The approach pioneered by the project maximises the use of existing network assets by identifying where capacity exists, but also developed innovative approaches to connecting and managing the additional load introduced onto the network for EV charging.

This report details the progress of the Charge project, focusing on the final 12-month period of the project from January 2022 until December 2022 when the project concludes.



1.3. Project Progress Highlights

The success of Charge is reliant on the coordination and cooperation of the project's principal partners and SP Energy Networks to deliver the outputs of three 'Methods':

Method 1 – Strategic Transport and Network Planning

Method 2 – Tactical solutions to support EV connections

Method 3 – The development of the 'ConnectMore' software tool

The Charge project concludes in December 2022. The past year has seen considerable work undertaken under Methods 2 and 3. This is somewhat different from the initial project plan and has resulted in the 2022 being especially busy for the project team. The following major output were delivered during the last 12 months:

- ConnectMore Cost Estimator for LV and HV quotes, including facility to express interest in planned reinforcement and flexible connections assessment data for SP Energy Networks connections engineers.
- ConnectMore Heatmap layers displaying HV network, planned reinforcement and en-route charging demand data
- Smart Charging Solutions Business Cases through findings from the Virtual Trials, Desktop Studies and associated Cost Benefit Assessments.
- Recommendations for establishing appropriate procedures, policies, and standards for business-as-usual deployment of Smart Charging Connection.
- Requirements and methodology for delivering customer curtailment assessment studies, both DNO-led and facilitating customer in-house study (in case of Customer-Led Smart Charging Connections).

This final year has also seen considerable emphasis on disseminating project outcomes. The project team have attended international, national, and local events to demonstrate, discuss and present learning, as well as taking part in well attended virtual events. They have also continued to seek stakeholder feedback.

Project outputs are now being adopted into Business-as-Usual procedures, the most notable evidence of this being the decision to deploy the ConnectMore tools across SP Energy Network's SPD licence area.

1.3.1. Method 1 – Strategic Transport and Network Planning

PTV Group, who are responsible for delivering Method 1, develop state-of-the-art transport modelling software to help represent the movement of people and goods, evaluate transport systems, and inform policy and investment decisions. For the Charge project, PTV is providing specialist domain knowledge about the transport sector, undertaking research into the future use and impact of EVs, and has developed a series of models to help understand future energy demand and charging requirements.

With the technical modelling work completed during 2021, the focus in 2022 was on helping to disseminate results and broaden understanding and use of the transport layer within ConnectMore. So that the transport demand data can be understood and the method repeated by other DNOs, the Transport Model Final Report was published in early 2022 on the SP Energy Networks [website](#). This report summarises all of the work carried out in Method 1, including the construction of future EV uptake scenarios, the building of the transport model, and the modelling of EVs so that future



charging and electricity demand can be estimated. The report also provides a blueprint for other DNOs such that similar work can be rolled out nationally.

1.3.2. Method 2 – Tactical solutions to support EV connections

Smarter Grid Solutions (SGS) is responsible for Method 2 which designs and demonstrates Smart Charging Connection (SCC) solutions that enhance the flexibility of EV charging and support the improved hosting of charging infrastructure without expensive reinforcement. The final report for Method 2 was issued in December 2022 and highlights some of the key learning points that have been derived as part of the studies across the following areas:

- A detailed analysis of historical public EV charging data.
- The methodology and key learning from the desktop assessment of smart charging infrastructure.
- A summary of learning from the Virtual Trial operation.
- Outputs from the value cases of different SCCs when applied to different network cases.
- Key recommendations for DNO and wider policy changes to enable SCCs to be adopted as BAU.
- The summary outputs from the integration of SCCs to the ConnectMore mapping tool.

Charge has consulted with stakeholders across the distribution networks and EV domain, using learning from this process to refine the SCC offerings and established two forms of SCC:

- **Customer-Led SCCs:** where the customer is responsible for managing EV CP consumption against pre-agreed, fixed import limitations.
- **DNO-Led SCCs:** where the customer must manage EV CP consumption against a varying import threshold that reflects prevailing network conditions.

The Virtual Trial and Desktop Assessments consist of simulation of SCC solutions, investigating the value of SCCs to charge point developers, while exploring the levels of constraint that will be experienced in practice. The Virtual Trials simulate the configuration and real-time operation of the Distributed Energy Resource Management System platform that delivers the SCC control functionality for the DNO. The Desktop Assessments provide a planning-timescale study of grid congestion and resultant constraint across a wide range of network cases and study scenarios. These studies allow the evaluation of the capacity release achievable through SCC's and ultimately their value case for use on the distribution network.

1.3.3. Method 3 – The development of the 'ConnectMore' software tool

The ConnectMore software tool, developed by EA Technology combines the outputs from Methods 1 and 2, with a detailed model of the electricity distribution network, to provide customers with a self-service solution to locate suitable locations and receive budgetary estimates for new EV charging connections.

Combining visual identification of likely EV charging requirements with an easy to interpret display of available capacity on the distribution network, customers can determine the optimum location for new connections. Budgetary estimates are provided, based on the connection requirements, available network capacity and necessary cable routing. Where the network capacity is currently insufficient, the ConnectMore tool will include for all necessary network reinforcement works as part of the estimated cost, whilst also offering alternatives to reduce the connect cost. If flexible



connections are viable for the network location and required connection capacity, these will be offered as part of the connection estimate, providing details on the level of customer flexibility that would be required, and the potential cost savings that can be achieved.

The ConnectMore tool includes network data for both the LV and HV networks, and also provides details on the forecast plans for network reinforcements across the network licence area. This layer will provide details on the location, capacity increase and planned deployment date for the reinforcement works. Customers are also able to record an unofficial 'interest in capacity' at specific locations on network, enabling the planned reinforcement works to be updated if deemed necessary.

The project team have continued engagement activities throughout 2022, supporting SP Energy Networks in quarterly webinars, joint webinars with UKPN's Optimise Prime Project, and bespoke one-to-one sessions with interested parties.

Outside of the Charge Project, the ConnectMore tool is now being deployed to SP Energy Network's SPD Licence area and will be available for use in Spring 2023.

1.4. Business Case

At the time of writing, the business case is being reviewed as part of project evaluation activities. This re-examination will be included in the Project Close Down report, due for submission to Ofgem in March 2023. This review will include re-calculations based on changes to the wider landscape, including regulatory and political, that have become clearer towards the conclusion of 2022.

1.5. Learning Outcomes

Learning points are reviewed by the Charge project team at regular meetings to establish what has been learned from the activities undertaken and how these should be disseminated. These are detailed in Section 8 of this report.

1.6. Key Risks

As the project moves into Business-as-Usual deployment, a small number of commercial risks to further deployment of the solutions developed as part of the Charge project remain. These include:

- Customer acceptance of Smart Charging Solutions
- Ongoing validity of the transport model
- Regulatory uncertainty around connection access and
- Supplier lock-in for the ConnectMore software

Section 10 of the report provides a brief overview of the control measures in place for each of the above.



2. Project Manager's Report

Over the last twelve months the project has achieved:

- Smart Charging Solutions Business Cases through findings from the Virtual Trials, Desktop Studies, and associated Cost Benefit Assessments.
- Recommendations for establishing appropriate procedures, policies, and standards for business-as-usual deployment of SCC.
- Requirements and methodology for delivering customer curtailment assessment studies, both DNO-led and facilitating customer in-house study (in case of Customer-Led SCC's).
- Release of the ConnectMore Cost Estimator Tool and further enhancement of functionality
- Enhancement of ConnectMore Heatmaps including en-route data, HV data and planned reinforcement layers
- Dissemination, including attendance at international, national, and local events, and webinars

The COVID pandemic and lack of industry and technology readiness among chargepoint operators led to the re-organisation of Method 2 deliverables when it became apparent that meaningful technology trials as part of Method 2 were no longer viable. To compensate for this change, SGS have instead carried out exhaustive desktop and network studies. 2022 has seen the delivery of three reports from SGS as part of this amended work package.

The incorporation of HV data into the version of ConnectMore available to stakeholders was delayed until December 2022 because of issue providing EA Technology with a valid HV data set.

2.1. Project Management

The progress made during the final full year of the project has been in line with the amended project plan developed at the end of 2021. Charge will successful delivery the outputs set out in this plan. The resultant modification of work packages because of the changed project plan has meant that there has been a higher level of activities across Methods 2 and 3 than originally anticipated.

2.2. Project Governance

Charge has continued to utilise the Project Governance measures put in place during the first year of the project. At the heart of this is a dedicated 'Microsoft Teams' channel and file structure established for the project.

The project delivery team has continued to meet fortnightly to provide updates on each partner's progress, actions required from others, highlight key risks and to coordinate upcoming stakeholder engagement / dissemination activities. These meetings are supplemented by weekly calls, where delivery timetables require this, between SP Energy Networks and each of the individual partners as well as dedicated meetings to collectively work on aspects of the project.

Central to ensuring Charge remains to deliver its outputs are our regular Project Board Meetings as well as keeping the Ofgem Project Officer abreast of key developments / changes. The Project Boards constitute of Directors from each partner as well as their respective Project Leads and provide the chance to consolidate the projects overall progress against the original project plan and seek approval for any minor change requests. In a similar vein, Charge has informed the Ofgem Project Officer of the timetable to bring the project to a successful project closure and the appointment of a 3rd party to verify the condition for satisfactory conclusion the project in March 2023



2.3. Project Delivery Team Update

The following additions to the SP Energy Networks project management team have been made :

- John Orr joined the team as Project Manager.
- Tracy Pear is providing expert support across all SP Energy Networks project functions on a contractual basis.

2.4. Project Finance Reporting

There are no major changes. The project spend tracker is kept up to date to provide a live view of expenditure and committed spend. It is used to populate the NIC Project Table (CV37) in the annual Regulatory Reporting Pack.

2.5. Stakeholder Engagement

It has been important to the project team, from the start of the Charge project, to gather feedback to direct the development and direction of the ConnectMore tool. This has been achieved over the last year by utilising a number of different methods:

- Demonstrations and discussions at SP Energy Networks stakeholder engagement events
- One-to-one demonstrations
- Questionnaire for trusted stakeholders
- LinkedIn survey
- Feedback and smiley face function for more detailed feedback in ConnectMore

Stakeholder feedback is detailed in 'User feedback on the ConnectMore interactive tools.

2.6. EV driver attitudes to Smart Charging Connections

The decision not to hold physical trials of Smart Charging Connection schemes as part of the Charge prevented the Project obtaining feedback from EV drivers charging their vehicles at sites participating in the project. To compensate, the Project conducted a survey of EV driver attitudes towards smart charging . The results were published in November 2022.

2.7. Method 1 – Strategic Transport and Network Planning

The focus in 2022 was on helping to disseminate results and broaden understanding and use of the transport layer within ConnectMore. Images from the transport layer, embedded within ConnectMore can be seen in Figure 1 below.

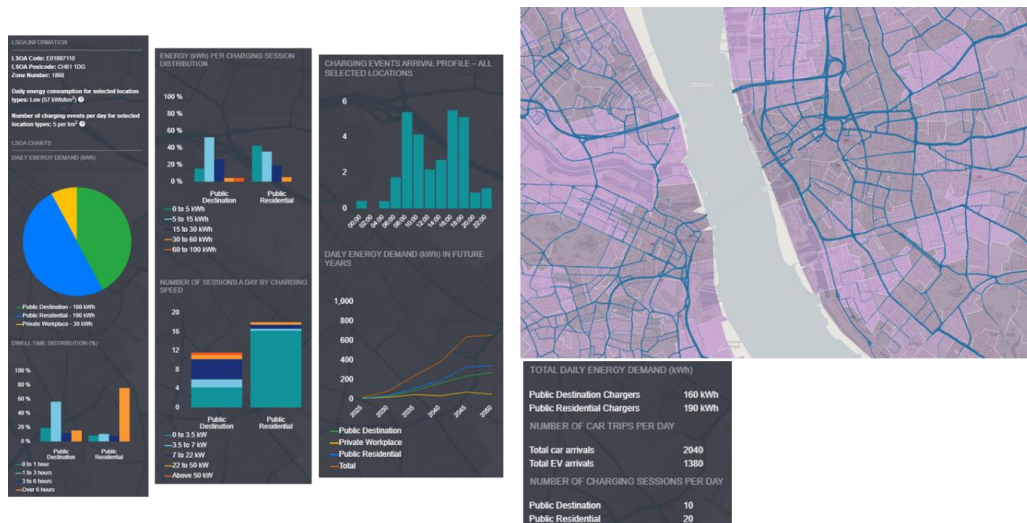


Figure 1 - Results from the Method 1 transport layer displayed in ConnectMore

So that the transport demand data can be understood and the method repeated by other DNOs, the Transport Model Final Report was published in early 2022 on the SP Energy Networks [website](#). This report summarises all of the work carried out in Method 1, including the construction of future EV uptake scenarios, the building of the transport model, and the modelling of EVs so that future charging and electricity demand can be estimated. The report also provides a blueprint for other DNOs such that similar work can be rolled out nationally.

The transport model was presented at several conferences and workshops (see Section 8). Methods and outputs from Method 1 were also shared and delivered at the Electric Vehicle Symposium (EVS35) in Oslo, Norway in June 2022, the leading international event for electric vehicles. A technical paper was presented at the event titled: *An Integrated Approach for the Planning of Public Charging Infrastructure*.

2.8. Method 2 – Tactical solutions to support EV connections

Through 2022 the Charge project team focused on the delivery of the virtual trials and desktop assessments. This has been achieved through presenting learning from:

- Practical experience of Distributed Energy Resource Management System (DERMS) platform configuration, commissioning, and operation through the Virtual Trial tests.
- Smart Charging Solutions Business Cases through findings from the Virtual Trials, Desktop Studies, and associated Cost Benefit Assessments(CBA).
- Recommendations for establishing appropriate procedures, policies, and standards for business-as-usual deployment of Smart Charging Connection (SCC).
- Requirements and methodology for delivering customer curtailment assessment studies, both DNO-led and facilitating customer in-house study (in case of Customer-Led SCC's).
- The integration of Method 2 learning to the ConnectMore tool.

The studies for both Virtual Trials and Desktop Assessments cover a variety of network cases reflecting connection of different forms of EV charging infrastructure: en-route, destination, and on-street residential charging. For each network case, scenarios of varying chargepoint installation, utilisation, and EV uptake are explored. The scenarios analysed are either connection applications received by SP Energy Networks, or sites and schemes of high interest as disclosed to the project team by stakeholders. These varied application cases allow comparison of constraint levels across



all study conditions and observation of the key characteristics associated with *high* or *low-constraint* applications of SCC's. This helps identification of typical SCC application cases where the operational management of site consumption under periods of constraint is a preferred option to the conventional reinforcement of the network.

Simulations were conducted to investigate the relationship between network capacity and chargepoint management capability to simulate SCC. Desktop assessments were undertaken to simulate SCC solutions across a range of scenarios and operating conditions, identifying chargepoint constraint throughout the year.

The completed outputs for Method 2 are:

- A document presenting the generated learning from:
 - The findings from the detailed study of historical datasets from public EV chargepoint infrastructure including a summary of data sources and methodology applied.
 - Illustration of the methodology and key learning from the Desktop Assessment of chargepoint infrastructure utilisation across 2025 and 2030.
 - Presentation of the design and test cases demonstrated through the Virtual Trials. A presentation of learning from the design, configuration, and commissioning of the SCC solution in the Virtual Trial laboratory environment focusing on Winter 2030.
 - Learning from the Virtual Trial operation including a summary of curtailment levels observed over study scenarios and a CBA of different SCC's.
 - The curtailment assessment best-practice methodology.
 - Recommendations for integrating SCCs into existing DNO connection processes and industry-wide standards to accommodate and reflect SCC's.
 - Summary outputs from the Enabling Smart Charging Connection Report which contains recommendations for DNO and wider sector policies and a summarised CBA for SCC's compared to traditional reinforcements.
 - A summary of findings from Method 2 is input to the ConnectMore tool including; the role of SCC's in ConnectMore, the nature of data metrics to be used in ConnectMore and a summary of specific findings to be used in ConnectMore.
- Algorithmic outputs for the integration of SCC's to ConnectMore.

2.9. Method 3 – The development of the 'ConnectMore' software tool

Development of the 'ConnectMore' tool progressed well through 2022, with the disparate project partner outputs being combined by year end to enable the final planned functionality.

This year, project delivery focus has been on:

- Updating the user interface to improve usability;
- Finalising the costing logic;
- Deploying the ConnectMore Tool to SP Energy Networks' website;
- Automating the process to import LV data into the ConnectMore Tool; and
- Incorporating HV data into the ConnectMore Tool.

2.9.1. Improved user interface

We have improved the User Interface for the EV Charging Demand layers within the tool. Data is now displayed in a more intuitive manner based on user feedback. The EV Charging Demand layer now uses two colour palettes, purple for the LSOA forecast energy requirements, and blue for the enroute data. Higher forecast energy requirements utilise a darker colour shade, enabling users, at



a glance, to identify areas likely to benefit from EV charging points in the selected year as shown in Figure 1

All data layers, (LSOA, enroute, and distribution network data), can be displayed simultaneously, enabling users to readily identify areas of interest.

2.9.1. Incorporating HV data

HV data has now been incorporated into the ConnectMore tool and is displayed in the same manner as the LV network. Similarly, HV data is now incorporated into the cost estimator for customers to generate self-serve budgetary estimates.

2.9.2. Finalising the costing logic and website deployment

The costing logic was completed, and is now implemented on the ConnectMore website, enabling customers to ‘self-serve’ and generate their own budgetary estimates for a connection cost.

This enables customers to confirm their desired location for connection prior to seeking a firm quotation from SPEN, reducing the number of quotations SPEN must provide, and accelerating the time to deployment for the customer.

The ConnectMore Tool also calculates the potential for flexible connections and includes this information in the data passed to SPEN regarding the individual budgetary estimate.

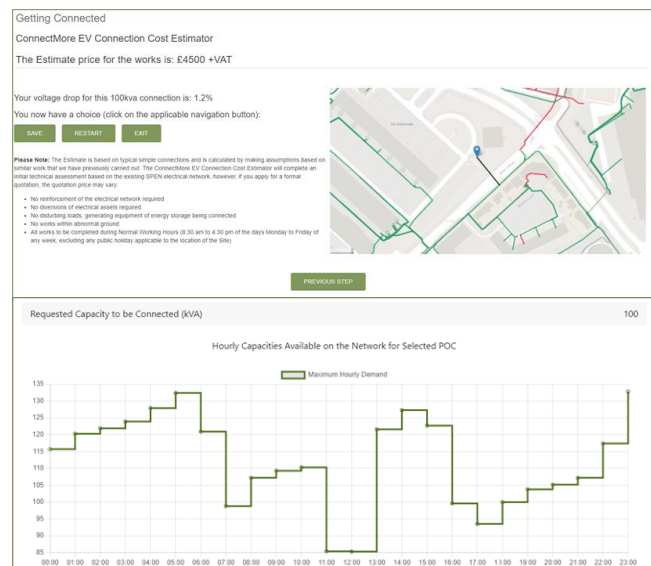


Figure 2: Budgetary estimate and flexible connections provided by ConnectMore

2.9.3. Automating the LV data import process

We have significantly automated the process by which LV network data is imported to the ConnectMore Tool, greatly reducing the effort required to verify, process, and validate the data provided by SPEN, before updating the database behind the tool.

2.10. Knowledge Dissemination

Knowledge dissemination has been central throughout 2022 as the project has drawn to a close and had more learning to share. The project team has also attended conferences and exhibitions to disseminate learning from the project, as well as organised several webinars. A list of conferences, webinars, exhibitions, and workshops where the project team presented can be found in Table 3 (Section 8). Newsletters, leaflets, videos, press releases and other material have been used to increase awareness of project outputs.

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3. Business Case Update

At the time of writing, the project business case is in the process of being reviewed as part of project close down evaluation activities. This re-examination will be included in the Project Close Down report, due for submission to Ofgem in March 2023. This review will include re-calculations based on changes to the wider landscape, including regulatory and political, that have become clearer more recently.



4. Progress Against Plan

Table 1: Project Progress against plan

Met	Par	Milest No	Milestone	Original Due Date (End of Quarter)	Reforecast Due Date (End of Quarter)	Actual Deliv Date	Ma	Jun	Sep	Dec	Ma	Jun	Sep	Dec
3	EATL	1	Signing Contract	Mar-19	Jun-19	Jun-19								
2	SGS	1	Collaboration Agreement	Mar-19	Jun-19	Jun-19								
3	EATL	2	Stakeholder Strategy / Steering Group Management / Communications Plan incl. web, publications etc.	Jun-19	Dec-19	Dec-19								
1	PTV	2.1	Model Specification and Data Requirement Report	Jun-19	Sep-19	Sep-19								
2	SGS	2.1	Report Defining Methodology	Jun-19	Jul-19	Jul-19								
3	EATL	2.1	Stakeholder / Communications / Annual report: Year 1	Dec-19	Dec-19	Dec-19								
1	PTV	2.2	Workshop 1 Report	Sep-19	Oct-19	Nov-19								
2	SGS	2.2	Report baseline analysis completed	Jun-19	Jul-19	Jul-19								
3	EATL	2.2	Stakeholder / Communications / Annual report: Year 2	Dec-20		Dec-20								
1	PTV	2.3	Workshop 2 Report	Sep-19	Nov-19	Nov-19								
2	SGS	2.3	CBA methodology	Jun-19	Jul-19	Jul-19								
3	EATL	2.3	Stakeholder / Communications / Annual report: Year 3	Dec-21		Dec-21								
2	SGS	2.4	Smart solutions analysis and Q2 report	Jun-19	Oct-19	Oct-19								
3	EATL	2.4	Stakeholder / Communications / Annual report: Year 4	Dec-22		Dec-22								
3	EATL	3	Method 1: Model Specification	Sep-19	Dec-19	Apr-20								
1	PTV	3.1	Scenario Planning Framework Report	Sep-19	Nov-19	Nov-19								
2	SGS	3.1	CBA report	Sep-19	Oct-19	Oct-19								
3	EATL	3.1	Network / Transport Plan integration specification	Sep-20	Sep-20	Sep-20								
2	SGS	3.2	Trial locations defined	Sep-19	Dec-19	Dec-19								
1	PTV	3.2	EV Data Collection Report	Jun-20	Jun-20	Jun-20								
2	SGS	3.3	SDRC 3	Sep-19	Oct-19	Oct-19								
1	PTV	3.3	Model Data Collection Report	Jun-20	Jun-20	Jun-20								
3	EATL	4	Method 2: Network Modelling for integration into Connectmore	Sep-20	Jun-22	Jun-22								
1	PTV	4.1	Transport Model Build Report	Dec-19	Dec-19	Dec-19								
2	SGS	4.1	Phase 2: Interface Specification	Dec-19	Mar-20	Mar-20								
1	PTV	4.2	Transport Model Calibration and Validation Report	Dec-19	Jan-20	Jan-20								
2	SGS	4.2	Equipment (strate + licence + element devices	Dec-19	Jan-20	Jan-20								
1	PTV	4.3	SDRC 1: Transport & Network Model Interim report	Dec-19	Jan-20	Jan-20								
2	SGS	4.3	Q4 Report	Dec-19	Dec-19	19-Dec								
1	PTV	5	ConnectMore Integration Plan	Sep-20	Sep-20	Sep-20								
2	SGS	5	Phase 2: Deployment and Commissioning Plan	Mar-20	Jul-20	Jul-20								
3	EATL	5	Method 3: User requirements & Model specification	Jun-20	Jul-20	Jul-20								
3	EATL	5.1	Data extraction and processing - Data Plan	Jun-20	Jul-20	Jul-20								
2	SGS	6	Phase 2: FAT / SATS	Jun-20	Jul-20	Jul-20								
3	EATL	6	Network capacity assessment LV	Sep-20		Sep-20								
1	PTV	6.1	SDRC 2: Transport and Network Model Final Report (DRAFT)	Dec-20	Feb-22	Feb-22								
3	EATL	6.1	Network capacity assessment HV	Dec-20	Mar-21	Dec-20								
1	PTV	6.2	SDRC 2: Transport and Network Model Final Report	Dec-20	Feb-22	Feb-22								
3	EATL	6.2	Transport interface development	Mar-21	Dec-20	Dec-20								
1	PTV	7	Transport Interface Implementation Report	Mar-21	Mar-21	Mar-21								
2	SGS	7	Phase 3: Interface & Functional design spec	Dec-20	Dec-20	Dec-20								
3	EATL	7	Connect More beta version1	Sep-21	Sep-21	Sep-21								
3	EATL	7.1	Findings and user feedback	Dec-21	Dec-21	Dec-21								
1	PTV	8	Transport in ConnectMore Solution Testing Report	Dec-21	Dec-21	Dec-21								
2	SGS	8	SDRC 4 - pilot trial interim report	Dec-20	Dec-20	Dec-20								
3	EATL	8	Connectmore online tool - limited availability	Dec-21	Mar-22	Mar-22								
3	EATL	8.1	Finding and user feedback	Mar-22		Mar-22								
3	EATL	9	SDRC 5: ConnectMore Online Tool	Jun-22	Apr-23	Apr-23								
1	PTV	9.1	Annual Report and Dissemination 2019	Dec-19	Dec-19	Nov-19								
2	SGS	9.1	Equipment (additional element devices)	Mar-21	Mar-21	Mar-21								
3	EATL	9.1	Integration into BaU systems - integration with existing systems and	Sep-22	Sep-22	Sep-22								
1	PTV	9.2	Annual Report and Dissemination 2020	Dec-20	Apr-21	Apr-21								
2	SGS	9.2	Phase 3: Deployment and commission plan	Mar-21		Mar-21								
1	PTV	9.3	Annual Report and Dissemination 2021	Dec-21	Apr-22	Apr-22								
1	PTV	9.4	Annual Report and Dissemination 2022	Dec-22	Apr-23	Apr-23								
2	SGS	10	Phase 3: FAT / SAT	Jun-21		Jun-21								
3	EATL	10	Project closedown report / connectmore publications	Dec-22	Apr-23	Apr-23								
2	SGS	11	Q12 report / post trial analysis / standards	Sep-22		Sep-22								
2	SGS	12	SDRC5	Sep-21	Sep-22	Sep-22								
2	SGS	13	SDRC 6	Dec-22	Mar-23	Mar-23								



5. Progress Against Budget

Below is a summary of the projects Actual spend at the end of December 2022 compared to the expected Budget spend at the end of the Regulatory Year (March 2023). The latter taken directly from the original NIC submission. Costs for the NIC funded elements have been tracked through the project bank account and a certified copy of the statement will be submitted to Ofgem in January.

Table 2: Project Progress against budget

Expenditure Category	Project Direction Value	Project Liabilities at December 2022	% Variation
Labour	£1,285,760	£1,035,907	-19.4%
Equipment	£358,850	£145,172	-59.5%
Contractors	£5,121,680	£5,197,845	1.5%
IT	£375,000	£246,513	-34.3%
IPR Costs	-	-	-
Travel & Expenses	£332,160	£187,304	-43.6%
Payments to users	-	-	-
Contingency	-	-	-
Decommissioning	£100,000	£0	-100.0%
Other	£401,230	£94,155	-76.5%
Total	£7,974,680	£6,906,896	-13.4%

The following categories experienced a variation from intended budget in excess of 10%:

- *Labour*. The expenditure on labour by SP Energy Networks was less than anticipated at the bid development stage due to recruitment problems during the early part of the project. The key impact of this was the late delivery of some SDRC reports (notably SDRC 2) due to delays in obtaining document approval.
- *Equipment*. This expenditure covers the cost of the Distributed Energy Resource Management System for the trials undertaken under Method 2. As the in-situ trials were replaced by Virtual Trials and Desktop Assessments, the equipment costs were significantly reduced compared to the those anticipated at the bid development stage.
- *IT*. Expenditure in this category covers data improvements within SP Energy Networks corporate systems and integration of the ConnectMore tool with corporate systems. Work on improving the performance and functionality have been captured as an increase in Contractor spend resulting in an underspend in this category.
- *Travel & Expenses*. COVID restrictions during 2020 and 2021 have resulted in significant underspend on travel expenses. Although additional expenses have been incurred to secure additional server resources to deliver the Virtual Trials (Method 2) and to use virtual cloud and public facing servers for the delivery of the ConnectMore tool (Method 3) as result of office working restrictions during the COVID pandemic, there is a significant underspend this category.
- *Decommissioning*. There were no decommissioning costs due to the replacement of physical trials with Virtual Trials and Desktop Assessments. Hence there is a 100% underspend in this category.



- *Other*. This item includes expenditure on stakeholder engagement. Due to COVID restrictions, many of the stakeholder engagement activities were carried out remotely rather than face to face, thus reducing costs in this category. Some dissemination outputs were undertaken by project partners resulting in an increase in Contractor spend and an underspend in this category.

6. Bank Account

A copy of the bank statement, detailing the transactions of the project bank account since its creation will be submitted to Ofgem in January. The figures in the statement will relate to the NIC funded costs only and not the total project costs. The total value of withdrawals from the NIC bank account will be lower than the NIC element of project costs actually incurred until all transactions have been reconciled. Minor differences in the reconciliation between costs and funding being transferred from the bank account are due to timing of transactions.



7. SDRC

This section describes the work to date associated with the project SDRCs.

Table 3 SDRC progress summary

SDRC	Status	Due Date	Comments
SDRC 1 – Transport and Network Model – Interim report.	Complete	31/12/2019	
SDRC 2 – Transport and Network Model – final report.	Complete	31/12/2020	
SDRC 3 – Identify suitable EV connection solutions for different locations	Complete	30/09/2019	
SDRC 4 Definition, Refinement and Design of EV Smart Charging	Complete	30/04/2022	
SDRC 5 Smart Charging Connection Network Case Studies	Complete	20/09/2022	
SDRC 6 – Smart Charging Connections: Trials Learning & BaU Roll-Out	Complete	31/01/2023	
SDRC 7 – ConnectMore Online Tool - Specification.	Complete	31/07/2022	
SDRC 8 - ConnectMore Online Tool – Prototype delivery.	Complete	30/06/2022	
SDRC 9 – Project Close Down Report	On Track	31/03/2023	
Comply with knowledge transfer requirements of the Governance Document	On Track	31/03/2023	



8. Learning Outcomes

Learning points are reviewed by the Charge project team at regular meetings to establish what was learned from the activities undertaken, and how this should be disseminated. The following learning outcomes, over the last 12-month period of the project, are detailed below.

The principle learning outcomes from the last twelve months are that:

- Chargepoint operators have a low awareness and acceptance of flexible smart connections for EV chargepoints and the technical mechanisms to allow it are at a low readiness level
- Conversely, for some use cases (but not en-route charging), the limited survey that we conducted suggests that EV drivers are willing to accept a slightly longer charge time under certain circumstance if it means that more chargepoints are installed
- The work on Smart Charging Connections undertaken by the project provides a framework for SP Energy Networks and other DNO to offer this, as long-term or temporary proposition (for example to allow a connection before necessary reinforcement can occur), as the market matures
- Stakeholders appreciate how the ConnectMore Heatmap, and Cost Estimator can benefit them and would like to be able to apply it to other connection types, and also the SPD license area. We have listened to this feedback and will be making ConnectMore available for the SPD license area in Spring 2023.

The table below details Stakeholder events that the project has contributed to over the last reporting period. These have been supplemented where necessary by other methods of gathering stakeholder feedback.

Table 4 Stakeholder engagement events attended by the Charge project

Workshop Title	Location	Date	Description
Preparing for Net Zero	Virtual	March 2022	Interactive demonstration of ConnectMore to SP Energy Networks stakeholders.
Preparing for Net Zero	Virtual	June 2022	Interactive demonstration of ConnectMore to SP Energy Networks stakeholders.
Preparing for Net Zero	Virtual	October 2022	Explanation of project work on Smart Charging Connections and demonstration of ConnectMore to SP Energy Networks stakeholders.
Preparing for Net Zero	Virtual	December 2022	Interactive overview all aspects of the Charge project to SP Energy networks stakeholders.



Table 5 Learning dissemination undertaken by the Charge project team

Workshop Title	Host	Date	Description
What mobility patterns tell us about the requirement for public EV charging infrastructure (online webinar)	SP Energy Networks	16 March 2022	PTV Group described the work undertaken as part of Method 1 of the Charge project.
The Energy Innovation Showcase and Awards 2022, Liverpool	Energy Innovation Centre	5 th May 2022	Project partner EA Technology demonstrated ConnectMore at this event.
CIRED Porto Workshop 2022: E-mobility and power distribution systems. Porto	CIRED	2 nd and 3 rd June 2022	Project partner Smarter Grid Solutions represented the project at this event, describing project work on Smart Charging Connections
International Electric Vehicle Symposium 2022, Oslo	EVS	14 th June 2022	Project partner PTV Group presented the paper, "An Integrate Approach for the Planning of Public Charging Infrastructure" describing the work undertaken by the Charge project.
The Green Expo Youth Conference, Chester	CHASE	16 th to 18 th June 2022	SP Energy Networks graduates provided demonstrations of ConnectMore to attendees.
CENEX-LCV 2021, Millbrook	CENEX	7 th and 8 th September 2022	The ConnectMore interactive tool was demonstrated to the public and members of the project team discussed their work on Smart Charging Connections.
Energy X 2022 North, Chester	Energy Network Events	21 st September 2022	SP Energy Networks provided connections customers with an update on the progress with the project including a demonstration of ConnectMore.
Energy Networks Innovation Conference, Glasgow	ENIC	28 th and 29 th September 2022	Charge was represented on the SP Energy Networks stand at this industry event.
Getting Connected: The future of EV Charging Infrastructure (online webinar)	SP Energy Networks and UK Power Networks	9 th November 2022	A joint webinar, organised in conjunction with the UK Power Network Optimise Prime project, to share how both projects have benefited those wanting to install EV chargepoint infrastructure.
Enabling the EV revolution (online webinar)	SP Energy Networks and UK Power Networks	23 rd November 2022	A joint webinar, organised in conjunction with the UK Power Network Optimise Prime project, to share how both projects have benefited enabled the connection of more chargepoints to the distribution network.



9. Intellectual Property Rights (IPR)

The terms relating to the ownership and use of intellectual property developed under NIC funded projects are set out in the Project Direction and these terms are maintained through the Partner Agreements between SP Energy Networks and each of the project partners. No issues in relation to IPRs have been raised in the reporting period, and no future issues are anticipated as all partners are fully aware of the terms of engagement.

Intellectual property developed through previous NIC and NIA funded projects, most notably through the Northern PowerGrid AutoDesign and Western Power Distribution Electric Nation projects, will be incorporated in the development of the ConnectMore tool thereby demonstrating the wider value of this work to GB DNOs.



10. Risk Management

To ensure successful delivery of the expected benefits and learning objectives of the Charge project, we proactively identify risks to the project and provide mitigation plans. The risk register was updated regularly throughout the duration of the project. All identified risks were listed under one of three major risks areas (technical, commercial and financial). The Charge project is now completed leaving a small number of remaining commercial risks pertaining to the project outcomes transition to Business As Usual. These are identified in **Error! Reference source not found.** Table 6 below.

The most pertinent risks to the project at the time of writing have been identified as:

Low acceptance of Smart Charging Connection solutions by chargepoint providers

Discussions with chargepoint operators as part of the Charge project has suggested that at least at the time there was little appetite to adopt Smart Charging Connections. This has been tempered by results of the survey of EV drivers that suggests that they will be more accommodating, in particular circumstances, if SCCs result in more chargepoints being installed quickly.

Regulatory Uncertainty

On-going changes to the regulations concerning connecting to the distribution network may impact ConnectMore or Smart Charging Connections, reducing the benefits available from either.

Future Validity Of Transport Model

The validity of the transport model will be impacted by any radical changes to the transport network or policy dictating EV uptake. This may reduce the value of the model to SP Energy Networks or reduce customer satisfaction with the model.

ConnectMore supplier lock-in

ConnectMore is provided by a single supplier. These risks increased costs outside the control of SP Energy Network and deployment by other DNO. To mitigate an IP agreement has already been put in place and the project team has documented the approach undertaken allowing replication by a third party via an independent tender process



Table 6: Project Risk

Risk No.	Issue	Risk Description	Potential Impact	Control & Contingency Measures	Overall Risk (2-40)
Commercial Project Risks					
3.12	Supplier lock-in	Single provider of ConnectMore software	<ol style="list-style-type: none"> 1. Cost increase outside the control of SP Energy Networks 2. Risk to broader deployment by other DNOs 	<ol style="list-style-type: none"> 1. Agreement of IP upfront (i.e. royalty free licence for GB DNOs) 2. Software approach will be documented allowing other third parties to replicate through an open tendering process 	4
1.04	Validity of Model	The Transport Model will be built on a 2018 Base Year and using EV-Uptake scenarios devised in 2020. Any radical changes to the transport network or EV-Up will impact the validity of the model and its findings	<ol style="list-style-type: none"> 1. Reduced value of model to SP Energy Networks and Customers 2. Poor customer satisfaction if not kept up to date 	Periodic review of: <ol style="list-style-type: none"> 1. the major changes to transport infrastructure / developments 2. EV uptake statistics 3. Revisions to DFES 4. Options to refresh model 	8
3.7	Regulatory uncertainty	Changes are made to the way in which connections are charged that renders the functionality in ConnectMore redundant	Method 3 benefits cannot be realised	<ol style="list-style-type: none"> 1. Amend system functionality based on the outcome of the Ofgem Charging Futures Consultation 2. The costs of the connection will not be affected and therefore the initial development of the ConnectMore EV chargepoint connections cost estimator has focused on calculating the cost of the connection. 	6
3.23	Acceptance of Smart Charging Connection (SCC) solutions	Chargepoint operators and EV drivers are not receptive to SCC solutions	Project outputs do not offer value for money to customers	<ol style="list-style-type: none"> 1. End user survey to obtain feedback on EV driver attitudes towards the acceptability of SCCs 2. Engagement with local government, chargepoint operators and installers, along with wider interested parties to promote the benefits of SCCs in accelerating the deployment of public charging infrastructure 	10



11. Data Access Details

When data becomes available for this project interested parties can request it by following the guidance in the SP Energy Networks Data Sharing policy. The following link to this policy also contains further details about the data sharing process, https://www.spergynetworks.co.uk/pages/data_sharing_policy.aspx.

12. Accuracy Assurance Statement

The Project Manager and Director responsible for the 'NIC – Charge Project' confirm they are satisfied that the processes and steps in place for the preparation of this Project Progress Report are sufficiently robust and that the information provided is accurate and complete.

Steps taken to ensure this are: -

- Regular update reports from each project team member for their area of responsibility.
- Evidence of work undertaken by the project team is verified by the section manager as part of their day-to-day activities. This includes;
 - Checking and agreeing project plans.
 - Holding regular team project meetings and setting/agreeing actions.
 - Conducting frequent one-to-one meeting and setting/agreeing actions.
 - Confirming project actions are completed.
 - Approving and signing off completed project documents.
 - Approving project expenditure.
- Weekly updates are received by each section manager of the progress of the work their department is undertaking.
- Director and Senior Management summary reports for the project progress are produced.

Signature:



John Orr– SP Energy Networks, Project Manager for Charge