

The Charge Project

Refuelling tomorrow's electrified transport

The Charge Project was an initiative from SP Energy Networks to develop new and innovative ways to accelerate the UK's transition to electrified transport and help meet its 2050 net zero targets.

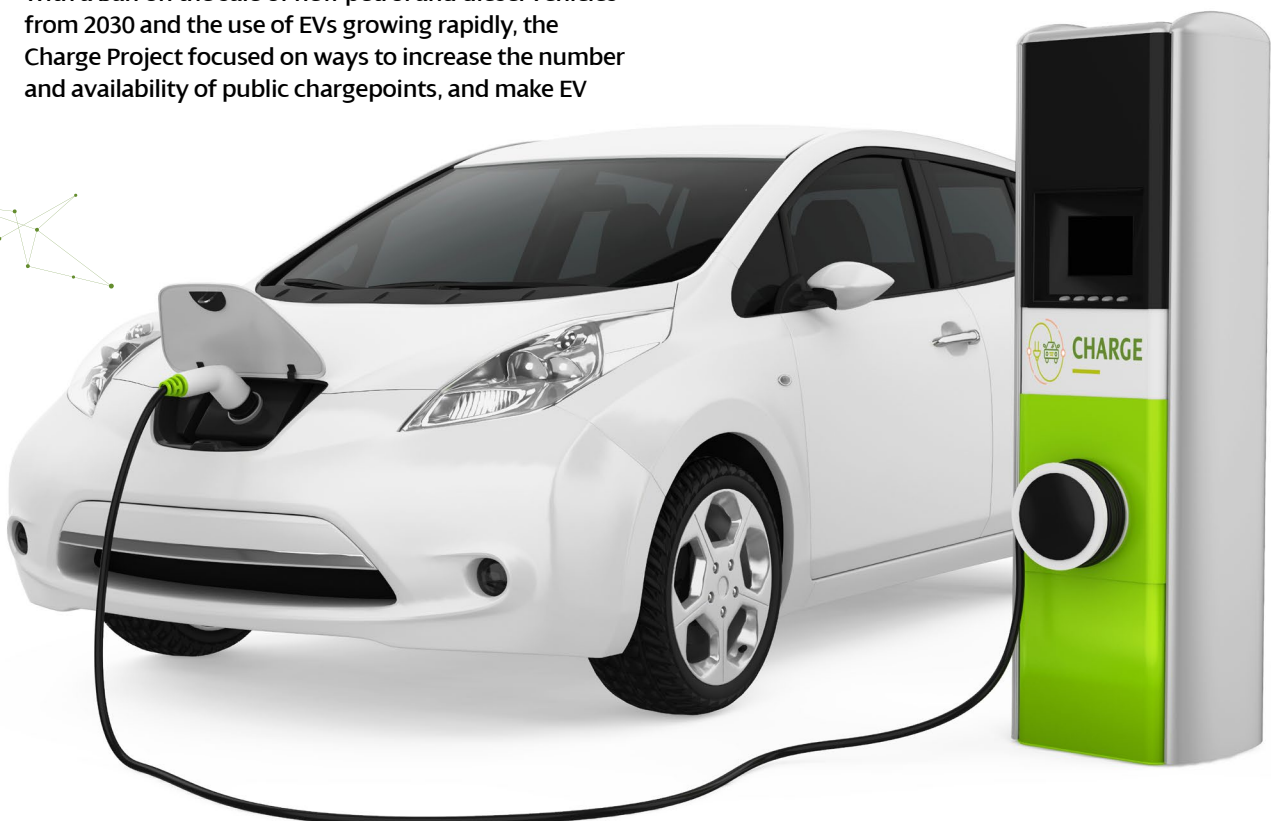
Funded by Ofgem and implemented over four years in partnership with the PTV Group, Smarter Grid Solutions and EA Technology, the Charge Project has been a ground-breaking initiative.

For the first time, transport and electricity network planning data has been combined to deliver unique insight into the future of electric vehicle (EV) charging infrastructure.

With a ban on the sale of new petrol and diesel vehicles from 2030 and the use of EVs growing rapidly, the Charge Project focused on ways to increase the number and availability of public chargepoints, and make EV

ownership a viable option for every driver in the UK, not just those with access to private charging.

Initiated in January 2019 and completed in December 2022, the Charge Project has significantly increased our understanding of the road ahead for public charging infrastructure roll-out. It has developed new tools and methodologies to empower both DNOs and customers – including chargepoint operators, local authorities, site owners and property developers – to quickly and more easily deploy chargepoints where they are needed.





Mapping the future: creating a new type of transport model

The Charge Project's first step was to develop robust, reliable data about where and when EV drivers are likely to need to charge their vehicles in the coming years.

The PTV Group combined traffic data with predicted EV ownership to create a comprehensive transport model covering Merseyside, Cheshire, North Shropshire, and North & Mid Wales.

The first of its kind in the UK, the Charge Project transport model is based on a digital representation of traffic patterns showing where and how far EVs are

driven, as well as where they are parked. It uses this data to predict where charging demand will increase over 2025 to 2050, based on a series of road usage and traffic scenarios. By analysing the likely effect of different factors over time, the transport model can produce forecasts detailing where public charging demand will occur, the type of charge required, and the electricity needed to meet this demand.

The transport model's creation involved a series of stakeholder workshops that brought together a range of people from across the energy and transport sectors to explore the drivers and key variables for modelling EVs and their energy demands.

Given the complexity of the variables involved, PTV had to develop new methods, scripts and software tools to model both vehicle journeys and associated charging demand. This included simulating many more trips than are usually necessary to understand how EV energy is likely to deplete over the course of multiple journeys, and what this means for charging requirements.

Laurence Chittock, Project Lead, PTV Group:



"The transport model has given us unprecedented insight into how and where the UK's public charging infrastructure needs to expand to accommodate the needs of EV drivers in the future."





Smart Charging Connections: Maximising the electricity network

The Charge Project also investigated new ways to connect public chargepoints to the distribution network and make the most efficient use of existing network capacity.

To overcome the issue of expensive, time-consuming reinforcement-led connections holding back chargepoint installation, the Charge Project undertook extensive research into the deployment of "flexible connections". By utilising the intelligence of modern chargepoints to ensure their demand never exceeds the available capacity of the electricity network, flexible connections minimise the need for reinforcement, and usually result in a cheaper and quicker connection.

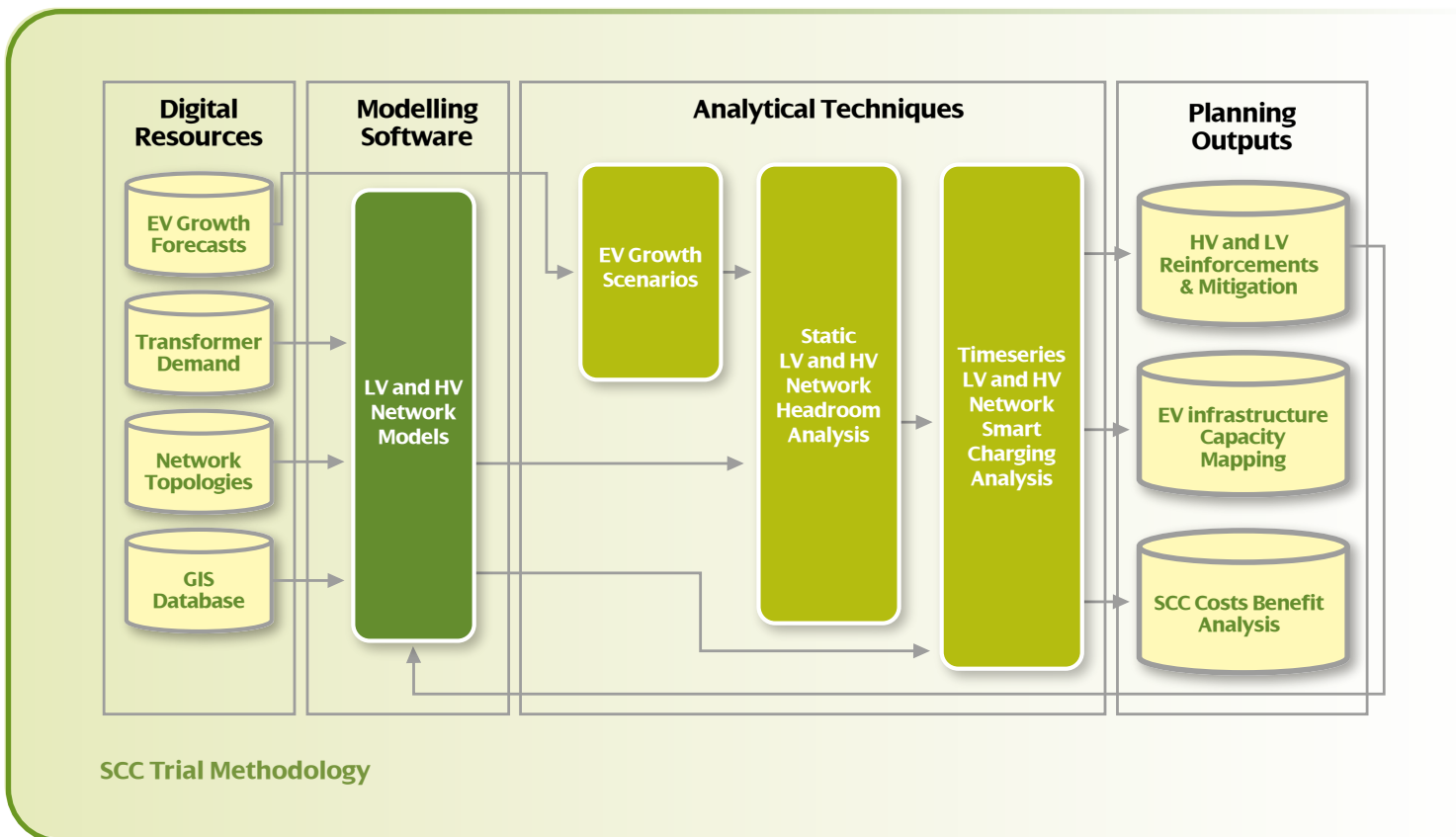
Smarter Grid Solutions (SGS) conducted virtual trials to understand how Smart Charging Connections (SCCs) – the Charge Project's term for flexible connections for public chargepoints – could be adapted and deployed in both simple behind-the-meter schemes (customer-led SCCs) and more complex network control schemes (DNO-led SCCs). SGS also developed a DNO control infrastructure solution that enabled SCCs to be deployed as part of business-as-usual activities.

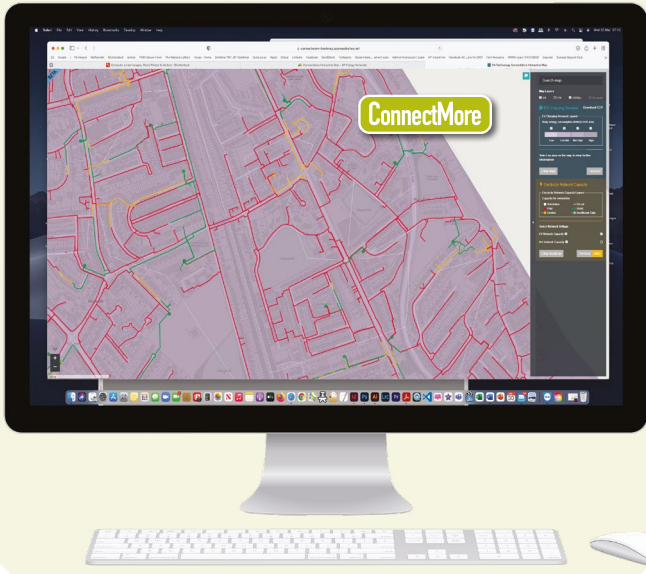
By constraining demand as necessary to ensure the network never becomes overloaded, Smart Charging Connections allow more chargepoints to quickly and more easily be installed in the same location without the need for reinforcement work, boosting the near-term availability of public charging. The Charge Project also conducted research into the acceptability of SCCs, with EV drivers generally positive about their deployment if it increases the number of public chargepoints.

Robert MacDonald, Head of Planning & Analysis, Smarter Grid Solutions:



"We now have a much greater understanding of how Smart Charging Connections can be implemented in the real world and a valuable framework for their deployment going forward."





Empowering customers to make better decisions: ConnectMore

A fundamental objective of the Charge Project was to help chargepoint operators and other customers make more informed decisions about where public chargepoints needed to be located.

Tim Butler, Manager for the Charge Project at EA Technology:



"ConnectMore is a game changer for public chargepoint investment and installation. By empowering users to research, plan and budget connections themselves, getting instant quotes rather than having to wait for weeks, ConnectMore will truly accelerate the chargepoint deployment process."

To this end, EA Technology utilised the Charge Project transport model, up-to-date LV and HV network capacity data, and 30 years of connection request documentation to create ConnectMore, a unique, free-to-use, self-service online planning tool that empowers customers to make quicker and more accurate decisions about chargepoint installation.

Two core elements to ConnectMore:

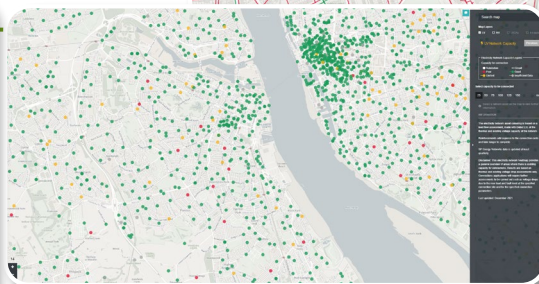
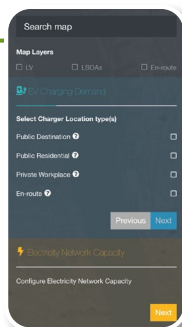
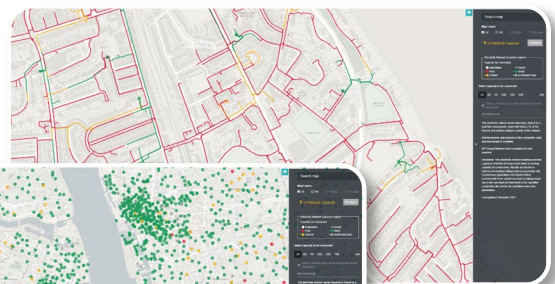
The first is the ConnectMore Interactive Map (CIM), which enables users to quickly identify both where EV charging demand is likely to be high and where the electricity network can accommodate chargepoints with minimal reinforcement. By allowing both potential charging demand and ease of connection to be viewed together on the same interactive map, the CIM can help the user identify the optimum locations for EV chargepoint installation and inform roll-out strategy.

The second ConnectMore element is the EV Connection Cost Estimator. This gives users an instant quote to connect chargepoints to a specific location on the electricity network, and thus enables them to identify the most cost-effective chargepoint site.

ConnectMore can quickly deliver the hard evidence needed to get chargepoint projects off the ground.

Instead of being hindered by a complex, time-consuming, DNO-led process, customers can now take control of the process themselves, identifying the best locations for chargepoints and getting a connection quote in a matter of minutes.

ConnectMore has also proved to be a major asset for SP Energy Networks' own internal connections team.





Understanding the road ahead: The Charge Project's legacy

By enabling a significant collaboration between the transport and electricity industries, the Charge Project has successfully delivered new and innovative ways for the UK to create a public charging infrastructure that supports all EV drivers, both now and in the future.

It has created detailed forecasts of EV driving patterns and chargepoint demand over the next 25 years, developed smart connection solutions that can maximise the use of existing network capacity and rapidly boost the number of public chargepoints, and empowered customers with a time-saving self-service tool that takes the complexity out of chargepoint location and enables them to generate their own quotes.

As such, one of the key learnings from the Charge Project is increased awareness of the value and importance of good-quality data, and the way it can be used to put more control into the hands of customers. ConnectMore in particular has demonstrated how data can be combined from different sources – in this case, from the transport and electricity sectors – and made more widely available to non-specialists. It also emphasises the need to maintain this data as standard practice.

The Charge Project's work and engagement with a wide range of stakeholders has also provided valuable insight into the UK's roadmap for EV adoption on a mass scale, particularly in relation to the technology readiness of both chargepoint operators and DNOs to deploy new charging methodologies and schemes. This is an area in which improvements are clearly necessary, with more work needed on development of communications protocols and control systems.

Ongoing conversations revealed a need for all parties to think "smarter" if the UK is to meet the charging demands of the future. While network reinforcement will inevitably be needed to accommodate the increase in connection requests, alternative smart solutions are available to mitigate the extent of this work and accelerate the near-term deployment of public charging infrastructure in line with demand.



Alastair Oldfield, Lead Engineer for the Charge Project, SP Energy Networks



"We're very proud of the Charge Project's achievements and the way in which SP Energy Networks and its partners have worked together to produce a credible roadmap for the next phase of public chargepoint deployment."

Working smarter also means keeping reinforcement costs down through better planning and coordination, ensuring that connections are future proofed now rather than being subject to ongoing reiterations.

However, investment in local electricity distribution is required to adequately support growth in EV usage, and ultimately meet the UK's net zero goals. There also needs to be increased coordination between local and national government and the private sector to drive policies that prioritise the reduction of CO2 emissions, with the EV transition a major focus.

Ultimately, the Charge Project has delivered new tools and methodologies that the electricity industry can use as part of its business-as-usual activities going forward.



Appendix

The Charge Project produced a series of reports that detailed the feasibility and benefits of the technologies and methodologies it proposed, and outlined the results of trials it conducted. Click on the image to read the report.




Smart Charging Connection network case studies: Final Report




The Charge Project
September 2022






Transport Model Final Report
Method, Findings and Conclusions

The Charge Project
February 2022

Definition, Refinement and Design of EV Smart Charging Connection Solutions
Final report

The Charge Project
May 2022





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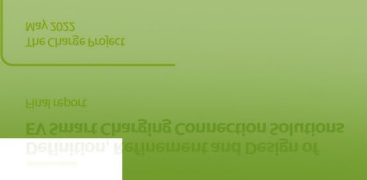
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Public Chargepoint Flexibility Insight Report

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December 2021

Smart Charging Connections: Trials Learning and BaU Roll-Out



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March 2023






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To access all the project reports, please go to www.chargeproject.co.uk