

Data-driven electric vehicle transition



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Image courtesy @EVclicks

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ElectraLink welcomes the Electric Vehicle Energy Taskforce proposals

The impetus to transition to zero emission transport is rapidly gaining traction on the political and societal agenda, as is evident through the unprecedented collaboration of the energy and automotive industries on the Electric Vehicle Energy Taskforce. The Taskforce launched its report¹ on 14 January 2020, with 21 key proposals for industry and government to facilitate integration of electric vehicles (EVs) with the energy system. The report reinforces that consumer needs should be at the heart of EV charging. Throughout, data is highlighted within the recommendations; data-sharing arrangements are recognised as critical, as is data access and privacy, together with an asset register for EV charge points, all with the ultimate purpose of meeting the needs of the customer and, in turn, supporting the growth of electrified transport.

This chimes well with the work of ElectraLink. As a central industry body operating at the heart of the energy industry, governance bound energy market data sharing and asset registration has been a core component of ElectraLink's work for over twenty years. As, the industry urgently moves towards open access to data, a need that has emphasized by the Energy Data Taskforce, ElectraLink continues to work with government and industry to support and fulfil these data-driven ambitions.

This paper looks at the emergence of EVs on UK roads and the impact of those cars on the energy system. It also aims to provide an overview of the work that ElectraLink is doing to help increase visibility of domestic charge points as we move towards a far smarter and flexible energy system, and considers how ElectraLink could help government and industry in its vision of open access to, sharing, and registration of data.

The rise of the electric vehicle

EV registrations in the UK increased by 220%² (pure battery electric vehicles) in December 2019 compared with any of the previous 12 months, with both diesel and petrol vehicles on a downward trajectory. Aside from the climate and health imperatives of shifting to low and zero emission transport, consumers are starting to realise the economics of making the move to battery-powered vehicles, not least of all as the second-hand market for EVs emerges.

Despite this, challenges in perception remain, such as those of range anxiety, cost and purported lack of public charging infrastructure. However, with the vast majority of automotive Original Equipment Manufacturers (OEMs) committing to electric drivetrains, and new makes and models being launched on an almost weekly basis, the UK has seen the number of electric car options catapult from just a handful a few years ago, to over 100 available to choose from today. Battery size and therefore range on a single charge is increasing, with most models now offering from 100 to over 300 miles of range – with start-up companies such as Rivian in the US promising 400 miles' electric range for its all-terrain vehicles. All of which is changing perceptions, which is being

¹ <https://www.lowcvp.org.uk/projects/electric-vehicle-energy-taskforce.htm>

² SMMT figures.

played out in the numbers. Back in 2013 there were just 3,500 electric cars on UK roads; today there are almost 250,000.

Impact of electric vehicles on local electricity networks

As we move towards mass adoption of EVs, clusters of cars chargers on local, low voltage (LV) electricity networks, without some form of management, will pose a challenge to Distribution Network Operators (DNOs). Research on this has been well documented through projects such as UK Power Networks' (UKPN) Low Carbon London, Scottish and Southern Electricity Networks' (SSEN) My Electric Avenue and Smart EV projects, and Western Power Distribution's (WPD) Electric Nation. What these projects have also established is that smart, or managed, charging can alleviate the impact of EVs on the LV network. These findings were reflected in the UK Government's Automotive and Electric Vehicle Act, which states that all chargers, both domestic and non-domestic, must be smart enabled as of 1 July 2019 to be eligible for the Office for Low Emission (OLEV) Homecharge Scheme Grant. EV uptake in the UK is also being supported via a number of government funded incentive mechanisms, as espoused in the Road to Zero Strategy.

The GB DNOs have been working ahead of need since 2012 to facilitate EVs on their networks, and to ensure that customers are not disadvantaged by EV uptake. EVs represent a significant new demand on the LV networks; it is incumbent on the DNOs to encourage innovation in this area and plan for mass uptake. Whilst a challenge for the networks, EVs can also be leveraged as a key enabler to flexibility, for example through vehicle to grid technologies. UKPN, a GB DNO, has recently published its latest EV Strategy update. With forecasts of between 1.4 to 4.9 million EVs across its three licence areas by 2020, it is imperative that appropriate technologies and systems are in place to facilitate our transition towards zero emission vehicles and net zero.

The visibility challenge

Lack of visibility of where EVs are being charged on the LV network is a challenge for the DNOs. A notification process is in place, managed by the Energy Networks Association, and predicated on access to the OLEV Homecharge Grant Scheme, which subsidises purchase and installation of smart chargers. Notifications of EV chargers are, however, incomplete, and there is an absence of any early notification system in place. Where EV charger installations *are* notified by charge point installers, this can often happen months after installation. Network operators need good visibility of what is connected to their networks in order to plan effectively for network reinforcement, or to understand where such reinforcement can be either be avoided or deferred, leading to potential cost savings, and less disruption (i.e. fewer roads being dug up to lay new cables) for customers.

ElectraLink believes that there is merit in defining and testing an early notification process, together with associated incentive mechanisms for charge point installers, operators and even EV dealers, to offer up notice of intent to buy an EV or charger. Early notification will support DNO network planning by providing a richer source

of EV charger install data. This approach could also capture those EVs without chargers installed, i.e. where drivers are using a three-pin plug to charge, as well as highlighting any geographic proliferations of on-street charging.



Image courtesy @EVclicks

Fig 1: An electric car charging using the Ohme intelligent charging cable

Visibility can also be tackled through data science, for existing yet unnotified EV chargers. This has been demonstrated through WPD's Network Innovation Allowance -funded Low Carbon Technologies Detection project, delivered by ElectraLink in partnership with IBM.

This project identified indications of an additional 15,000 EVs and solar panels in WPD's licence areas, equating to a 13% increase in visibility for the network operator³. The second phase of the project, Virtual Monitoring Data, is currently underway to validate and enhance the models, and to deliver a virtual monitoring capability to the DNOs.

The benefits for customers

The focus on improving data visibility is not only beneficial to market participants such as flexibility providers, third parties and innovators. The increased visibility of consumer changes (e.g. PV and EV uptake), load changes (e.g. the growth in embedded generation) and new business models (e.g. aggregators) should provide a short-term solution to bridge the gap between industry change and network requirements. This will enable network operators to understand what products are available, allowing them to plan daily operations and understand

³ LCT Detection Closedown Report: <https://www.westernpower.co.uk/innovation/projects/lct-detection>

whether there is the potential to use 'smart solutions' to avoid network reinforcement in the face of growing constraints⁴. Improved visibility of EV chargers will also support better network planning, which should result in financial savings (lower bills) as a result of deferred reinforcement, and reduction in LV monitoring investment through optimised, targeted implementation.

DSO and data-driven solutions

As noted in a previous ElectraLink paper, 'The grid of things: worldwide lessons for British DSOs'⁵, the GB energy landscape is in a period of rapid evolution. The energy market is becoming a decentralised market with a rise in localised, often renewable, generation and smart devices and batteries in the home that allow for actors to manage domestic consumption remotely. With the quantity of actors and granularity of interactions in the energy market increasingly sitting within the distribution area, so too will the levers to balance the energy in the system. This shift moves the balance and arena of control for energy balancing towards the LV network, which is monitored and managed by the DNOs.

With the influx of new technologies, greater demand and generation and the move towards a more decentralised energy system, the need for data-driven solutions, underpinned by open access to rafts of data from across a range of market actors, becomes ever more prescient. Data that is presumed open is a core principle and recommendation of the Energy Data Taskforce⁶. DNOs are moving towards becoming Distribution System Operators (DSO), as they take on a more active role in optimising network utilisation to reflect these fundamental changes in the market. The need to manage assets and innovation in support of a far more flexible and smarter network is paving the way for digitisation of our networks at an unprecedented rate. ElectraLink works with its shareholders, the DNOs, to ensure that its work complements and supports emerging DSO and digitisation strategies.

How ElectraLink's data can support the EV sector

ElectraLink operates at the heart of the energy industry in the UK. It is a DNO-owned data and governance management company, which has operated the Data Transfer Service (DTS) for over 20 years. The DTS connects over 270 energy market participants and facilitates the data flows that underpin the operation of the retail energy market. As an Ofgem regulated body, ElectraLink's data transfer mechanisms are fully cyber secure and GDPR compliant.

The parties connected to the DTS include all six GB DNOs, energy suppliers and aggregators and a range of other actors in the energy supply chain. The DTS now runs on the Energy Market Data Hub (EMDH) which stores vast amounts of energy market data. The data includes energy consumption, supplier switching, smart meter

⁴ <https://www.electralink.co.uk/2019/09/the-grid-of-things-worldwide-lessons-for-british-dsos/>

⁵ <https://www.electralink.co.uk/2019/09/the-grid-of-things-worldwide-lessons-for-british-dsos/>

⁶ <https://es.catapult.org.uk/news/energy-data-taskforce-makes-five-key-recommendations/>

locational and meter type data and embedded generation data – going back across the UK for over seven years. Due to a robust and industry endorsed governance process, this data can be made available for the benefit of the energy market. A raft of products and services related to this data are available through ElectraLink. Major customers that use this data include National Grid, Ofgem and BEIS, as well as a portfolio of energy retailers and other market players.

In order to further awareness of ElectraLink’s data set and its value to industry, ElectraLink partnered with the Renewable Energy Association (REA) in 2019 to deliver *Flexible Futures*⁷, a ground breaking report that uses ElectraLink’s analysis and dataset from the EMDH, together with REA expertise, to understand developments on the GB distribution network and chart a course for the next decade. Open data is key to a smarter, more flexible energy network, as espoused by the Energy Data Taskforce. ElectraLink supports this move towards more open access to data and has set up a dedicated space on its website to explore access to multiple energy market datasets⁸.

EV sector data transfer and notification system

The EMDH can be utilised as a platform on which to facilitate transfer of data between EV sector bodies, as well as share notification of charge points with DNOs or other relevant parties as required. As a governance-bound and cyber secure platform, the EMDH is fully extendable to deliver a platform for sharing data between EV sector parties – charge point operators, charge point installers, EV dealers, DNOs and others.

The EMDH is a fully flexible, integration-capable data transfer service and platform that can be tailored to unique requirements in order to enable and catalyse transfer of data and intelligent signals between market participants for the furtherance of EV uptake in the UK.

EV asset registry

A natural extension of the EMDH as a data transfer platform in support of the EV sector is that of an asset register of EV charge points – as recommended by the EV Energy Taskforce. The EMDH delivers this service for smart meters by virtue of storing all locational and meter type data. An essential dataset on the EMDH would be an asset registry which details all EV-related assets. Currently, there is no GB DNO with a complete EV asset or charge point registry. In line with the work on the Energy Data Taskforce⁹, it is vital that the industry has access to a registry of all assets, including EVs, within their network. Moreover, as the consumer becomes a player in the market, a registry that manages consent to engage in the smart network is key. The EV asset registry would provide useable information to inform strategic decisions both internally to the DSO and externally to market actors.

⁷ <https://www.electralink.co.uk/2019/10/flexible-futures-report/>

⁸ <https://www.electralink.co.uk/open-data/>

⁹ <https://es.catapult.org.uk/impact/specialisms/energy-data-taskforce/>

As an independent central body, governed by the industry, ElectraLink believes that the creation of an EV data platform and asset register can be achieved through working with the DNOs and EV sector to understand data visibility and sharing requirements. This can be achieved using the EMDH – a readily adaptable and cost effective mechanism through which we can implement a future-proof solution which will lead to improved EV charge point notifications, greater EV visibility to support DSO network planning and ultimately benefits for customers through electricity networks that are fit for our EV future.

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