



Western Power Distribution

Electric Vehicle Strategy

March 2019



Contents

1.	Introduction	4
1.1.	About the document	4
1.2.	High Level Government Objectives.....	4
1.3.	Our approach to facilitate EV charging	5
1.4.	Flexibility and Charging	5
1.5.	Existing Charge Points and Capacity	6
2.	Forecasting and Data	7
2.1.	Forecasting for the ED1 business plan (2015-2023)	7
2.2.	Developing Distribution Future Energy Scenarios (DFES)	7
2.3.	Electric Vehicle Growth Factors	8
2.4.	Investment allocated within ED1	9
2.5.	Forecasting local growth and pinpointing upgrades.....	9
2.6.	Forecasting ED2 and informing specific ED1 plans	9
3.	Planning and Capacity Availability	10
3.1.	Our expectation of EV charger installations	10
3.2.	Estimating Connection cost and timescale	11
3.3.	Simplifying the application processes	11
3.4.	Making use of existing local capacity.....	11
3.5.	Planning and Design Changes	12
3.6.	Technical Changes related to Electric Vehicles	12
3.6.1.	Thermal Capacity	12
3.6.2.	Earthing	13
3.6.3.	Power Quality	13
4.	Providing information to Customers	14
4.1.	Guidance and Advice Documents published.....	14
4.2.	Guidance and Advice Documents planned	14
4.3.	Capacity Indication for customers	14
4.4.	Connections Surgeries.....	14
5.	Stakeholder Engagement.....	15
5.1.	Our Approach to Stakeholder Engagement	15
5.2.	Business Plan Strategic Stakeholder Engagement	15
5.3.	Strategic Engagement with local authorities	15
5.4.	Local Engagement with local authorities	16
5.5.	Engagement for Fuel Station Operators	16
5.6.	Engagement for housing design.....	16
5.7.	Engagement with Vehicle Manufacturers and Transport Operators	16
5.8.	Engagement with Depot Based Fleet Operators.....	17
5.9.	Engagement with UK Government	17
5.10.	Engagement with Welsh Government	17
5.11.	Engagement with Go Ultra Low Cities (GULC)	17
5.12.	Engagement with Local Enterprise Partnerships (LEPs) and Electricity Supply Areas (ESAs)	18
5.13.	Stakeholder Engagement Plans for 2019	18
6.	Plans to support Electric Vehicle Charging	19
6.1.	Our approach	19
6.2.	Releasing existing network capacity	19
6.3.	Motorway Services and Major Road Filling Stations	19
6.4.	New Homes	20

6.5.	Existing Homes	20
6.6.	On Street Charging	21
6.7.	Depot Based Fleet Users	21
6.8.	Workplace and Off Street Charging	21
6.9.	Vehicle to Grid (V2G).....	22
6.10.	Smart Charging	22
6.11.	EV clustering	22
6.12.	Mitigation of local network constraints	23
7.	Smart Solutions and Flexibility.....	24
7.1.	Our approach	24
7.2.	Domestic Flexibility	24
7.3.	Commercial Flexibility	25
7.4.	Whole System Flexibility	25
8.	Projects to demonstrate EV connections	26
8.1.	Developing a balanced portfolio of projects.....	26
8.2.	Completed Projects	26
8.2.1.	CABLED (2009)	26
8.2.2.	V2G Taxi (2011).....	27
8.2.3.	Electric Boulevards (2014)	27
8.2.4.	Smart Charging and Vehicle Telematics (2015).....	27
8.2.5.	EV Emissions (2016)	28
8.2.6.	Alternative Connections for EV Charging (2017)	28
8.2.7.	IET Code of Practice	28
8.3.	Current Projects	29
8.3.1.	Electric Nation.....	29
8.3.2.	LV Connect and Manage	29
8.3.3.	LCT Detection	30
8.3.4.	Superfast Electricity – three phase services	30
8.3.5.	Reinforcement Planning - Forecasting and Planning Interface Tool	31
8.4.	Future Projects	32
8.4.1.	EV Filling Stations.....	32
8.4.2.	On Street Charging Solutions.....	32
8.4.3.	Smart Homes – EVs and Storage.....	32
8.4.4.	Smart Meter Load Control	33
8.4.5.	Self-Assessment	33
8.4.6.	Hub Charging Solutions.....	33
9.	Targeted Commitments in 2019 and 2020	34
9.1.	Realising benefits	34
9.2.	2019 change - “Superfast Electricity”	34
9.3.	2019 change – Design capacity assumptions.....	34
9.4.	2019 change – Network capacity indication	34
9.5.	2020 change – Public charging hub infrastructure	34
9.6.	2020 change – LV Connect and Manage.....	34

1. Introduction

1.1. About the document

This document sets out how Western Power Distribution will ensure that drivers of electric vehicles are able to charge their vehicles in the manner convenient to them.

It describes research, development and deployment activities carried out during the current and previous electricity distribution price control periods. It also explains the rationale behind current innovation projects and business initiatives. Further, it describes future activities including the transition of early-stage solutions into business as usual practice.

This document also documents our vision for electric vehicle recharging solutions for a range of customer types. It provides detail on the roadmap to achieve this vision.

Following the ENA/Ofgem Stakeholder Engagement events held in February, we are also responding to Ofgem's request. They have asked all DNOs to publish how they are preparing for the potential rollout of EVs. These plans must include time-bound commitments to address the needs and issues of EV stakeholders that are identified at the EV meeting

Our preparations for each specific customer group are listed in Section 4 of this document and draw upon our own stakeholder engagement and that undertaken nationally. In Section 6 we also detail our time-bound commitments in the short term to accelerate readiness for the rollout of EVs.

1.2. High Level Government Objectives

Electric Vehicles (EVs) are becoming more commonplace on our roads. The trend towards them is set to increase.

The Government's "The Carbon Plan" (2011) set out the UK's objectives to reduce carbon emissions, with an 80% reduction achieved by 2050. This will be achieved through the decarbonisation of heating and transport and we need to take action to support this transition of vehicle power from carbon sources to electricity. Our electricity networks need to be ready to accept this additional demand. We build networks with a 50 year asset life so will take steps now to ensure we build the right network for foreseeable future demands.

The requirements of The Carbon Plan have been strengthened with targets to improve air quality and reduce Nitrogen Dioxide levels. These targets will all support the transition to electric vehicles.

The Government published Driving the Future in 2013 to "ensure almost every car and van is a zero emission vehicle by 2050". In July 2017 the Government announced that "it will end the sale of all new conventional petrol and diesel cars and vans by 2040". In May 2018 the Prime Minister announced a further target for 2040, that all new cars and vans should be "effectively zero emission" and in July

2018 the Road to Zero Strategy set an aspiration for “at least 50%, and as many as 70%, of new car sales and up to 40% of new van sales being ultra-low emission by 2030”.

Alongside the sales targets, the Government has set a goal for the UK to be “a world leader in the development, manufacture and use of zero emission vehicles... [and] in the design, development and manufacture of batteries” in the Automotive Sector.

2019 has brought the first electric vehicle as a “What Car” Car of the Year. The Kia e-Niro took this award and What Car describe it as the first sensibly priced electric car that can fit into most people’s lives. It provides a substantially longer range than almost all rivals without costing substantially more. We consider this to be an indicator to a future when there is price parity between electric and Internal Combustion Engine (ICE) vehicles. We anticipate it to become a reality in 2021 or 2022 and will create a step change in ownership models for car buyers.

1.3. Our approach to facilitate EV charging

As an electricity system operator our approach is to ensure that a suitable network exists for all charging requirements in all situations. This has many factors as charging requirements vary dependent on the type of vehicle and the owner’s access to either their own or public charging infrastructure. Only 60% of car users have access to an off-street parking location which is likely to be suitable for charging.

In one sense the actual charging infrastructure is of less concern to us than our ability to provide the adequate and safe electricity connection which serves it. Our plans will vary depending on the application and we detail various different options in this section.

The principle is simple, the charging infrastructure requires higher volumes of energy and it is our job to provide the conduit for this energy.

We predict that the majority of our larger local transformers will be able to accommodate one 35kWh charge every five days for each of the customers connected to it. This provides a charged range of around 150 miles in many EVs and it is likely that this will support the demands of home connected EV charging.

We also expect that our backbone 33kV network and transformers will be able to accommodate this level of charge point activity.

As we focus in to the specific cables which supply local streets or to the service cables which feed individual properties, there is more chance of the network becoming constrained. We are already installing larger cable assets from new and have identified areas where the proactive uprating of cable networks is appropriate.

1.4. Flexibility and Charging

We expect that flexibility will provide a key role in delivering EV charging. This is likely to provide solutions for many customer types, from domestic users to fleet users who return their vehicles to a depot overnight.

Domestic users will be able to take advantage of time of use tariffs that we expect electricity suppliers to offer in conjunction with Smart Meters. With their vehicles at home when not in use, they will be able to use managed charging to charge their vehicle at times when price signals show it to be beneficial for the wider electricity network.

Fleet users with depots are likely to make use of overnight charging to recharge their vehicles for the next working day. We expect a depot charging facility to require a larger electricity supply similar to a factory. This could cause constraint on some of our network at peak times if connected conventionally. However, we expect to have the opportunity to offer flexible connection solutions to allow charging at off-peak times without network reinforcement. This could make connections quicker and cheaper for customers.

1.5. Existing Charge Points and Capacity

We already have experience of installing charge points on our network to support the early adopters of Electric Vehicles. The table below shows the number and capacity of chargers as reported to Ofgem as part of our annual returns.

Our numbers of Fast Chargers are relatively high due to the reporting split used by Ofgem. Most of the newer domestic chargers are 23 Amp units and therefore are reported in the Fast Charge category.

	Number	Capacity
Slow Charge (up to 16 Amps)	2,072	7,500 kVA
Fast Charge (over 16 Amps)	4,996	39,300 kVA

(Total number as at March 2018)