



A guide on electric vehicle charging and DNO engagement for local authorities



UK EVSE

UK ELECTRIC VEHICLE SUPPLY EQUIPMENT ASSOCIATION

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Who is this guide for?

This guide is intended for local authorities wishing to buy and install Electric Vehicle (EV) charge points to support staff, visitors and local residents who drive EVs.

What is this guide about?

The transition to EVs is expected to play an important role in achieving the UK's targets for decarbonising the transportation sector, as well as helping to reduce air pollution. Based on 2018 Future Energy Scenarios published by National Grid, there are already more than 130,000 electric vehicles on UK roads and that number is predicted to rise to 36 million by 2040. This growth will lead to increased demand for publicly accessible charge points and it is important to ensure that everyone can have easy access to a well-structured EV charging network across the UK. Local authorities can help support this transition by investing in charge points and by the advice and support provided to others who are interested in investing in local charging infrastructure.

This guide lays out the fundamentals of what is required during a charge point installation project, from equipment considerations through to location choice and stakeholder involvement. It also explains the important role the Distribution Network Operator (DNO) plays in providing power to the charge points and why contacting your DNO early in the process of planning new charge point installations will be beneficial.

What is a Distribution Network Operator (DNO)?

A Distribution Network Operator (DNO) is a company licensed to distribute electricity in the UK. It is responsible for the distribution of electricity downstream from the national transmission grid, to industrial, commercial and domestic users. It also maintains and operates the underground cables, overhead lines and substations and distributes electricity to our homes and businesses.

When new charge points are installed, it is the DNO that connects them to the power network.

DNOs do not supply the electricity. Customers can choose from many different suppliers. Electricity suppliers pay DNOs to distribute electricity through the network to homes and businesses.

How can DNOs help?

The cables and substations that make up the electricity networks that distribute electricity to our streets and buildings are assets with a long operational life and the

networks we have today are the result of many years of planning and development. It is recognised that a rapid growth in EV uptake will lead to EV charging at a wide variety of locations and these additional connections to the distribution network will each need to be assessed to determine if there is available capacity or if local upgrades will be needed.

An early engagement with the DNO and a qualified electrical contractor can help identify whether your proposed location has adequate capacity to meet the charging demand. If there is enough capacity from the existing supply, no network reinforcement will be required. If any reinforcement is needed, it will be your local DNO who will provide this. The DNO will also provide quotations for new connections and upgrades to existing ones. The scope of this upgrade and reinforcement may extend to include increases in capacity for existing transformers, distribution overhead lines and cables to meet higher peak demand. Cost calculations for grid network investments will vary depending on the local situation.

When thinking about planning to get charge points installed and operational, it is important to think of the process from the energy system perspective – with the DNO providing the critical link to an electrical power supply. Put simply, any plan to install EV charging infrastructure needs to consider both the charge point hardware installation and necessary grid network reinforcement.

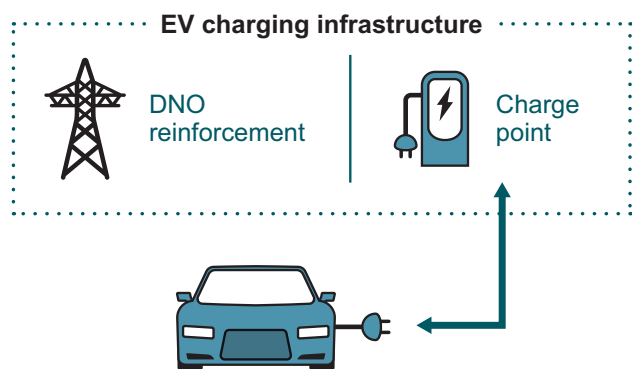


Figure 1: EV charging infrastructure installation

Your DNO needs to be properly engaged and consulted to coordinate and facilitate the connection of charge points to the network. Your DNO needs to understand how much electricity demand the charge points will require to help ensure the local low voltage and medium voltage network has sufficient capacity and protection to prevent issues for other local electricity users.

What are the key considerations?

Charge point specifications

EV charge points are mainly defined by the power they can produce and the how quickly they can charge an EV. The Connector Type is also a consideration as there are different charging plug standards and configurations for slow and fast charging compared with rapid charging and for

Direct Current (DC) charging when compared with standard Alternating Current (AC) charging.

The following table represents the various charging options available to plug-in car drivers based on a 30kWh battery.

Table 1: Types of charge points

| Charge point type | Power transfer | | Typical charging time | Recommended location |
|-------------------|----------------|--------------|-----------------------|--|
| Slow | ≤3kW | Single phase | 8-12 hrs | Parking on public streets, in public car parks, leisure facilities, shopping centres and tourist attractions, workplace parking and depots |
| Fast | ≤7kW | Single phase | 3-4 hrs | |
| | ≤22kW | Three phase | 1-2 hrs | |
| Rapid | ≤43kW | Three phase | 80% in 20-30 mins | Public parking, taxi ranks, bus depots and motorway service areas |
| | ≤50kW | DC | | |
| Super-rapid | >43kW | Three phase | <20-30 mins | |
| | >50kW | DC | | |

Power requirements

The table below outlines the design requirements for the connection of EV charge point equipment to new and existing supplies.

Table 2: Charge point types and energy supply requirements for charge point locations

| Charge point type and power output per outlet | New energy supply capacity needed per charge point now | New energy supply capacity per charge point for future-proofing |
|---|--|---|
| Slow or Standard 2.4kW or 3kW | Usually not needed | 80 or 100Amps AC single phase (for a faster charge point) |
| Fast 3.7kW AC | 32Amps AC single phase (2 outlets) | 80 or 100Amps AC single phase (for a faster charge point) |
| Fast 7kW AC | 63Amps AC single phase (2 outlets) | Three phase AC supply; 100Amps per phase (for a faster or rapid charge point) |
| Fast 11kW AC | Three phase AC supply; 32Amps per phase (2 outlets) | |
| Fast 22kW AC | Three phase AC supply; 63Amps per phase (2 outlets) | |
| Rapid 20kW DC | Three phase AC supply; 32Amps per phase (1 outlet) | Three phase AC supply; 100Amps per phase (2 outlets) |
| Rapid 43kW AC | Three phase AC supply; 100Amps per phase (1 outlet) | Three phase AC supply; 200Amps per phase (2 outlets) |
| Rapid 50kW DC | Three phase AC supply; 100Amps per phase (1 outlet) | Three phase AC supply; 200Amps per phase (2 outlets) |
| Supercharger 130kW DC* | Three phase AC supply; 200Amps per phase (1 outlet) | Three phase AC supply; 400Amps per phase (2 outlets) |

*Higher power superchargers are under development and testing at the time.

Cost of installation and commissioning

The cost of charge point installation and commissioning and how long it will take depends on:

- How many charge points do you want?
- How many EVs do you want to charge at any one time?
- Which types of EV?
- How quickly do you want them to charge?
- How much is the spare capacity of the existing electricity network? What is the cost of possible network reinforcement?

Site selection

In terms of site selection and suitability, the following should be considered:

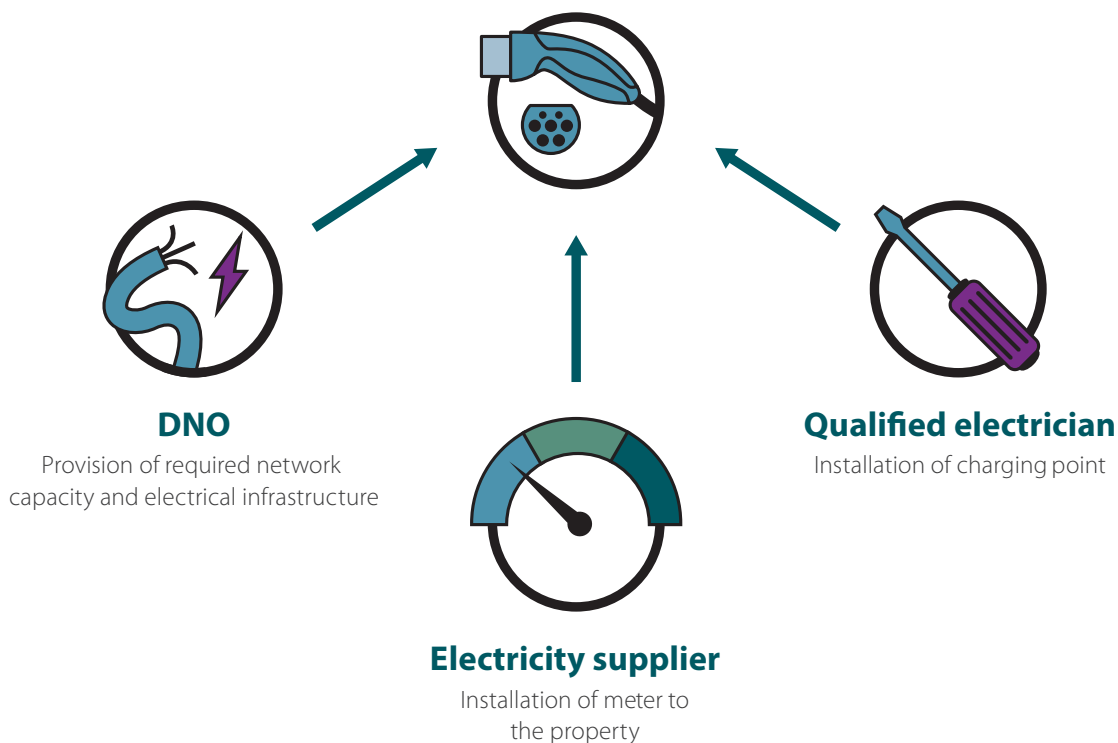
- Where is the site and what are its surroundings?
- Are there nearby amenities suitable for a captive charging audience?
- What is the site accessibility?
- Who will be the potential users?
- How is the site being used now?
- When is the charging infrastructure needed?
- What is the proximity to existing EV charging infrastructure?

When planning a charge point installation it is first helpful to take into account the key considerations and prepare a requesting document that can be shared with the internal stakeholders and your DNO.

Who is involved in the electricity connection process?

Electricity connections require a number of different services. The DNO, the electricity supplier and an electrician need to be contacted and involved.

Figure 2: Required services for electricity connection



When? Who? Why?

The following steps should be followed when considering installing a charge point:

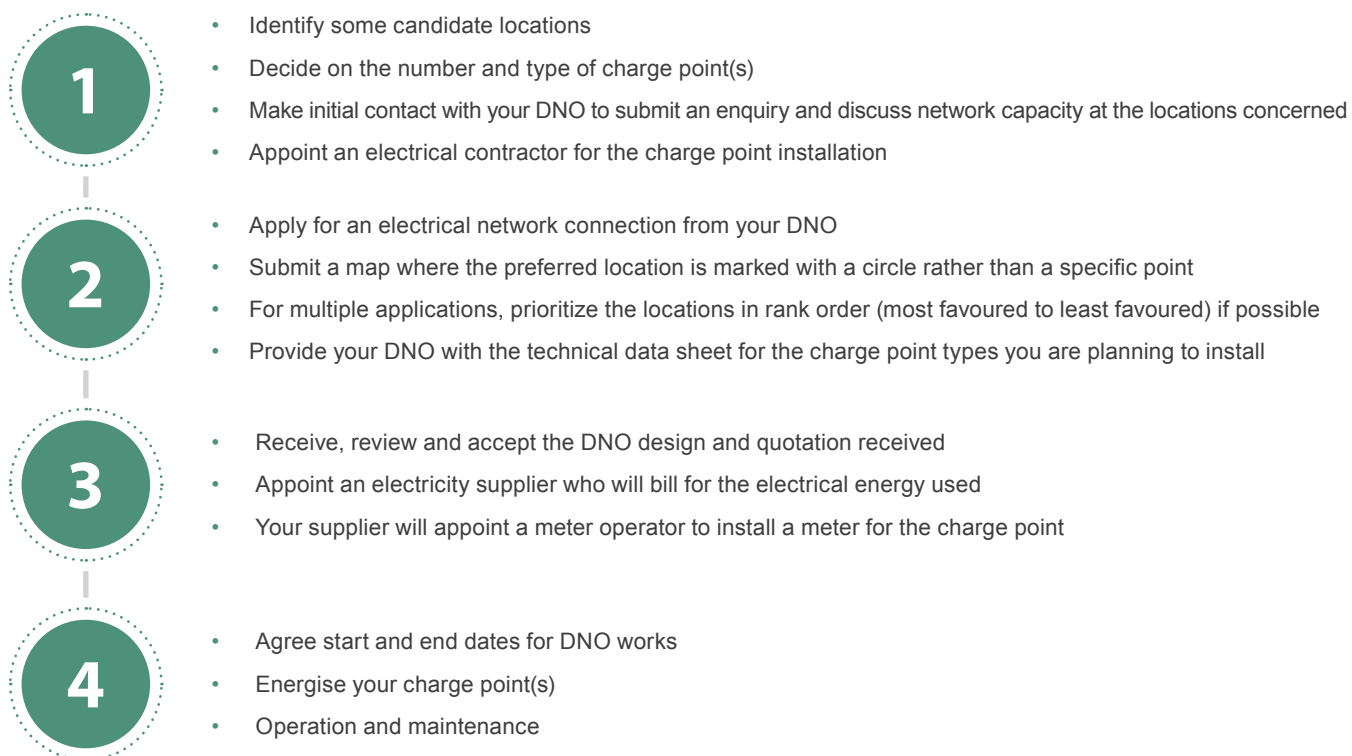


Figure 3: A stepwise approach to installing a charge point



Estimating connection cost and time

The new electricity connections are described as Small (up to 70kVA), Medium (200kVA - 1,000 kVA) or Large (above 1,000kVA). This section provides illustrative costs and time for the power supply to be connected to different types of charge points.

Figure 4: Illustrative costs and time to install a charge point

| Small (up to 70kVA) | Medium (200kVA – 1,000kVA) | Large (above 1,000kVA) |
|---|--|---|
| Number of charge points | | |
| 1-3 fast or 1 rapid charge | More than 3 fast or more than 1 rapid charge | Multiple fast/rapid charge points |
| Approximate connection time | | |
| 8-12 weeks | 8-12 weeks | 6 months + |
| Approximate connection cost | | |
| £1,000 - £3,000 | £4,500 - £75,000 | £60,000 - £2 million |
| Other considerations that may affect the cost | | |
| Street work costs | Street work costs Legal costs for easement and wayleaves | Street work costs Legal costs for easement and wayleaves Planning permission and space for a substation |

Key takeaways

The cost and time for each charge point project will always be location and application specific. The costs above illustrate that some proposed locations may cost much more than others due to power supply factors. It is therefore advisable to take a pragmatic approach when it comes to locations and the choice of charging. Be prepared to be flexible and to forgo some sites to settle on the most cost-effective options.

Each project will have a planning phase, procurement phase, along with an installation and commissioning phase. When planning a charge point project, it is strongly advised that you contact your DNO early in the planning process. As a simple rule of thumb, in your timing plan, allow as

much time for information exchange and dialogue with your DNO during the planning phase as you allow for installation and commissioning.

Pre-procurement market engagement with candidate charge point providers will also help, as they have years of experience when it comes to installation and commissioning and will be able to offer helpful advice.

For more information on planning for procurement, please see the UKEVSE General procurement guidance for electric vehicle charge points, available at:
www.ukevse.org.uk/resources/procurement-guidance

Interested?

We hope you find this guide helpful.

For more information about UKEVSE, please visit: www.ukevse.org.uk

For more information about WPD, please visit: www.westernpower.co.uk

This document was produced in collaboration with Western Power Distribution