Electric vehicles

There are three types of electric vehicle: -

Battery electric vehicles (BEVs) are fully electric vehicles with no Internal Combustion Engine (ICE), this is essentially a big battery you can drive.

Hybrid electric vehicles (HEVs) have both internal combustion engine and electric motors but are principally ICE vehicles as they cannot be plugged in to a charger.

Plug-in hybrid electric vehicles (PHEVs) are like HEVs but have the option of using external electrical power.

The battery is charged through plugging in to an external source of electrical power. Many EVs also generate a small amount of electricity through regenerative braking (which means electricity is produced when you brake and is stored in the battery to be used later).

Carbon emissions from the electricity used to charge the battery are much lower than emissions from running petrol or diesel engines, so as we decarbonise UK electricity generation by switching to clean renewable energy generation, the emissions from grid electricity get even lower.

The benefits of EVs –

- **Lower running costs:** 220 miles in an EV when charged at home costs around £23, an equivalent distance in modern petrol/diesel vehicle is £41.
- **Lower maintenance costs:** there are fewer moving parts in an EV, so less to go wrong.
- **Lower tax:** Depends on when the car was manufactured. Older EVs now £20 per year but newly registered BEVs from 2025 are required to pay tax of £180/year +.
- Access to low emission zones and free parking in some cities.
- Some models of car enable the car battery to be used as a home battery. This requires a vehicle to grid charger, and a compatible car battery.

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Considerations -

- Off-street parking is needed to be able to charge the vehicle at home or work. Some councils are bringing in on street charging, but this is not widespread currently.
- The carbon emissions from manufacturing the car are typically offset after 10-13,000 miles.
- Second hand EVs are comparable in price to other non-electric vehicles now so can be considered by those on a lower income. These vehicles don't have as long range as the new ones but if you do regular trips under 50 miles or so you can benefit from the reduced tax, maintenance and fuel costs.
- There is a wide range of EVs on the market, with different styles, sizes, speeds and battery ranges.
- The average range for cars currently on the market is 239 miles.
- Some new zero-emission vehicles (ZEVs) are eligible for government grants of £1,500 to £3,750 towards new car costs. This **government website** has more info.

Running costs -

- EVs can be more expensive to purchase than their ICE equivalents (although, we are starting to see increasing parity in pricing), their running costs (electricity vs petrol) are lower.
- The cheapest way to charge is to have a charging point and an EV tariff which means you can access electricity at a much lower price per kWh. This is because of incentives for reducing electricity consumption at peak times (i.e. during the day).
- There are an increasing number of off-peak tariffs on the market, giving cheaper charging if you plug in at night.
- Many chargers and EVs now have 'smart features' built in which mean you can programme the EV to prioritise solar electricity or cheaper rates with a time-of-use tariff.

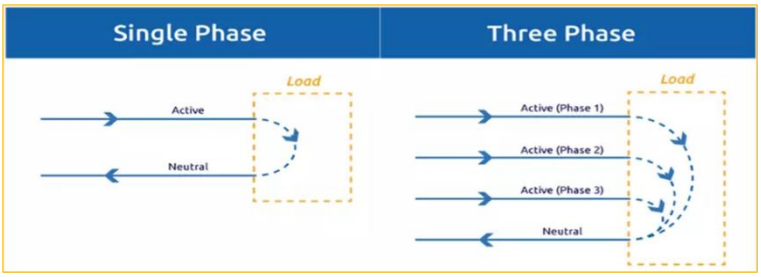
Installing an EV charger

Electrical supply and capacity -

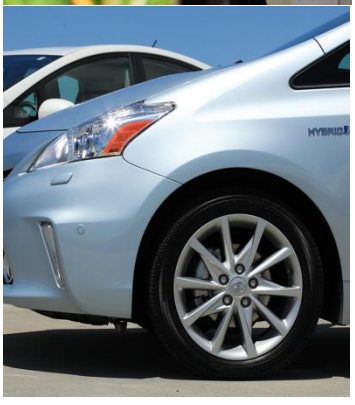
- Supply type: Single-phase or three-phase (this dictates the possible number of chargers and speed of charge).

A 3-phase simply means 3 cables supplying electricity (although usually 4 cables – 1 being neutral)

Most non-domestic buildings will be 3-phase
(It maybe single-phase if domestic-like in nature
And has low energy use)



- Available capacity: Check the main supply breaker limits for capacity.
- Future demand: Consider existing loads and future growth requirements of your building and activities.
- Distribution board: A separate board is preferred for EV chargers to avoid nuisance tripping.
- Metering: Consider installing a sub-meter for chargers to understand the usage and costs.



Charger type and performance -

EV chargers are classified according to the power output of the electricity connection, and the speed with which they recharge an EV battery. The classifications are Level 1, 2 and 3. All EVs can charge at Level 1 or Level 2, but not all at Level 3.

- Level 1 (Slow chargers) generally use a standard household outlet to plug into the electric vehicle. They provide power at around 3kW and usually take 6 to 12 hours for a pure EV charge.
- Level 2 (Fast chargers) provide power from 7kW to 22kW. These are usually found at workplaces and public charging stations and can also be installed at home. They take about 4 hours to charge an EV battery.
- Level 3 (Rapid chargers) are currently the fastest charging solution in the market and will charge the majority of compatible EVs to 80% in around 30-60minutes. They are found at dedicated EV charging stations, in places like service stations and car parks.

Other considerations –

- External space requirements, cable routing, visibility and security
- Who can use the chargers, how do you control access and payment
- Land ownership, insurance, maintenance responsibility

Get more energy advice at www.cse.org.uk/advice