



Your handy guide to alternative fuelled vehicles

Forward

Arnold Clark

By 2030, it is anticipated that there will be between approximately eight million and 11 million hybrid or electric cars in the UK if uptake remains aligned with the Road to Zero (RTZ) targets.

By 2040, the number of hybrid or electric cars could reach 25.5 million.

Source: <https://www.local.gov.uk/electric-vehicles-whats-going-out-there#:~:text=By%202030%2C%20it%20is%20anticipated,cars%20could%20reach%2025.5%20million>



Electric vehicles (EVs) are becoming more popular, and it seems that this trend is only going to continue.

In November 2020, the Prime Minister put the UK on course to be the fastest nation in the G7 to decarbonise cars and vans, announcing that all new petrol and diesel cars and vans will be phased out by 2030.

WHAT'S THE BUZZ ABOUT ELECTRIC VEHICLES?

- Simply stated, electric cars are fun to drive – with quick acceleration and enviable performance. Unlike combustion engines, electric motors produce peak torque from a standstill, without the build-up that gasoline engines require to reach maximum power.
- At least two-thirds of global car sales will be electric by 2040. Internal combustion engine vehicles have already peaked, while electric cars are getting cheaper and going farther.
- As technology improves, manufacturers are working hard to make electric cars and vans more affordable.



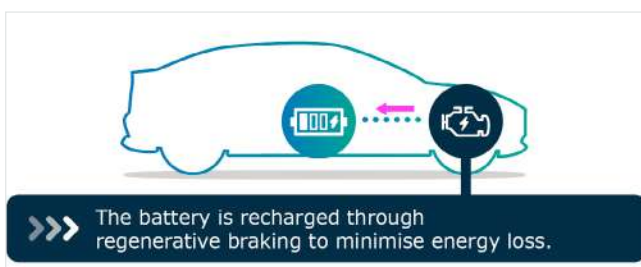
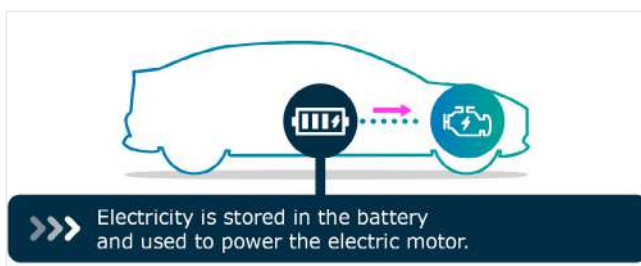
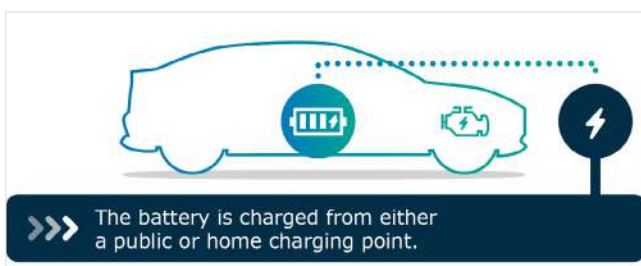
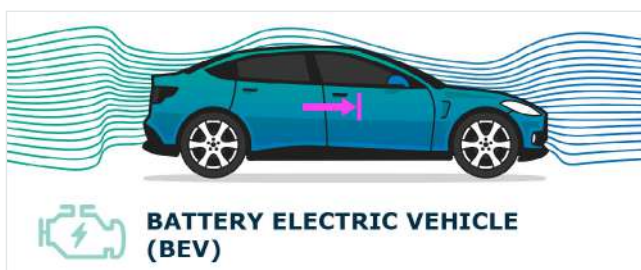
SUMMARY OF AFVS

An alternative fuel vehicle is any car or van that doesn't entirely run on a traditional internal combustion engine. The technology of 'regenerative braking' is present in electric vehicles; the battery itself uses this so when you press the brake pedal, it makes the electric motor go in reverse and act as a generator. This can assist in maximising an electric vehicle's range.

What types of alternative fuel vehicles are there?

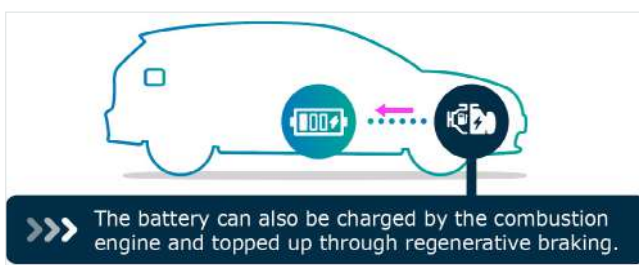
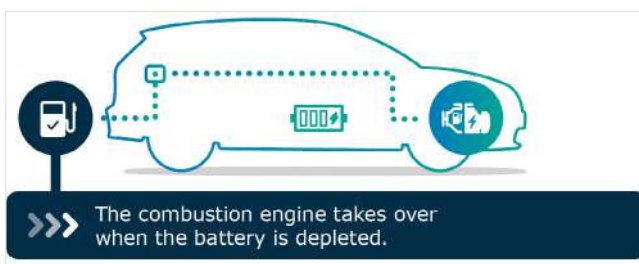
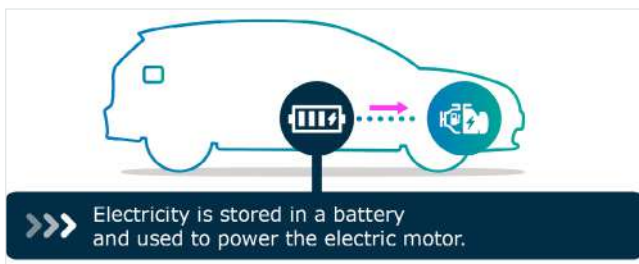
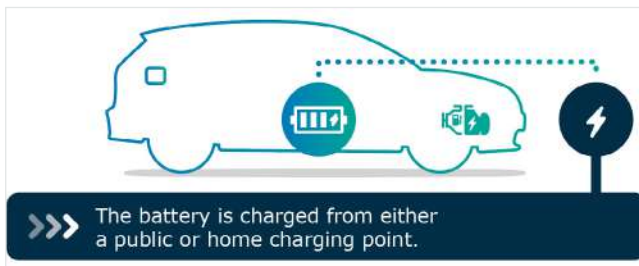
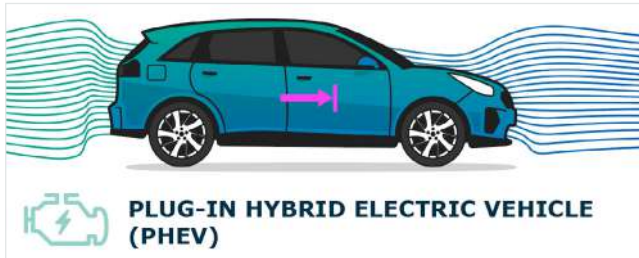
Fully electric (EV or BEV)

An electric vehicle powered by a battery and electric motor only.



Plug-in hybrid (or PHEV)

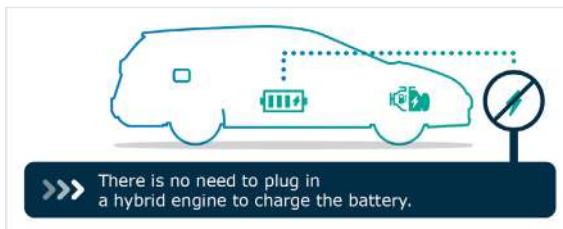
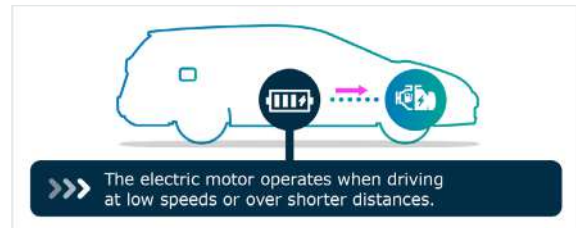
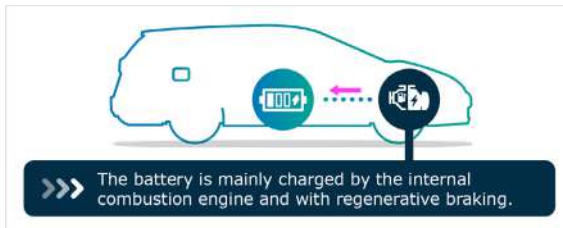
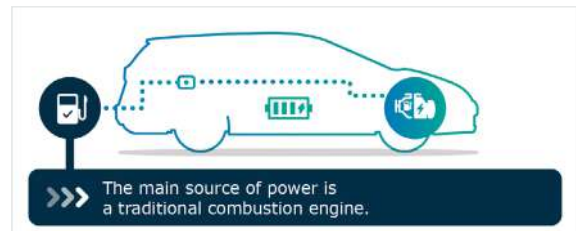
The 'plug-in' part just means you need to plug the car into a charging point to charge its battery. 'Hybrid' means the car has both a battery and a normal petrol or diesel engine. A PHEV will typically go about 30 miles on the electric motor only and then the petrol/diesel engine will take over. For short trips, you can drive 100% electric in a PHEV. However, for longer trips, you will start with electric, but then have the comfort of knowing you can fill up quickly at a petrol station and continue your journey.



Hybrids (or HEVs)

Hybrids (or HEVs) have both a petrol/diesel engine and a battery. However, you can't plug the car in to charge the battery. HEVs are predominately normal petrol/diesel cars; their very small battery typically either helps the car go further and/or improves its performance (such as acceleration).

The car will often run on the battery alone at low speeds but as soon as the car needs to go faster, the petrol/diesel engine kicks in. The battery itself charges partly via 'regenerative braking'. When you press the brake pedal, it makes the electric motor go in reverse and act as a generator.



Hydrogen

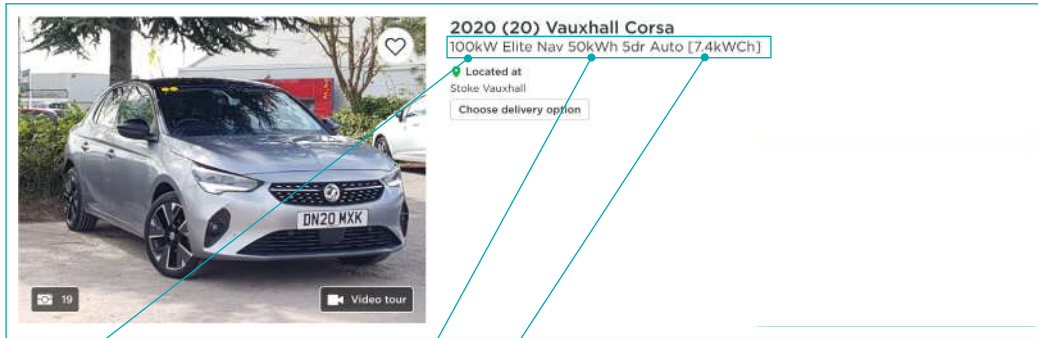
The fuel cell is a device that takes chemical energy, in the form of hydrogen, and turns it into electricity that can power an electric motor, just like a battery. So, a hydrogen-powered car is powered with an electric motor.

Bi-fuel

A bi-fuel natural gas vehicle can use either gasoline or natural gas in the same internal combustion engine. Both fuels are stored on board and the driver can switch between the fuels. The vehicle is equipped with separate fuel tanks, fuel injection systems, and fuel lines for both fuels.

KEY POINTS OF AN ELECTRIC VEHICLE

Below is an example of an advert you would find on ArnoldClark.com of an electric vehicle pointing out key information and what each point means.



100kW:
Motor (power output) - it could be converted to BHP. In theory, if you multiply this figure by 1.35 it will give you an approx. BHP for the vehicle (e.g. 100 x 1.35 = 135 BHP) also known as badge power.

7.4WCh:
On-board charger capacity, this will limit the rate of charge an electric vehicle can receive from any size of AC charger.

50kWh:
The size of the battery.

Technical specification Generated by CAP

Electric vehicle data

Battery Capacity in kWh	50	Battery Charge Slow kW	7.4
Battery Charge Slow Percentage	0-100	Battery Charge Slow Time (Minutes)	450
Battery Charge Fast kW	22	Battery Charge Fast Percentage	15-80
Battery Charge Fast Time (Minutes)	300	Battery Charge Rapid kW	50
Battery Charge Rapid Percentage	15-80	Battery Charge Rapid Time (Minutes)	45
Battery Charge Super Charge kW	100	Battery Charge Super Charge Percentage	15-80
Battery Charge Super Charge Time (Minutes)	30	Battery Type	Lithium-ion
Coupler/Connector Type	Type 2	Standard manufacturers Battery warranty - Mileage	100000
Standard manufacturers Battery warranty - Years	8	WLTP - EC (kWh/100km) - Comb	16.5
WLTP - EC (kWh/100km) - Comb - TEH	16.8	WLTP - EC (kWh/100km) - Comb - TEL	16.5

Battery size

Battery warranty in years

On-board charger

Battery warranty in mileage

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WLTP - EC (kWh/100km) - Comb - TEH	16.8	WLTP - EC (kWh/100km) - Comb - TEL	16.5
WLTP - EC (miles/kWh) - Comb	3.8	WLTP - EC (miles/kWh) - Comb - TEH	3.7
WLTP - EC (miles/kWh) - Comb - TEL	3.8	WLTP - Pure Electric Range (km) - City	417
WLTP - Pure Electric Range (km) - City - TEH	412	WLTP - Pure Electric Range (km) - City - TEL	417
WLTP - Pure Electric Range (km) - Comb	336	WLTP - Pure Electric Range (km) - Comb - TEH	328
WLTP - Pure Electric Range (km) - Comb - TEL	336	WLTP - Pure Electric Range (miles) - City	259
WLTP - Pure Electric Range (miles) - City - TEH	256	WLTP - Pure Electric Range (miles) - City - TEL	259
WLTP - Pure Electric Range (miles) - Comb	209	WLTP - Pure Electric Range (miles) - Comb - TEH	204
WLTP - Pure Electric Range (miles) - Comb - TEL	209		
Emissions - ICE			
CO2 (g/km)	0		

Combined efficiency

Electric range (comb)

WLTP = Worldwide Harmonised Light Vehicle Test Procedure

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GRANTS/INCENTIVES AVAILABLE

For a number of years there have been various grants available designed to make the transition to electric vehicle (EV) ownership more affordable for more drivers.

Vehicle purchase grants

The government's electric vehicle grant is paid out by the Department of Transport's Office for Zero Emission Vehicles (OZEV). This grant, where applicable, is taken off the list price of the vehicle and administered by the dealer.

<https://www.gov.uk/plug-in-car-van-grants>

Home charger grants

When looking to install a home charger, there may be some GOV funding available. Again, these schemes are subject to change, so it is always advisable to check with **the installers who will give up-to-date information.**

<https://www.gov.uk/government/collections/government-grants-for-low-emission-vehicles#electric-vehicle-homecharge-scheme>

There are also additional regional offers at times that can be of value. One example is The Energy Saving Trust in Scotland, which may promote 0% interest loans for cars or electric bikes.

<https://energysavingtrust.org.uk/grants-and-loans/ebike-loan/>

However, as with the other grants, these are not always available and can be withdrawn at short notice.

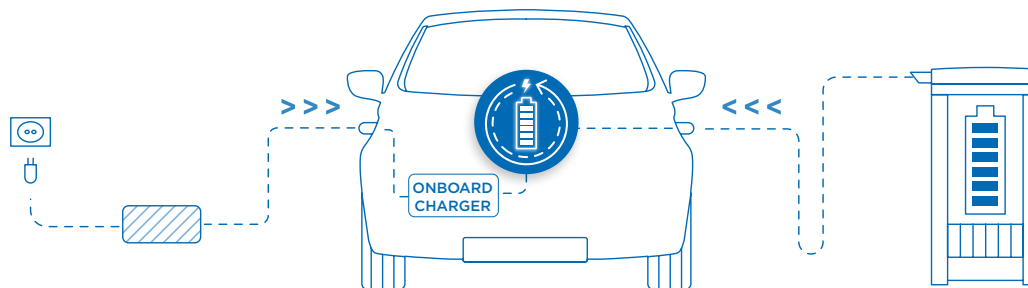
The staff at the Innovation Centres are always on hand for the most up-to-date information.



CHARGE

AC vs DC

Electric (BEV) and PHEV vehicles need to be charged using external plugs and cables. The diagram below explains the technical details for how the power reaches the battery.



AC alternating current

The EV's onboard charger converts AC power to DC to charge its battery. The size of the onboard charging device is constrained by space, which limits the amount of power they can deliver and makes charging typically slower.

DC direct current

A DC fast charger bypasses the onboard charging device, supplying power directly to the EV's battery. The DC charger is external to the car, so it isn't constrained in size or cost and makes charging typically much faster.

CHARGING AN ELECTRIC VEHICLE

Charging cables

If you buy an electric vehicle, some manufacturers may supply two charging cables, the first option being a three-pin socket and the other being a Type 2. You will require at least a Type 2 if you want to both public and home charge your electric vehicle.

Type 2 variants are for cars compatible with fast chargers. Meanwhile, CCS and Chademo are for cars that are compatible with rapid chargers.



Home charging

Charging at home can be the most convenient and cost-effective way of charging your new electric vehicle. The main thing to consider is if your home is suitable for a charger; for example, do you have dedicated off-street parking where the cables pose no obstruction to the public walkway?

You can also check when your off-peak charge time is to avoid paying more than you need, while there are also government grants available for home charging points, all cost-saving options.

There are a number a different providers and units to choose from - BumbleBee EV provide national coverage - contact them for no obligation quotes or advice.



BumbleBee EV
🌐 bumblebeeev.com
📞 0333 050 9863
✉ info@bumblebeeev.com



How to calculate how much it costs to charge to full capacity via a home charger?

To estimate the cost of home charging, you need to apply the following formula:

Price per kW of your electricity supplier X Battery capacity in kWh = Estimate total cost.

Charging example

An entry-level Hyundai Ioniq 5 sporting a 58 kWh battery and an electricity tariff of 35p/kWh, the cost of a full charge at home is: 58(KWH) X 35P = £20.30



Public charging

Public charging can be used when traveling long distances, topping up when out or if home charging is not an option.

How much does it cost to charge an electric car?

There are many public charging providers, most of which have two different costs for use – one if you are a member of that network, and one for visitors. Members can usually benefit from lower tariffs.

Public charging points

There are lots of great websites and apps available to help you find your nearest charging point – these also allow you to filter by different connector types, networks, location, access and payment options, including free to use chargers.

Examples include:



chargeplacescotland.org



zap-map.com/live



network.bppulse.co.uk



chargeyourcar.org.uk



shellrecharge.com/en-gb/find-a-charge-point

DRIVING AN ELECTRIC VEHICLE

Electric efficiency explained

The following explains how you can calculate your electric car's efficiency and cost to run easier. Just like miles per gallon (MPG) for petrol vehicles, we **measure EVs in miles per kWh (mi/kWh)**.



In an electric car, the miles per kWh figure tells you how many miles the car will go on 1 kWh, or unit, of electricity. So if your EV has a battery size of 50 kWh and an efficiency rating of 3 miles per kWh, then on average it can travel 150 miles on a fully charged battery (50 kWh x 3 miles per kWh).

How to calculate electric vehicle efficiency

In theory, electric car economy can be calculated by using a car's battery capacity and its official range.

For example, An electric car with a 40 kWh battery pack and a 100-mile range would have an assumed economy/consumption figure of 2.5 miles/kWh.

What is the difference between driving an electric vehicle and an internal combustion engine?

There isn't a difference, driving an electric vehicle from a driver's perspective is still the same. However, there are a few things to consider and the following FAQs may help. First, let us explain the electric efficiency.

What is regenerative braking?

Regenerative braking is an energy recovery mechanism that slows down a moving vehicle by converting the kinetic energy into a form that can then be stored back into the battery.



What could I do to maximise the range in an electric vehicle?

It is recommended to make adjustments to your driving style as this will enhance its recommended range. For example, favour the regenerative braking when slowing down, consider an alternative route and don't accelerate too harshly. If there are different drive modes available, eco will be most efficient.



What other contributing factors may affect the range?

There are many factors which can affect the range. These include the outside temperature - during winter months when it's coldest, you'll see a reduced range. Using your air conditioning will also reduce the range of an electric vehicle. Top tip - if your car has heated seats and/or a heated steering wheel, this will have less of an effect on the range than climate control.



How accurate is an electric vehicle's claimed combined range?

An electric vehicle's claimed combined range is calculated using the new WLTP testing procedure. This involves a series of different drives in a variety of conditions which should result in a fair real-life range test. However, due to the variables that can affect this, we should never guarantee what range the vehicle can achieve.



Knowledge is power

These core tips apply no matter what type of vehicle you are driving. They significantly reduce fuel consumptions and can also have positive safety impacts.

- Maintain momentum - avoid harsh braking and acceleration where possible.
- Ensure all tyres are correctly inflated.
- Plan ahead to avoid traffic or getting lost which may add unnecessary mileage.
- Close windows at higher speeds (above 45mph) and remove unused roof racks, boxes and bike racks to reduce drag.
- Remove all unnecessary weight from the car.

ALL-ELECTRIC VEHICLE SERVICING

The same elements as any other vehicle will be checked to be determined an EV's roadworthiness, including tyres, the braking system and headlights. However, EV drivers will be delighted to know that they no longer need oil changes.

Electric vehicles don't have a clutch, gearbox, timing belt or spark plugs.

And, because most EVs can still produce power even when braking, movements are much easier on its brakes and tyres.

Fundamentally, an electric motor only has two or three moving parts, making it easier to service.

FEWER MOVING PARTS, EASIER TO MAINTAIN.

A technician will look at...

- The charging cable – making sure it's present and in the right place before carrying out a visual check of its condition.
- The high-voltage battery – checking the level of charge, and recharging the battery if necessary.
- Components and cables – these will be checked for any damage and to ensure the lines carrying electric power are secured and routed correctly.

How often do EVs need to be serviced?

As regularly as any petrol or diesel vehicle – it's also a good idea to book seasonal checks to make sure tyres, brakes, lights and other parts of the car are ready for any extreme road conditions.



NEED MORE HELP?

We have a dedicated team of innovation geniuses and management at our Innovation Centres.

Please reach out for any questions or queries you have on alternative fuel vehicles.

Glasgow

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0141 435 5633

Stafford

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01785 559663

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FAQS

What is an electric vehicle comprised of?

An electric vehicle uses the stored power from the car's battery to power an electric motor, which turns the wheels. There are less moving parts in an electric vehicle.

What grants/incentives are available when purchasing an electric vehicle?

There are currently incentives available from both the Office of Zero Emissions Vehicles for the whole of the UK and from Energy Savings Trust in Scotland. For the most up-to date information, please contact the team at the Innovation Centre.

Are electric vehicles automatic?

Yes, the main difference is there is no gear changes in electric vehicles as they use a single-speed transmission.

How long does an electric battery last?

Electric car batteries don't have a typical lifespan, however the majority of electric cars come with a battery warranty of 8 years or 100,000 miles. Always refer to the appropriate manufacturer before advising the customer.

Can an electric vehicle tow?

Yes, however not all electric vehicles are suitable for towing, as this depends on a variety of factors which are manufacturer-specific. For towing capacity, please refer to the technical specification of the vehicle.

What are the potential cost savings of moving to an alternative fuelled vehicle?

This all depends on how many miles you drive and your style of driving and the vehicle type. To get further examples, please contact the Innovation team for examples.

What will happen when my electric vehicle runs out of charge completely?

Your electric vehicle will eventually come to a stop when the range runs out. However, before this happens, you will receive a variety of warning signs prior to this. If you run out of charge, you would be required to contact a breakdown service to uplift the vehicle.

Is there a difference in car insurance when insuring an alternatively fuelled vehicle over a combustion engine vehicle?

Car insurance is unique to the individual and based on different factors, such as age of the driver, where they stay, power of the vehicle and the value of the vehicle in question. Arnold Clark Insurance can help if you have a customer interested.

How often should I be charging my electric car?

Unlike combustion engines, it is recommended to graze charge your electric vehicle, i.e. do not run to empty. Try and always take the opportunity to charge, even if it's a small amount of 10/20% to keep your car's charge between 20-80%.

At home, can you get different tariffs with electricity providers when charging and electric vehicle?

Some electricity companies will offer smart tariffs with cheaper rates overnight to encourage drivers to charge their vehicle when there is a lesser demand on the grid. This will usually incur a price rise for on-peak hours.

Is the cost of a home charger included in the price of the car?

This varies - manufacturers have different offers which can change.

Can I get an electric car on Motability?

Yes, you can. Visit www.Motability.co.uk for all up-to-date information on the list of electric vehicles available.

What are the BIK rates on electric vehicles?

For 2020/2021 its 0%. For 2021/2022, its 1% and for 2022/2025 its 2%.

Business related questions

If you have any enquires or queries relating to business users of electric vehicles, please contact the Innovation Centre, as we have a business specialist here to help.

Do I own or lease the battery?

Pre-2018, there were a number of Renault Zoes where depending on the version of the electric vehicle, there may be a separate agreement of the rental battery. Where the vehicle variant is **i-Dynamique**, then the battery would have been purchased outright. Where the vehicle variant is **Dynamique** then there is a separate agreement for the rental of the battery. Full details and clarification can be obtained by either calling **0330 3310220** or via email to electricvehicle@rcibanque.com.

What is a low emission zone?

Low emission zones (LEZ) are areas where local authorities have introduced traffic restrictions to help improve air quality. This is an area where a person may not drive a vehicle which does not meet a specific exhaust emission standard.

<https://www.lowemissionzones.scot/local-zones>

<https://www.gov.uk/clean-air-zones>

What is the ECO mode?

Many electric vehicles come with a range of features that can ensure smarter and more efficient driving, to learn more about your vehicle refer to the driver's manual for specific information. Switching on the eco mode or equivalent in your car can reduce the drawdown of energy used by limiting the throttle and the power of some ancillary features such as air conditioning. Some plug-in hybrid vehicles and range-extended electric vehicles also have features that allow drivers to choose when they use battery charge or fuel, ensuring that drivers can opt to use the battery when its most efficient, for example city driving.

