



electric vehicles



what are they?

Electric vehicles (EVs) are run by electric motors powered by on-board rechargeable batteries, rather than by fossil fuels - although there are hybrid vehicles that use both. There are four basic types:

- Fully-electric vehicles that only have a battery, and you can't put fuel in; they are charged from mains electricity at plug-in points.
- Hybrids (e.g. the Prius) that can't be plugged in - the battery is charged by the engine and by braking.
- Plug-in hybrids that are charged from the mains and run on the battery until the charge runs out and the conventional engine takes over.
- Extended range electric vehicles that have a petrol generator on board that kicks in to top up the battery when required, but doesn't drive the car - the drive is always electric.

Another type of electric vehicle is powered by on-board fuel cells. These vehicles require a whole new hydrogen infrastructure rather than the existing National Grid, and will be covered in a future factsheet.

EVs have been around since the late 19th century, and the image conjured up in many people's minds is possibly not much more advanced than that - perhaps a milk float (as an aside, in the 1960s the UK probably had more EVs than the rest of the world put together, and they were almost all milk floats). But they'd be wrong - the development of modern EVs began to take off in the 1990s with little quadricycle-type vehicles - the most popular being the G-Wiz, which is still around. Since 2010, major manufacturers have been developing and safety testing fully electric cars, and now there is a range of different models available. The market leader is the Nissan Leaf.



Subaru lithium-ion car battery.



Charging a Nissan Leaf.

By 2016, there were around 90,000 electric vehicles on UK roads, up from around 3500 in 2013. All major players are developing electric models, and the market and infrastructure for EVs is growing so rapidly that it's not hyperbole to say that the future of motoring is almost definitely electric. The reason it's taken so long is that the development of the EV was deliberately suppressed by large corporations, especially oil companies (see whokilledtheelectriccar.com). EVs are typically automatic, and the standard mode is 'eco', which is fine - unless you want to change to a more 'sporty' mode that drains the battery more quickly.

A new generation of lithium-ion batteries are being developed for EVs that are smaller, lighter and more powerful than lead-acid batteries.

what are the benefits?

Environmental benefits

- Although EVs produce more CO₂ in their manufacture, studies (like this one) show that for the whole of the vehicle's life-cycle (i.e. manufacture plus use), CO₂ emissions will be 20% lower for an EV, even if charged with electricity from coal/gas-fired power stations.
- However, the real benefits of EVs will be realised in future, when more green electricity comes online, and as lithium-ion batteries become lighter and more efficient.
- The mining of the raw materials for lithium-ion batteries causes environmental problems, but the overall impact is lower compared to lead-acid or nickel-cadmium batteries because they are much lighter, and so use fewer resources per unit of output, and they don't contain extremely toxic cadmium.
- No motor oil required.



Other benefits

- Cheaper - around 3p per mile using mains electricity, compared to 8-20p per mile using petrol or diesel, depending on efficiency.
- No road tax, congestion charge or company car tax, free parking - depending on the local authority, reduced resident zone parking fees.
- Improves the driving experience - electric vehicles are silent, which can reduce stress.
- Lower maintenance - no changing parts (filters, plugs etc.) and no checking water or oil levels.
- No emissions or noise from the vehicle when running on battery, which means cleaner air and a quieter environment in urban areas.
- No wars required to secure fuel for Evs.

Here are a couple of downsides of EVs, which mean that they may not yet be able to fit easily into a vision of a truly just and sustainable society. Firstly, they're more expensive (see below), but as with most things, prices will fall as uptake increases. Secondly, the market is controlled by the corporate, growth-oriented world - something that we believe is inherently unsustainable. But at least the energy for EVs can be generated locally from renewables, and doesn't have to be in the hands of giant oil companies. There are even books on how to build your own EV, and so maybe manufacture can become more local and small-scale. We think that all things considered, EVs are a step in the right direction.

what can I do?

Getting an electric vehicle: compare specs, prices and environmental impact of different models at nextgreencar.com. You can get electric motorbikes and scooters too. There are government grants for electric cars or plug-in hybrids - the dealer / manufacturer will have the forms. The Nissan LEAF is just over £20k - even after the grant. The Renault Zoe (similar to the Clio) costs around £13k, plus £70 per month to lease the battery - so that if it dies, you get a new one. This is a new market, and so no-one knows for sure how long the batteries will last yet - and a new one could cost up to £8k!

Charging: there are around 4000 public charging points in the UK - in car parks, shopping centres, universities, hotels, council offices, car dealerships and motorway services - set to rise to over 12,000 in the next 2-3 years (see zap-map.com). Most

people will charge at home or at work though - via a special charging unit with a standard 3-pin plug. The government offer 70% off home charging units, and the manufacturer usually pays the rest - making them free. Workplace charging (e.g. at hospitals) is often free too. For home charging you'll need off-street parking - you can't trail cables across the pavement. Slow/standard charging takes 8-10 hours, and can be done overnight (cheaper); fast charging takes 3-4 hours, and rapid charging can give an 80% charge in 20-30 minutes. There are government schemes around the UK (see our links page) to help set up the infrastructure for charging.

Range: 'range anxiety' may be a factor when considering EVs. A couple of decades ago, an electric vehicle might have been expected to have a range (the distance travelled between charges) of 20-30 miles. But the Nissan Leaf and Renault Zoe have a range of 120 miles. The average driver in the UK covers 60-70 miles per day, so we can expect range anxiety to wane a little.

resources

- see lowimpact.org/electric-vehicles for more info, advice, links and books, including:
- Mark Warner, *the Electric Vehicle Conversion Handbook*
- James Billmaier, *Jolt: the Impending Dominance of the Electric Car*
- L E Carmichael, *Hybrid & Electric Vehicles*
- evworld.com - *Electric Vehicles Magazine*
- nextgreencar.com - information & buyers' guide
- zap-map.com - map of UK charging points
- wevaonline.net - World Electric Vehicle Association



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