energy saving trust

Information pack

Zero emission powered light vehicles for personal use

Small, lightweight and energy efficient alternatives to traditional vehicles

What are zero emission powered light vehicles?

Zero emission powered light vehicles (zePLVs) are two, three and lightweight four-wheeled vehicles that don't produce harmful emissions at the exhaust. They include electric mopeds, motorbikes and micro cars.

ZePLVs are good alternatives to cars for everyday journeys like commuting or running errands.

ELECTRIC SCOOTERS (CATEGORY L1E)

These are most commonly electric mopeds or scooters used for delivery or commuting and are split into two categories:

- L1e-A powered cycles have two, three or four wheels, a power output up to 1kW and pedals. Their power assist cuts off at 15.5 mph (25km/h). It's recommended that rider wears a helmet.
- L1e-B powered two wheelers (PTWs) have up to 4kW of power and a top speed of 28mph (45km/h). The rider must wear a helmet by law.

note that* **electric bikes with pedals of 250w or less *are not L-category.*

ELECTRIC THREE WHEEL MOPED (CATEGORY L2E)

These are usually small delivery vehicles that have three wheels and one or two seats. They can hold a maximum weight of up to 270kg. Power is limited to 4kW, and the maximum speed is 28mph (45km/h).

ELECTRIC MOTORCYCLES (CATEGORY L3E)

Electric motorcycles are the most common zePLV. They are split into three categories (A1, A2 and A3) that are defined by power output. Riders must wear a helmet by law.

- A1 – Low performance motorcycle or scooter up to 125cc and 11kW power.
- A2 – Medium performance motorcycle or scooter up to 35kW power.
- A3 – High performance motorcycle above 35kW power.

ELECTRIC MOTORCYCLES WITH SIDECAR (CATEGORY L4E)

These are L3e electric motorcycles that are fitted with a sidecar.

ELECTRIC POWERED THREE WHEELED (CATEGORY L5E)

These are usually small delivery vehicles that have three wheels and are similar to L2e vehicles, but they have power in excess of 4kW and top speeds exceeding 28mph (45km/h). They can have a maximum of five seats and a running mass of 1000kg.

ELECTRIC LIGHT FOUR WHEELED (CATEGORY L6E)

These micro cars (or quadricycles) have four wheels and no more than two seats, so they're a good alternative for commuting or small cargo delivery. Their power is capped at 6kW, and they have a top speed of 28 mph (45km/h). Their running mass is limited to 425kg.

ELECTRIC HEAVY FOUR WHEELED (CATEGORY L7E)

These micro cars and micro vans (or heavy quadricycles) have four wheels and an enclosed passenger area. Great for commuting and delivery. They have a maximum power of 15kW. They can have up to four seats or two seats plus a cargo area. Their top speed is limited to 56mph (90km/h).

What are zePLVS?

zePLVs have a range of benefits, including being cheaper to run and quicker at getting around than cars and vans.

Cheaper

- zePLVs don't produce any tailpipe emissions, so you won't be charged for driving through clean air zones and ultra-low emission zones.
- The cost of servicing and maintenance is lower for zePLVs than for internal combustion engine (ICE) vehicles. This is because zePLVs have electric powertrains which don't have as many moving parts to look after or replace, so they're cheaper to maintain.
- It's already cheaper to charge an EV than to refuel an ICE car or van, but zePLVs are even cheaper to charge than electric cars.
- You also don't need to pay to have a charger installed to charge your zePLV. You can charge most low-powered zePLVs from a regular three-point plug, which you'll find in all UK homes and workplaces.
- It only takes 2–5 hours to fully charge a zePLV from a three-pin plug.

You can see some charging and fuelling cost comparisons in the table below.

We haven't included the cost per mile, as this can vary a lot depending on your driving speed. However, as a rough idea, a motorbike rider riding a low powered motorbike at lower speeds would save around two thirds of their petrol costs by switching to electric.[1]

Vehicle	Cost of charging/ fuelling at home[1]
Electric motorbike	**£1.16**
Electric microcar (heavy quadricycle)	**£2.99**
Petrol motorbike	**£17.52**
Electric car	**£23.24**
Petrol car	**£80.30**

1 In calculating these costs, we assumed that the electric motorbike has a 3.5kWh battery, the quadricycle a 9kWh battery and the electric car a 70kWh battery. We used electricity costs of 33.2p/kWh (accurate as of April 2023, energysavingtrust.org.uk/about-us/our-data). As of April 2023, in Great Britain, the average standard rate unit cost for gas is currently capped at 10.3p per kilowatt hour (kWh) and 33.2p per kWh for electricity. The exact unit rate you pay varies slightly depending on where you live, and it will always depend on how much energy you use. We also assumed a 12-litre petrol fuel tank for the petrol motorbike and 55-litre tank for the petrol car, with a petrol pump cost of 146p/l (accurate as of April 2023, Weekly road fuel prices – GOV.UK (www.gov.uk)). The scenario assumes 0 to 100% charging or refuelling. It's unlikely batteries or tanks would be drained to zero, so the prices should be used for comparative purposes only.

Greener

- zePLVs produce zero emissions, so they don't add to local air pollution and will help keep the air around where you live and work cleaner.
- By switching to a zePLV, you'll be reducing your carbon footprint. ZePLVs produce less harmful emissions over their lifetime, including when they're being manufactured and when their parts are recycled, when compared to any type of ICE alternatives or larger EVs.[2]

Quicker

- Smaller zePLVs, especially electric mopeds and motorbikes, can easily move through traffic when it's safe to do so.
- If more people used zePLVs, it could reduce traffic and speed up journeys by making better use of road space. Replacing 5% of private cars with zePLVs would reduce journey delays by 8.2%.[3]
- By downsizing from a larger car, you could save time that you might have spent finding a big enough parking space.

Better for your wellbeing

- 82% of motorcyclists agree that riding a motorcycle makes them happy. This figure drops to 55% among all other motorists.[4]
- Riding a motorbike improves cognitive function. This is because motorcyclists have to engage their brains more than car drivers.[4]
- Riding a motorbike is good physical exercise. It improves muscle tone and core strength.[4]

2 Lifetime greenhouse gas emissions include vehicle production, fuel production, electricity production, vehicle use, battery replacement and end-of-life. These emissions are lower per kilometre when comparing zePLVs to similar vehicles doing the same journey. https://www.zemo.org.uk/news-events/news,powered-light-vehicles-can-enable-transport-decarbonisationlifecycle-analys_4329.htm

3 Local Transport Projects, 2019, *L-Category Vehicles Congestion Impact Study*, p. 26.

4 MCIA, 2022, The Journey to a Brighter Destination

What can I use zePLVs for?

Commuting

If your commute is too long or too difficult to walk or cycle, or it's hard for you to get to work using public transport, you could use a zePLV instead.

They're particularly useful if you're a shift worker who can't rely on regular public transport (e.g. you work overnight or very early in the morning, which is often when there's less public transport available) or you live in an area with limited public transport.

You can use any type of zePLV for commuting. For example, commuting in an L7e micro car is dry and comfortable in all weathers, and it's cheaper and more efficient than a standard car. Electric mopeds and motorbikes (L1e and L3e) are good options if you're looking for a cheaper commuter vehicle that can move through traffic quickly.

Electric mopeds are best for commuting around towns and cities or if your journey is around 10 miles. This is because their speeds are capped at 28mph, so they're suitable for areas with a 20mph or 30mph speed limit, and they have a limited range.[5]

For commuting along motorways and country roads, electric motorbikes are a good option because they don't have the same speed restrictions as mopeds and can go faster. The plug-in vehicle grant[6] offers up to £500 off certain motorbikes and £150 off certain mopeds.

Many new electric mopeds and low powered motorbikes also come with batteries you can swap over, so you'll never have to stop and wait for a battery to charge. You can carry two batteries and extend your range while on the go or leave one to charge while you ride.

5 MCIA, 2019 The Route to Tomorrow's Journeys

6 Accessed December 2022, https://www.gov.uk/plug-in-vehicle-grants/motorcycles-and-mopeds

7 Zemo Partnership, 2021, https://www.zemo.org.uk/news-events/news,powered-light-vehicles-can-enable-transport-decarbonisationlifecycle-analys_4329.htm

ENVIRONMENTAL IMPACT: An electric motorcycle, used for a commute that involves travel along motorways and/or country roads, has a lifetime carbon footprint that is equivalent to 35g of carbon dioxide (CO_2) being emitted per kilometre travelled, compared with 130g per kilometre when doing the same commute with a 650cc ICE motorbike.[7]

Electric motorbike **35G** lifetime emissions equivalent of CO_2 emissions CO_2 per kilometre

Petrol motorbike **130G** lifetime emissions equivalent of CO_2 emissions CO_2 per kilometre

Shared mobility

Shared mobility schemes, which is where you rent a vehicle for occasional journeys, are starting to use zePLVs. This is a great alternative to taxis if you need to travel a bit further or faster around a city than you could on a bicycle, by e-scooter or walking. Shared mobility is also ideal if you don't want to buy a vehicle because you only need to use one every so often or you don't have the space to store one.

While there aren't any shared mobility schemes using zePLVs in the UK right now, they've already been incredibly successful in Europe.

Leisure

If you enjoy riding motorbikes, zePLVs are a greener alternative. The UK Government aims to end the sale of new ICE motorbikes by 2035.[8] This would make zero emission motorbikes the next best option.

Electric motorbikes also offer a smooth riding experience and impressively fast acceleration.

8 Consultation closed September 2022.

9 Zemo Partnership, 2021, https://www.zemo.org.uk/news-events/news,powered-light-vehicles-can-enable-transport-decarbonisationlifecycle-analys_4329.htm

ENVIRONMENTAL IMPACT: Using an electric motorbike for leisure has a lifetime carbon impact equivalent to 70g of CO2 per kilometre travelled compared with 190g CO2 per kilometre with an ICE motorbike.[9]

Electric motorbike **70G** lifetime emissions equivalent of CO2 emissions CO2 per kilometre

Petrol motorbike **190G** lifetime emissions equivalent of CO2 emissions CO2 per kilometre

Find out more about zePLVs at **energysavingtrust.org.uk/advice/electric-motorbike-moped-micro-car**