



Efficient driving in electric and low-emission vehicles



Introduction

Driving efficiently and maximising range are important considerations for all drivers, especially those utilising ultra low emission vehicles (ULEVs) and pure electric vehicles where range anxiety might be an issue. ULEVs in this context refer to vehicles powered by both electricity and fuel, such as plug-in hybrid vehicles and range-extended electric vehicles.

Knowing how to efficiently drive these vehicles can help overcome range anxiety as a potential barrier to ownership, as well as reducing fuel costs and maximising the contribution of battery power.

This guide outlines our top tips for efficient driving in your ULEV:

- 1. Conserve momentum**
- 2. Avoid harsh braking**
- 3. Watch your speed**
- 4. Reconsider use of heating and air conditioning**
- 5. Know your vehicles eco features**

Ecodriving in Electric Vehicles (EV) Training Programme

Energy Saving Trust's Ecodriving in EVs Training Programme trained 67 drivers over a 3 month period. Results from training show a reduction in energy consumed by 16% and a resulting increase in range of 20%, illustrating how applying smarter driving techniques can make a real difference to the EV driving experience.

Top tips

1. Conserve momentum

Conserving momentum is the number one technique for efficient ULEV driving, as it is for conventional vehicles. Reading the road and observing other road users further ahead allows a driver to reduce unnecessary acceleration and braking, which has a major effect on energy consumption and maximises regenerative braking.

Harsh acceleration has less effect on energy consumption in a ULEV than in conventional vehicles, however, there is still an energy penalty. More importantly, harsh acceleration and a more aggressive driving style often goes hand-in-hand with heavier braking, and heavier braking means regenerative braking is not being maximised.

2. Avoid harsh braking

Regenerative braking is a key feature of ULEVs which converts some of their movement (kinetic) energy back into electricity to recharge their batteries. When a driver lifts their foot from the accelerator pedal, the electric motor acts as a generator and creates reverse torque to the front wheels, slowing the car down. This contrasts with conventional brakes which convert movement energy into heat in the brakes, which is then lost to the atmosphere.

- Energy recapture available through regenerative braking is around 10% through normal driving and up to 30% on descents.

- Regenerative braking, and therefore efficiency, is maximised by reducing the use of conventional friction brakes. The most effective way to increase regenerative braking is by anticipating further ahead to avoid unnecessarily harsh accelerating and braking.
- If you can safely avoid using the foot brake until below about 10 mph, regeneration will be maximised.

The extent of brake regeneration differs by model, with many ULEVs allowing the driver to adjust the level. Initially, higher level of regeneration may seem uncomfortable as the vehicle brakes automatically as soon as the acceleration ceases. Most drivers quickly adjust to this however.

3. Watch your speed

High speeds increase energy consumption in EVs more than they increase fuel consumption in conventional vehicles. Typically in a conventional vehicle, the most efficient speed (and therefore maximum MPG) is achieved at approximately 40 – 50 mph, but the most efficient speed for EVs is lower than this. The reason for the higher energy consumption at speed is that air resistance (drag) increases by the square of the vehicle speed. With conventional vehicles this effect is somewhat countered by the fact that vehicles are more efficient in higher gears, but with EVs the countering effect of gears does not come in to play. This is why electric cars are well suited to city driving where speeds are often lower.

4. Reconsider use of heating and air conditioning

Some ancillary features are essential for driver safety, such as lights, horn, indicators and windscreen wipers, whilst the use of others can be moderated by the driver. Ancillaries in a ULEV, such as heating and air conditioning, can add in excess of 10% onto the energy drawn from the battery. It is important for drivers to understand the consumption of the ancillary features so they know how this will impact their range and can adapt their behaviour accordingly. Simple changes to driving behaviour can easily improve efficiency for these features.

The heating system in a conventional car uses waste heat from the engine, unlike in an EV that has to generate the heat from the battery using additional energy. Some models of EV can pre-heat the car using electricity from the mains, but drivers should also consider just how necessary high levels of heating are. Air conditioning will utilise less energy than heating, however if travelling below 45mph it will be more efficient to open the window.

5. Know your vehicle's eco features

Many EVs come with a range of features that can ensure smarter and more efficient driving, so learn more about your vehicle and 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 it's most efficient, for example city driving.

When driving long distances, plan accordingly and know where charge points of a suitable type are located, to allow your vehicle to be recharged.

Other efficient driving tips

These core tips apply no matter what type of vehicle you are driving. They significantly reduce fuel consumption 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 simply 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.

Find out more about ULEVs, fuel efficient driving and electric vehicle training by visiting our website: www.energysavingtrust.org.uk/transport or contacting us at transportadvice@est.org.uk

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