

Background sheet: The electric vehicle debate

Are electric vehicles really green? ?

Overview: Electric vehicles (EVs) are becoming increasingly popular around the world as an alternative to vehicles that use climate-damaging fossil fuels, such as diesel and petrol. Supported by several governments – many of which have introduced subsidies to encourage a switch to EVs – they produce zero exhaust emissions and do not contribute to certain types of harmful air pollution, including smog. However, their large batteries require regular charging from electricity sources that are often powered by greenhouse-gas-emitting fuel types. At the same time, the processes involved in creating the cars themselves have also raised concerns among critics. These include the mining of rare earth elements, the carbon footprint of battery production, and questions about whether the electricity grid can cope with large-scale EV adoption. As a result, EVs have become a debated symbol of climate action, raising questions about fairness, sustainability and long-term environmental impact.

Key facts:

- ① While EVs have zero tailpipe emissions, the electricity used to charge them can still come from fossil fuels, depending on a country's energy mix.
- ① Producing an EV battery generates significantly more CO₂ than producing the engine of a petrol or diesel car, although EVs usually become 'cleaner' over their lifetime as they avoid emissions from burning fuel.
- ① Many EV batteries rely on lithium, cobalt and nickel – materials often mined in environmentally sensitive areas or regions with poor labour protections.
- ① EVs are generally cheaper to run than petrol or diesel cars, but they are often more expensive to buy upfront.
- ① Most EV batteries can be recycled, but large-scale recycling systems are still being developed in many countries.
- ① Governments worldwide are setting deadlines to phase out sales of new petrol and diesel cars – for example, the UK currently aims for 2035.

Ethical/social considerations:

- ④ Fairness and access: Are EVs affordable for everyone, or do they only benefit wealthier households with off-street parking and access to chargers?
- ④ Environmental trade-offs: How do we balance the benefits of lower emissions on our roads with the environmental damage caused by mining and battery production?
- ④ Infrastructure: Should governments prioritise investment in public charging networks, and how can they ensure rural areas aren't left behind?
- ④ Global responsibility: How should countries address the human rights concerns linked to the extraction of materials used in EV batteries?
- ④ Energy demand: As more people use EVs, can national grids cope, especially during peak times or extreme weather events?
- ④ End-of-life waste: What systems need to be in place to ensure EV batteries are recycled safely and sustainably?

Curriculum links:

Physics (electricity and energy),
Geography (resources, sustainability),
Citizenship (ethics, policy)

Roles: The electric vehicle debate

For example, in a class of 30 students, split them into five teams of six and assign each team one of the following roles.

Role 1: EV manufacturer

- ④ **Position:** Promote EVs as essential for a low-carbon future
- ④ **Consider:** Innovation, supply chains, production impacts, customer demand

Role 2: Environmental activist

- ④ **Position:** Support cleaner transport but demand higher environmental standards
- ④ **Consider:** Mining impacts, energy sources, recycling, long-term sustainability

Role 3: Car buyer / consumer representative

- ④ **Position:** Want affordable, reliable transport with clear information
- ④ **Consider:** Cost of living, access to charging, practicality, trust in new technology

Role 4: Local community leader

- ④ **Position:** Balance the benefits of cleaner air with pressures on local infrastructure
- ④ **Consider:** Installation of chargers, grid capacity, neighbourhood impacts

Role 5: Transport minister

- ④ **Position:** Make policy recommendations that balance climate goals, budgets and fairness
- ④ **Consider:** National targets, subsidies, public opinion, and infrastructure planning