

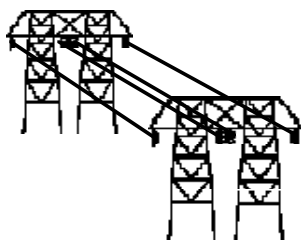


Electric Vehicles

Electric vehicles are gaining attention as an option for improving air quality and lessening United States dependence on imported oil. Research and development is under way on advanced battery and fuel cell technology and automakers are stepping up efforts to design electric vehicles for fleets and personal use. While today's technology is new, battery-powered vehicles have been around for a long time. Electrics flourished before the rise of the gasoline automobile and some 50,000 electric vehicles were in use in the United States by 1912.

How Clean are Electric Vehicles?

Electric vehicles are sometimes referred to as "zero-emission vehicles" because they produce essentially no pollution from the tailpipe or through fuel evaporation. This is important, for it means that the use of electric vehicles could greatly reduce emissions of carbon monoxide and smog-forming pollutants in cities with dirty air.



While electric cars themselves are clean, generating the electricity to charge vehicle batteries produces air pollution and solid waste. If electric power plants produce electricity using clean energy sources such as solar or hydropower, emissions are negligible. But power plants which combust conventional fuels like coal (used for more than half of the electricity generated in the U.S. today) produce emissions such as particulate matter, sulfur oxides, nitrogen oxides, hydrocarbons, and carbon monoxide. These same plants also create carbon dioxide, a combustion product of all fossil fuels, which contributes to global warming.

There are several factors that affect this pollution tradeoff. It may be easier to control pollution at a power plant than from individual vehicles. Power plants often are located outside major centers of urban air pollution. And finally, while only a fraction of today's power plants use renewable resources (biomass, wind, geothermal, or solar power), electricity can be produced from these clean sources of energy.

Potential health or safety risks associated with widespread electric vehicle use have not yet been fully evaluated. Many vehicle batteries contain toxic elements or produce toxic emissions which could make battery production, transport, use, and disposal a significant solid waste issue. The United States must consider how to safely dispose of or recycle these batteries.

When Will Electric Vehicles be Available to the Public?

A few electric vehicles are on the road already, but these are limited in capability by the state of battery technology. Currently available batteries are expensive, heavy, and store little power. For example, the most common batteries in use today (lead-acid) allow a car to travel only 60-70 miles on a charge, cost \$3,000 to \$4,000 per battery pack, and must be replaced every four years.

However, efforts are under way to advance vehicle technology. The Big Three automakers and the U.S. Department of Energy have formed the Advanced Battery Consortium, a \$260 million cooperative project, to investigate more efficient types of batteries such as nickel-iron, sodium-sulfur, and zinc-air batteries. On the policy front, the state of California will require automakers to sell zero-emission vehicles (ZEVs) beginning in 1998. The California law is intended to force technology development and hasten widespread commercial introduction of electric vehicles. California is requiring ZEVs to be 2 percent of annual sales (about 40,000 vehicles) in 1998, phasing up to 10 percent (about 200,000 vehicles) by the year 2003. Other states have the option of adopting these same laws.

What are Hybrid Electric Vehicles?

Hybrid electric vehicles have batteries to provide electric power but are also equipped with a small internal combustion engine (usually powered by gasoline). The engine provides a power boost and/or can be used to recharge the batteries, as pure electrics today simply cannot achieve the range, performance, or convenience of a modern gasoline car. Unfortunately, the extra engine substantially increases pollution from the vehicle, erasing many of the air quality benefits of pure electric vehicles.

Do Electric Cars Operate Differently?

For the most part, driving an electric car will feel very similar to driving a gasoline car. Without the internal combustion engine, electric cars have the potential to be quieter. Drivers will be able to recharge their cars by plugging them in overnight to an electrical outlet at home and scientists are researching batteries which can be recharged quickly. Because current batteries are large and heavy, there may be less room for cargo and passengers in some vehicles. Early electric vehicles will likely be used by fleets which can recharge vehicles at night and by commuters who drive short distances in urban areas or who use an electric car as a second vehicle.

For More Information:

The Office of Mobile Sources is the national center for research and policy on air pollution from highway and off-highway motor vehicles and equipment. You can write to us at the EPA National Vehicle and Fuel Emissions Laboratory, 2565 Plymouth Road, Ann Arbor, MI 48105. Our phone number is (313) 668-4333.