



Maryland Department of the
Environment

FACTS ABOUT: HYBRID VEHICLES

What are Hybrids?

A hybrid vehicle employs two or more distinct power sources in an effort to move a vehicle. The most common form of hybrids combine an internal combustion engine with an electric motor, and are called hybrid electric vehicles (HEVs). HEVs have battery packs onboard that power the electric motor. They usually employ at least one of two methods for charging their batteries. The internal combustion engine can be configured to charge the battery directly, or the vehicle can use regenerative braking to re-charge the battery. Regenerative braking is a method of reducing a vehicles speed while converting some kinetic energy into electrical energy through a generator. Hybrid vehicles are able to achieve better gas mileage than conventional vehicles of similar size and design, especially for city driving, by taking some strain off of the gasoline engine during acceleration and cruising. Most conventional vehicles produce poor fuel efficiency during city driving due to the constant starting and stopping. This activity actually helps hybrids recharge their batteries and allows the vehicle to be powered by the electric motor more so than the gas engine at low speeds, and in stop and go traffic, improving fuel economy. Hybrid vehicles use technology that is available now at a reasonable cost, and provide a feasible means to reduce America's dependence on foreign oil.

How do Hybrids Work?

Hybrid vehicles are configured primarily in two ways. If the electric motor and engine are configured to work in series then the electric motor powers the vehicle and the gas engine acts as a generator to power the electric motor or recharge the batteries. The engine also supplies additional power for high speeds and quick acceleration. If the power is supplied in parallel then both the electric motor and gas engine supply power to move the vehicle. Parallel hybrids often have smaller batteries and rely on regenerative braking and sometimes the gas engine to recharge. In this case the electric motor supplements the gas engine when possible. Parallel hybrids provide a greater benefit during city driving compared to highway driving. Hybrid electric vehicles cannot be plugged-in to charge the battery packs, making them distinct from plug-in hybrids. Hybrids can also operate with smaller more efficient gas engines, compared to conventional vehicles, therefore improving fuel economy while still providing desired road performance.



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Mabrey/ARMA/June 2012

Benefits

- Improves gas mileage compared to similar conventional vehicles, up to 15-20 more miles per gallon for city driving.
- Hybrids will help reduce America's dependence on foreign oil by reducing fuel consumption.
- Decrease harmful emissions from improved fuel economy.
- Reduced CO₂ emissions from mobile sources will help alleviate concerns of global warming.
- Hybrids tend to depreciate less rapidly than conventional vehicles therefore retaining a high resale value.
- Technology is available now and is currently on the market for less than most other advanced technology vehicles.
- Hybrid batteries are designed to last around 150,000-200,000 miles, almost the life of the vehicle. This is an advantage over plug-in hybrids and electric vehicles that may need their batteries replaced before the usable life of the vehicle is up.

Disadvantages

- Hybrids tend to cost several thousand more than their conventional counterparts reducing their appeal to consumers.
- It can take years to recover the initial cost increase through reduced fuel consumption.
- For most hybrid electric vehicles highway driving gives comparable gas mileage as conventional gas model.
- Since hybrids are still relatively new technologies it may be difficult to find skilled mechanics for certain vehicles. Repairs and maintenance may have to be done at dealerships which can be expensive.
- Because of the smaller gas engine most hybrids have slower acceleration than their conventional counterparts.
- In the event of an accident the high voltage wires in the batteries could become exposed causing damage to the vehicle and serious injury to passengers.



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