

Hybrid Vehicle Factsheet

What are hybrid vehicles?

Hybrid electric vehicles (HEVs) combine both a standard internal combustion engine with a smaller electric motor. HEVs do not need to be plugged in. Rather, batteries store electrical energy and are charged by an onboard generator or by regenerative braking. This process is similar to recharging the alternator in a conventional vehicle. In city driving conditions around 30% of a typical car engine's outputs is lost to braking; some of this energy can be recovered in the battery.

Hybrid vehicles can be designed in a series configuration, a parallel configuration, or a combination of both. In a series design, energy from the internal combustion engine along with energy regained from generators and/or braking is converted into electrical energy, which is stored in battery packs. An electric motor is used to drive the wheels. The electrical engine is used during idling or traveling at low speeds. Series design allows the engine to perform optimally at all times, but requires larger batteries and is therefore a heavier car. Also, some energy is lost converting mechanical energy into electrical energy and back again.

Parallel design connects both the electrical motor's battery pack and the internal combustion engine to the transmission, allowing both energy sources to drive the wheels concurrently. The electric motor is used when cruising at highway speeds; if acceleration is needed the standard engine is used. In the parallel configuration, smaller engines and battery packs are needed, as the two sources of energy are often used simultaneously.

What types of vehicles can be hybrids?

Most hybrid vehicles on the market today are small to medium sized cars. However, more recently pickup trucks, sport utility vehicles, and even transit buses and utility vehicles are being produced with hybrid engines. Hybrid engines are ideal for stop-and-go-driving conditions such as city driving, transit buses, and service/delivery trucks.

How do hybrid vehicles perform?

HEVs generally perform equal to or better than their standard counterparts. An HEV can generally travel 40-60 miles per gallon of gasoline, a significant increase versus a standard gasoline vehicle. Because less fuel is required to travel an equivalent distance, emissions are also lower with an HEV. Safety and performance with hybrid vehicles are comparable to standard vehicles. Batteries in hybrid vehicles may need to be replaced over time. As the market for HEV vehicles continues to grow, hybrid technology will continue to improve and become more efficient.

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What are the benefits of using hybrid vehicles?

Fuel efficiency with HEV vehicles is substantially better than conventional vehicles, making annual fuel costs much lower than an equivalently sized standard vehicle. Because a large distance can be traveled with little fuel, emissions are comparably much lower on an HEV vehicle. In 2002, the IRS qualified HEV vehicles for the Clean Fuel Vehicle Tax Deduction. The price for a new HEV vehicle is slightly more expensive than a new standard vehicle; but some buyers are qualified to receive a tax deduction if the HEV, and lower annual gas consumption may compensate for the slight price increase. and making cities more livable. Much of the maintenance associated with operating a conventional vehicle (e.g., fluid and filter changes) is eliminated.

Resources

Hybrid Vehicle Overview

www.eere.energy.gov/cleancities/hev/what_is_hev.html

Hybrid Research and Development

www.nrel.gov/vehiclesandfuels/hev/

Hybrid Tax Deductions

www.fueleconomy.gov/feg/tax_hybrid.shtml

Electric Drive Transportation Association

<http://www.electricdrive.org/>