

## How Do Hybrid Cars Work?

1. Conventional vehicles use gasoline or diesel to power an internal combustion engine. Hybrids also use an internal combustion engine—and can be fueled like normal cars—but have an electric motor and battery, and can be partially or wholly powered by electricity.
2. By using both a conventional engine and electric motor, the best hybrids achieve significantly better fuel efficiency than their non-hybrid counterparts. They also pollute less and save drivers money through fuel savings.
3. The most advanced hybrids have larger batteries and can recharge their batteries from an outlet, allowing them to drive extended distances on electricity before switching to gasoline or diesel. Known as "plug-in hybrids," these cars can offer much-improved environmental performance and increased fuel savings by substituting grid electricity for gasoline.
4. The engine might need to produce no more than 10 or 20 horsepower (HP) to carry this load. The reason why cars have 100- or 200-horsepower engines is to handle acceleration from a standing stop, as well as for passing and hill climbing. We only use the maximum HP rating for 1% of our driving time. The rest of the time, we are carrying around the weight and the friction of the much larger engine, which wastes a lot of energy.
5. In a traditional hybrid vehicle, you have a complete electric car. It includes an electric motor to provide all of the power to the wheels, as well as batteries to supply the motor with electricity. Then you have a completely separate gasoline engine powering a generator. The engine is very small -- perhaps 10 to 20 horsepower -- and it is designed to run at just one speed for maximum efficiency. The purpose of this small, efficient engine is to provide enough power for the car at its cruising speed. During times of acceleration, the batteries provide the extra power necessary. When the car is decelerating or standing still, the batteries recharge. This sort of hybrid car is essentially an electric car with a built-in recharger for longer range. The advantage is that the small, efficient gasoline engine gets great mileage.
6. The addition of a battery-powered electric motor increases the fuel efficiency of hybrids in a number of ways.
7. Idle-off / stop-start is a feature that turns off your car's conventional engine when the vehicle is stopped, saving fuel. The battery provides energy for the air conditioner and accessories while the vehicle idles at stoplights or in traffic, and the electric motor can start the vehicle moving again. If needed, the conventional engine will reengage to provide more power for acceleration.
8. "Regenerative braking" is another fuel-saving feature. Conventional cars rely entirely on friction brakes to slow down, dissipating the vehicle's kinetic energy as heat. Regenerative braking allows some of that energy to be captured, turned into electricity, and stored in the batteries. This stored electricity can later be used to run the motor and accelerate the vehicle. Regenerative braking is insufficient to stop a car quickly, so conventional hydraulic brakes are still necessary.
9. Having an electric motor also allows for more efficient engine design. This "power assist" feature helps reduce demands on a hybrid's gasoline engine, which in turn can be

downsized and more efficiently operated. The gasoline engine produces less power, but when combined with electric motors, the system's total power can equal or exceed that of a conventional vehicle.

10. The most efficient hybrids utilize "electric-only drive," allowing the vehicle to drive entirely on electricity and use less fuel. In hybrids that can't be plugged-in, electric-only drive is typically only utilized at low speeds and startup, enabling the gas or diesel-powered engine to operate at higher speeds, where it's most efficient. Most plug-in hybrids—which tend to have larger batteries and motors—can drive entirely on electricity at relatively high speeds for extended distances (typically 10 to 30 miles).

### **Exercise I**

**Read the text above and answer the following questions.**

1. What are the advantages of having two types of engine in a car, an internal combustion engine and an internal motor?
2. What are plug-in hybrids and what are their advantages?
3. Why is it important to have a more powerful engine in a car?
4. What are the functions of an electric motor and gasoline engine in hybrids?
5. What is the common function of the four features mentioned in the article? How do they work?

### **Exercise II**

**Pronunciation. Practise how the following words are pronounced.**

vehicle /vi:əkl/	purpose /pɜ:pəs/	hybrid /haɪbrɪd/
gasoline /gæsəli:n/	kinetic /kɪnetɪk/	environmental /ɪnvɪrənmentəl/
deceleration /di:seləreʃn/	capture /kæptʃər/	entirely /ɪntaiəli/

### **Exercise III**

**Find the words corresponding to the definitions.**

1. a reduction in the speed at which a vehicle is traveling - \_\_\_\_\_  
(par. 5)
2. the rate at which a vehicle increases speed - \_\_\_\_\_ (par. 4)
3. the relationship between the amount of energy that goes into an engine, and the amount that it produces - \_\_\_\_\_ (par. 2)
4. a thing that has the same function as something else in a different place or situation - \_\_\_\_\_ (par. 2)

5. to reduce in size - \_\_\_\_\_ (par. 9)
6. an act of burning - \_\_\_\_\_ (par. 1)
7. the rubbing of one body against another - \_\_\_\_\_ (par. 8)
8. of traditional design - \_\_\_\_\_ (par. 7)
9. to use something or someone instead of another thing or person -  
\_\_\_\_\_ (par. 3)
10. not enough - \_\_\_\_\_ (par. 8)

#### **Exercise IV**

**Find synonyms to the following words in the text.**

1. reach - \_\_\_\_\_ (par. 2)
2. far - \_\_\_\_\_ (par. 3)
3. overtaking - \_\_\_\_\_ (par. 4)
4. stop - \_\_\_\_\_ (par. 7)
5. distance - \_\_\_\_\_ (par. 5)
6. use - \_\_\_\_\_ (par. 10)
7. completely - \_\_\_\_\_ (par. 8)
8. waste - \_\_\_\_\_ (par. 8)
9. traffic lights - \_\_\_\_\_ (par. 7)
10. characteristic - \_\_\_\_\_ (par. 8)
11. count on - \_\_\_\_\_ (par. 8)

#### **Exercise V**

**Translate into English.**

1. silnik spalinowy - \_\_\_\_\_ (par. 1)
2. gniazdko elektryczne - \_\_\_\_\_ (par. 3)
3. prędkość podróżna - \_\_\_\_\_ (par. 5)
4. podłączyć - \_\_\_\_\_ (par. 3)
5. przeznaczenie, cel - \_\_\_\_\_ (par. 5)

6. naładować - \_\_\_\_\_ (par. 5)
7. ponownie zaangażować, włączyć się - \_\_\_\_\_ (par. 7)
8. hamowanie rekuperacyjne, odzyskowe - \_\_\_\_\_ (par. 8)

## **Exercise VI**

**Translate into English.**

1. Silnik generuje energię podczas hamowania i spowalniania.
2. Ten pojazd ma dobre przyśpieszenie.
3. On przyśpiesza od 0-100 km/h w 9,5 sekundy.
4. Celem tego wydajnego silnika jest dostarczenie wystarczającej ilości mocy podczas prędkości podróźnej.
5. Zaletą tego wydajnego silnika spalinowego jest to, że pokonuje duże odległości.

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