Electric vehicle types

Hybrid cars (HEV - hybrid electric vehicle)

Hybrid cars are vehicles that use a standard internal combustion engine and an electric motor. *Hybrids* obtain most of the power from the internal combustion engine. If needed, the electric motor can bring extra power. Energy for the electric motor is generated while the car is driving, and is then stored in batteries. Hybrid vehicles do not need charging from an external source of electricity to operate the electric motor. The electric motor also functions as a generator that converts the energy from regenerative braking and stores it in the batteries.
Toyota Prius already dominates the global market as “the most eco-friendly” car since 2000. Prius has been sold in more than 70 countries, and its biggest markets are Japan and the USA. By February 2012, a total of 2.5 million Prius cars were sold in the world. Prius has opened the door to all new technologies and proved that interest in *environmentally clean cars* is real.

The latest generation of Toyota's hybrid car Prius hybrid draws power from the hybrid assembly made up of the 1.5-liter petrol engine of 74 hp and an electric motor of 61 hp, with a combined power of 100 hp. The average fuel consumption is around 3 l/100 km. The nickel-metal-hydride battery allows driving over short distances (less than 1.6 km) at the maximum speed up to 40 km/h in purely electric mode. If the speed is greater than 40 km/h the petrol engine automatically turns on.
Technical knowledge and image that Toyota already has in connection with hybrid technology allows them to sell their knowledge related to the technology to companies like Ford and Mazda.

Plug-In hybrid cars (PHEV - plug-in hybrid electric vehicle)

Plug-in hybrids work in a similar way as hybrid vehicles. They also use the internal combustion engine and one or more electric motors for drive. Unlike hybrids, plug-in hybrid draws most power from the electric motor, which has the primary role. As the name suggests, to charge the battery plug-in hybrids must use an external power source via the outlet to fully charge the battery. However, as the battery discharges, the internal combustion engine comes in and takes over, and the battery is additionally recharged. When the battery fully discharges, a plug-in hybrid behaves like a standard hybrid, more precisely, the conventional engine takes on the role of the primary energy source. PHEV cars have very small battery capacity and thus also the range in all-electric mode (10-60 km). However, this does not mean that they are limited to such a small range. The internal combustion engine is a backup system and thus there is no fear of too short range with such vehicles.

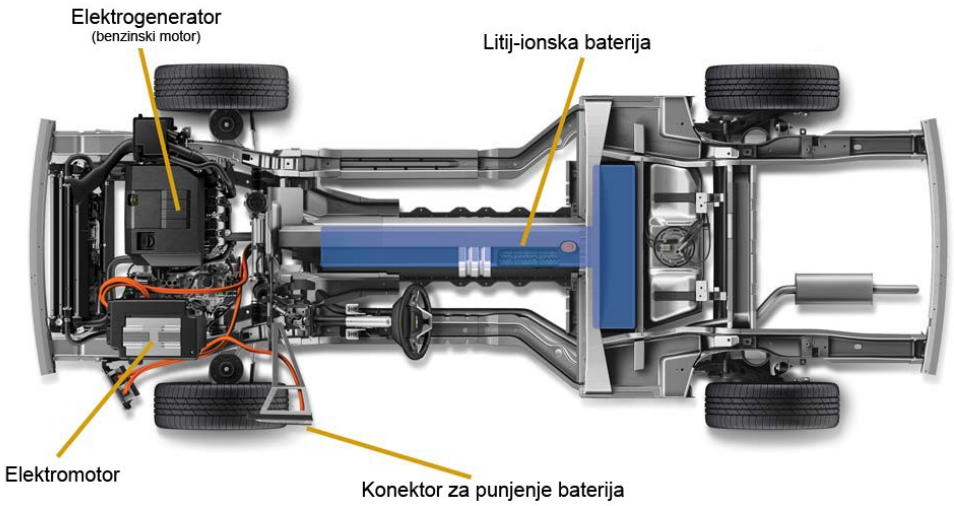
In HEV's, an electric motor assists the work of a conventional engine, while in PHEV's it is the other way round. PHEV variant is more environmentally friendly while all-electric vehicles are closest to achieving the objective of environmentally clean vehicles. While offering lower environmental contribution in relation to all-electric cars, PHEV cars have a very important role in bridging the technology from the car with the internal combustion engine to electric cars.

Picture: The main components of the drive system of Plug-In Prius

Source: Toyota Hrvatska

Extended range electric vehicle (E-REV) / Voltec technology

Picture: The main components of the drive system Opel Ampera and Chevrolet Volt (Voltec tehnology)



Source: www.opel.com

In conventional hybrids the wheels are powered by a petrol engine, electric motor, or both. In practice, the extended range electric vehicle (E-REV) is different from hybrids and plug-in hybrids as its wheels are always driven by the electric motor.

Voltec powertrain technology is used by Opel Ampera and Chevrolet Volt. The two twin cars. They can therefore be charged by plugging into any outlet of 230V in the household. Energy is stored in a T-shape lithium-ion battery of 16 kWh. The battery powers the electric generator that realises complete performance in terms of speed and acceleration of the vehicle to travel 40 to 80 kilometres. For longer distances the built-in petrol engine for extended range is used to drive the electric generator. The petrol engine is able to generate additional electricity to power the car and drive to a distance greater than 500 km.

Picture: Opel Ampera

Source: www.opel.com

100% electric cars (EV - electric vehicle)

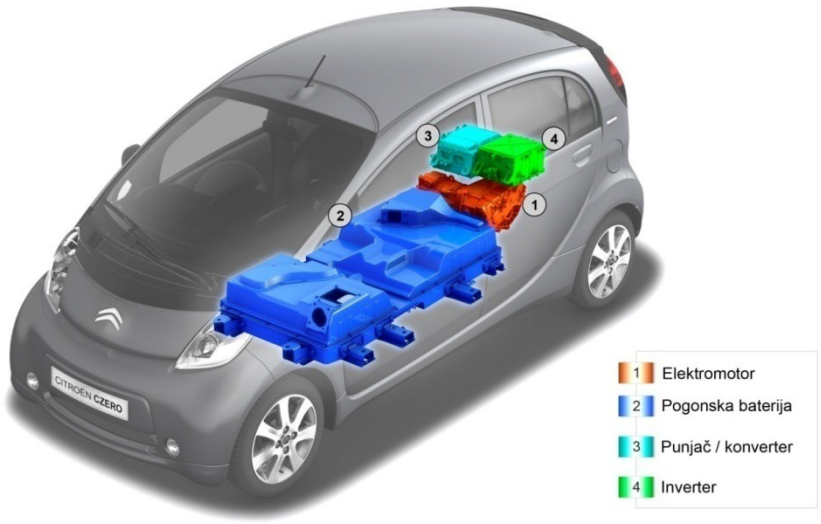
Electric cars are different from conventional cars with internal combustion engines in the part related to the drive system. Instead of the internal combustion engine and the classic tank, electric cars are equipped with an electric motor and batteries.

The electric motor provides better acceleration compared to the petrol engine (it has linear acceleration). This means that most of the electric cars will accelerate from 0-100 faster than petrol-powered cars. The induction motor (AC asynchronous motor) is the most common model of electric motors. This is mainly due to its simple design and low production costs.
The braking system of electric vehicles is designed so that the deceleration energy released during slowing down is stored back into the battery (so-called regenerative braking). This feature of electric vehicles is especially important in urban areas, where the driving mode consists of a stop-go principle.

Electric cars need to be recharged more often than we are used to fill the classic cars, but they can be recharged anywhere where there is an electrical outlet. The duration of charging varies depending on the current battery charge and options of the charging station. At a rapid charging station a car can be full already after 20-30 minutes, and at a slow charging system (slow charging stations or home charging) the charging time is 6-8 hours.

Compared to conventional vehicles, engines in electric cars, vans and trucks have only a few mobile parts and maintenance costs are minimized. Other benefits of electric vehicles are: reduced driving fatigue (due to the automatic transmission, low vibration and a smoother and faster acceleration) and the lack of engine noise (very useful for delivery vehicles that make deliveries early in the morning in residential areas).

Picture: The main components of the drive system - 100% electric car



Izvor: CITROËN Croatia

Picture: Comparison of electric cars and the car with the internal combustion engine

Source: CITROËN Croatia, Shutterstock and http://www.hybridcars.com/electric-car