

## Science Reference

### Alternative fuel vehicle

Alternative Fuel Vehicle refers to a vehicle that runs on a fuel other than traditional gasoline or diesel; any method of powering an engine that does not involve petroleum.

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Due to a combination of heavy taxes on fuel, particularly in Europe, tightening environmental laws, particularly in California, and the possibility of further restrictions on greenhouse gas emissions, work on alternative power systems for vehicles has become a high priority for governments and vehicle manufacturers around the world. Current research and development is largely centered on "hybrid" vehicles that use both electric power and internal combustion.

Other R&D efforts in alternative forms of power focus on developing fuel cells, alternative forms of combustion such as GDI and HCCI, and even the stored energy of compressed air. The use of alcohol as a fuel for internal combustion engines, either alone or in combination with other fuels, has been given much attention mostly because of its possible environmental and long-term economical advantages over fossil fuel. Both ethanol and methanol have been considered for this purpose.

While both can be obtained from petroleum or natural gas, ethanol may be the most interesting because many believe it to be a renewable resource, easily obtained from sugar or starch in crops and other agricultural produce such as grain, sugarcane or even lactose.

Since ethanol occurs in nature whenever yeast happens to find a sugar solution such as overripe fruit, most organisms have evolved some tolerance to ethanol, whereas methanol is toxic.

Other experiments involve butanol, which can also be produced by fermentation of plants. A hybrid vehicle uses multiple propulsion systems to provide motive power.

This most commonly refers to gasoline-electric hybrid vehicles, which use gasoline (petrol) and electric batteries for the energy used to power internal-combustion engines and electric motors.

These powerplants are usually relatively small and would be considered "underpowered" by themselves, but they can provide a normal driving experience when used in combination during acceleration and other maneuvers that require greater power. A hydrogen car is an automobile which uses hydrogen as its primary source of power for locomotion.

These cars generally use the hydrogen in one of two methods: combustion or fuel-cell conversion.

In combustion, the hydrogen is "burned" in engines in fundamentally the same method as traditional gasoline cars.

In fuel-cell conversion, the hydrogen is turned into electricity through fuel cells which then powers electric motors.

With either method, the only byproduct from the spent hydrogen is water.

A small number of prototype hydrogen cars currently exist, and a significant amount of research is underway to make the technology more viable.

A solar car is an electric vehicle powered by solar energy obtained from solar panels on the car.

Solar cars are not a practical form of transportation; insufficient power falls on the roof of a practically sized and shaped vehicle to provide adequate performance.