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Alternative Vehicle Fuels

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The internal combustion engine, fuelled by petrol or diesel, has dominated the automotive landscape for over 100 years. It does not have an infinite future in its current guise though, as it remains largely reliant on non-renewable fossil fuels.

Because of this, many fuels of the future are being proposed to take over from today's crude oil-fuelled engines. Engineers and scientists across the globe are right now working on the energy storage systems that will drive tomorrow's cars.

Some of these are very high-tech, others look to the past, and some even simply take today's engines and make their energy source sustainable. All have one thing in common though – the ability to not be reliant on non-renewable fuels.

Here are 10 fuels of the future then, that could be powering your car in decades to come.

1. Petrol

Petrol still has a big part to play in the future. It is the most widely used car fuel and is so prevalent, even small scale improvements in economy and emissions can lead to enormous overall improvements across the

globe. We will still use it for years to come – simply, less and less of it as time goes on.

2. Diesel

Diesel is even more efficient than petrol and as such, diesel cars return better miles per gallon figures. Combusting the fuel gives out more pollutants though, including NOx and particulates: diesel's future focus is to minimise these while still improving fuel efficiency.

3. Biofuel

Biofuels include bioethanol (which can be used instead of petrol), made from corn and sugarcane, and biodiesel, made from vegetable oils and animal fats. Both replace non-renewable crude oil-derived fuels. The best types are second generation biofuels which are produced from sustainable sources rather than those grown for food. Many consider them the best medium term solution to sustainable fuels.

4. Electricity

The electric car, powered by a motor with energy supplied by batteries, is getting lots of attention at the moment, thanks to cars such as the Nissan LEAF. Battery efficiency is still limited though, meaning most offer a maximum range of around 100 miles (and take several hours to recharge). Batteries are very expensive too.

5. Hydrogen

Hydrogen can be used instead of fossil fuels in combustion engines. BMW already sells hydrogen cars, which give out no harmful tailpipe emissions, only water. Critics point out it transfers energy consumption

away to the plant that makes the hydrogen, and there is currently no hydrogen refuel infrastructure in place.

Hydrogen can also be used to power a fuel cell and produce electricity. This is the solution many consider to be one of the best longer-term energy sources for cars: it produces zero emissions and overcomes the limitations of onboard batteries. Currently, however, fuel cell technology remains too expensive.

6. Steam

Steam cars have been around since the 19th century and were replaced by models with internal combustion engines. Some say they could now repay the favour. They are 'external combustion engines' where the fuel is combusted away from the engine, helping lower emissions. There are several concepts for modern high-power steam engines in cars.

7. Kinetic

Many electric cars (and growing numbers of internal combustion engine cars) have brake energy regeneration systems, that convert energy normally wasted during braking into electric energy. Utilisation of such systems is expected to increase in the future, to better harness the moving energy possessed by a car, and thus use less fuel overall.

8. Heat

Two-thirds of the energy generated by petrol or diesel is wasted as heat. Thermoelectric technology, which converts heat into electricity, can help reduce this and is already under development by several car makers. One solution is to use thermoelectric panels to convert waste exhaust pipe heat into electricity, which can cut fuel consumption by 5%.

9. Air

Compressed air can replace petrol in a combustion engine to drive the pistons and produce power. Stored in 4500psi tanks, air as an energy source is much less energy-dense but does produce zero tailpipe emissions. Several concepts have been mooted over the years and some car makers such as Tata have even proposed mainstream air-powered cars.

10. Nitrogen

Liquid nitrogen stored in a pressurised tank can be heated to produce high-pressure gas. This can be used to drive a piston or rotary engine. Liquid nitrogen is, however, a less efficient energy carrier than fossil fuels, and still requires electricity to produce it.