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## **Hydrogen cars**

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Hydrogen cars are basically electric cars. They have electric motors that drive the wheels just like an electric car but the difference lies in the battery. Whereas an electric car stores its electricity in a conventional battery (usually lithium ion or nickel metal hydride), hydrogen cars store their electricity in the form of hydrogen and convert it back to electricity in what is known as a fuel cell. A hydrogen fuel cell creates a chemical reaction with the hydrogen that generates electricity, water and heat [1].

Hydrogen fuel cell cars have no exhaust emissions so they are great for the kind of local pollutants that contribute to poor air quality in cities around the world. Nitrogen oxide, particulates, soot, black carbon, all the nasty stuff churned from the exhausts of petrol and diesel cars that people would rather keep out of their lungs is completely absent from fuel cell vehicles. You just get a dribble of clean water (that you could drink, if you were absolutely desperate). Hydrogen fuel cell cars are the best low emissions green cars. The hydrogen to power these cars has to come from somewhere and to produce it in the quantities needed to run significant numbers of cars you would need a lot of electricity. As with pure electric cars, if that electricity is generated from zero-emissions sources like solar, tidal or wind, a hydrogen fuel cell car can be truly zero emissions in its use phase.

Hydrogen is actually a very safe fuel. If it leaks it rises into the atmosphere so quickly that combustion is very unlikely and the tanks used in cars have been extensively safety tested.

Hydrogen fuel cell vehicles combine the range and refueling of conventional cars with the recreational and environmental benefits of driving on electricity. Refueling a fuel cell vehicle is comparable to refueling a conventional car or truck; pressurized hydrogen is sold at hydrogen refueling stations, taking less than 10 minutes to fill current models. Some leases may cover the cost of refueling entirely. Once filled, the driving ranges of a fuel cell vehicle vary, but are similar to the ranges of gasoline or diesel-only vehicles (200-300 miles). Compared with battery-electric vehicles, which recharge their batteries by plugging in, the combination of fast centralized refueling and longer driving ranges make fuel cells particularly appropriate for larger vehicles with long-distance requirements, or for drivers who lack plug-in access at home. Like other EVs, fuel cell cars and trucks can employ idle-off, which shuts down the fuel cell at stop signs or in traffic. In certain driving modes, regenerative braking is used to capture lost energy and charge the battery.

The idea of driving a hydrogen fuel cell car in the UK is quite compelling; the reality is a little more problematic. The key issue in the 'against' column is a complete absence of the kind of hydrogen refueling infrastructure that would be needed for people to use hydrogen cars effectively in this country. There are currently 11 hydrogen refueling stations in the UK and 4 are available to the public so unless you happen to be close to one, shelling out over £65k on a Toyota Mirai would be a very bold move.

If we ignore the chronic shortage of opportunities to fill them up with hydrogen in the UK, the fuel cell car does make a lot of sense. The hydrogen tank puts an end to long waits while the battery recharges and can give a range of up to 300 miles.

Hydrogen cars do make more sense in countries with a more advanced hydrogen infrastructure than the UK's and two models have gone on sale to the public, Hyundai's ix35 FCEV and the Toyota Mirai [2].

There are also a number of other companies working on hydrogen vehicle technology and we're likely to see the fruits of this labour emerging onto the market soon. We've been treated to prototypes including the Honda FCV, the Mercedes-Benz B-Class F-Cell, the BMW 5 Series GT FCEV, Nissan's TeRRA FCV and the VW Passat Hymotion.

It is most likely that in the future hydrogen cars will become a reliable means of transport as these cars don't pollute environment at all and are much more advantageous than common vehicles with internal combustion engines. Processing hydrogen emits only 0.42 mg of residual harmful substances, while the combustion of any other fuel emits minimum 2 mg, so hydrogen can be unambiguously considered an ideal alternative fuel [3].

#### References:

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