

# HYDROGEN FUEL

When I think of hydrogen fuel, a certain picture pops into my head: cars driving around dripping water, no exhaust, no smog, green grass, nice trees, blue sky, puffy white clouds, smiling children, no more poverty, kittens, flowers, no violent crime, no littering and a collective “how-do-you-do” attitude. Everyone is purring along in really cool BMW Hydrogen 7s, which have come down in price due to public demand, and are now available in a wide array of pleasant colours.

Hydrogen has been touted as the world’s next fuel, and a rather idyllic (see above) picture is often painted of this new fuel technology.

So why is hydrogen so darn glamorous? For starters, it can boast four major advantages to fossil fuel and petroleum based fuel products.

1. It is entirely emission free. When hydrogen is used in a fuel cell to power something like your car, the only product is water. Breathe easy.
2. Depending on how you create the hydrogen (more on this later), no greenhouse gas is created. Goodbye global warming? Helllooo hydrogen.

3. Our dependence on oil is a tricky political and economic situation. Hydrogen is available to all countries equally, so this would do some hopefully beneficial reorganizing of the international system.

4. As stated above, it is available to all countries equally. Interestingly enough, it could also be available to all people equally, as it can be produced at home rather inexpensively.

Those four points have some pretty enticing arguments. Developing and maintaining a hydrogen fuel economy could potentially eliminate some of the inequality built into the international system and exacerbated by globalization. Could it be a way to reduce massive poverty in continents such as Asia, Africa and South America?

A hydrogen fuel economy could also help eliminate the trend in developed countries which dictates that the rich get richer and the poor get poorer. Something as simple as “everybody producing at least some of their own fuel” could help even the playing field, de-monopolize the industry and assist the lower and middle classes in ventures that could boost their economic and social status.

The other good part about hydrogen is the whole zero emissions shenanigan. Imagine if your car only produced water.

It is almost a ludicrous thought, but fuel cells powered on hydrogen *actually* exist, they *only* produce water and they have *already* been successfully employed to power passenger vehicles.

What is a fuel cell, anyway?

Basically, it is two electrodes surrounding an electrolyte. Hydrogen enters into the anode (anyone remember Gr. 12 chemistry?) and oxygen enters through the cathode. A catalyst facilitates the ionization of H<sub>2</sub> into a proton (H<sup>+</sup> ion) and an electron. The electrons create an electrical current (which powers the motor), and then meet back up with H<sup>+</sup> (which has travelled through the electrolyte) and oxygen (which has entered through the cathode) to create water, the only product. The electrolyte serves to only permit the relevant ions (H<sup>+</sup>) to pass through. Other stuff would disrupt the chemical process.

You only need hydrogen and oxygen, and you create water! But wait... what about the hydrogen? Oxygen is available enough, but hydrogen is not. We have to create it. And how is hydrogen created?

The same excellent article from How Stuff Works as used above tells us that there are two options.

1. The electrolysis of water. The general idea is that you split water into hydrogen and oxygen to power the fuel cell and then it gets turned back into water after it has created you some damn fine electricity. But... and here is the unfortunate part... the electrolysis of water requires electricity itself. So you are using electricity to create electricity. Hmm.

2. You guessed it! Reforming fossil fuels! You can use a fuel processor to split hydrogen off of carbon in hydrocarbons AKA fossil fuels. Wait. We are using fossil fuels to power our hydrogen powered cars? Hmm.

So the above two ways of creating hydrogen seem to be a little fishy. Using electricity to create electricity seems rather redundant. However, if you can create the electricity through renewable resources, such as wind, solar, geothermal, hydroelectric (please see the rest of this website) then it still makes sense, as it cuts fossil fuels right out of the equation. No more dependence on oil. No more greenhouse gases and carbon emissions. Cleaner planet, healthier people, more peaceful international regime? This would, however, also require a very big investment into these other renewable energy resources to create the electricity needed to power the fuel cells, so there would have to be a global investment into hydrogen **and** other renewable resources.

The second part does not have as good of an excuse for being pretty irrational. Why would you use fossil fuels to create hydrogen to power your car, when you could skip the middle man and power your car with fossil fuels directly? On the plus side, doing this would reduce carbon emissions, but don't get too excited, because in the fuel processing process you are still dumping waste carbon dioxide into the atmosphere, where it contributes to the greenhouse effect and global warming.

Mr. Brain, however, does suggest that this step can be used as a transition phase (buzz word!) to ease us into a hydrogen economy, as gasoline would be an easily available source of hydrogen. This would assist us while we wait for those nifty Hydrogen Stations to be built (see thumbnail).

So what does this all mean? To me, it means that hydrogen is the future. I *do* see a future with cars dripping water, the air being cleaner, less inequality on a global and domestic scale and fuzzy kittens rolling around everywhere. However, I also see that this dream is clouded by obstacles and challenges. Where will we get the hydrogen? Is the fuel cell really an efficient way to power our vehicles? Can we develop the infrastructure? Will the public hop on board? In addition to this, there is the problem of storing the hydrogen in cars. It takes up a lot of room and runs the high risk of going KABOOM in any minor collision.

I think these are problems that science and technology can overcome, however. BMW has already released the Hydrogen 7, which has a bi-fuel engine that can instantaneously switch between gasoline and hydrogen fuel. Other car companies are joining in the hydrogen powered car race, and hopefully soon we will start to see some on the road. The next step would be developing the infrastructure so the average joe can buy one and fill it up at his house or the local Hydrogen Station. Then people may buy, the prices might go down (although perhaps not too much on the beamer) and hydrogen powered cars could be the future.

Source: <http://www.sassweb.ca/3bb3/volume1-0/hydrogen-volume1-0/hydrogen-fuel>