Hydrogen fuel cell cars – worth the investment

Technology, Cars

Hydrogen is the most abundant element in the universe, but only recently have people been able to harness this resource and turn it into energy. Hydrogen fuel cell cars are one such advancement made in the effort to turn hydrogen gas into electricity. Fuel cells in the car are used to convert hydrogen into an electrical current, and thus power the vehicle. Fuel cells convert hydrogen and oxygen into water while producing electricity. Hydrogen fuel cell cars are also quiet (similar to an electric vehicle), very energy efficient, have zero emissions and have equivalent range and performance to their gasoline counterparts.

However, these types of cars still haven’t gained popularity despite these advantages. This is because more research still needs to go into this new emerging technology. Advancements still needed to be made in order for FCVs (Fuel Cell Vehicles) to be successful and competitive alternatives for consumers. Things such as onboard hydrogen storage, fuel cell durability and reliability, readily available refueling stations, and of course vehicle cost need to be addressed. 1 In the long run however, the advantages of Fuel Cell Vehicles will outweigh the costs.

Thus, the government should invest more into the development of FCVs because they are environmentally friendly, the source of energy to power them (hydrogen) will sustain us into perpetuity, and further advancements in this field will have many additional applications pertaining to energy consumption. Gasoline powered vehicles release a lot of green house gasses, but mostly carbon dioxide, which contributes to global warming. On the other hand, Hydrogen powered vehicles emit no green house gasses; just heat and water. This water is also pollutant free and clean enough for people

to even drink. FCVs will also reduce the amount of air pollution in the U. S (mainly emitted from gasoline vehicles). If the hydrogen fuel is produced through fossil fuels, some pollution is made, but it is much less in comparison to the amount generated by regular gasoline powered vehicles. According to the Department of Energy, FCVs are ranked 10th in the amount of both C02 emissions and Smog emissions produced (with 1 being the worst and 10 being the best)1. Also, Hydrogen Fuel Cell cars exhibit maximum fuel efficiency, even when the car is low on fuel.

Their efficiency is as high as 60%2, unlike typical gasoline cars, whose efficiency is at only about 14%-16%, depending on the drive cycle1. When fully fueled, FCVs can travel about 210 miles and average 56 mpg (combined city/hwy)1. This will help lower the demand for hydrogen refueling, which in return will lower the amount of CO2 gasses produced from companies creating hydrogen from fossil fuels. Furthermore, Hydrogen does nothing to the environment if it was accidently released, unlike oil spills, which devastate the surrounding ecosystem. One such example is the BP oil spill.

A In addition, making Hydrogen and supplying it will have a significantly lower impact on the ecosystem in comparison to the production of oil, which has resulted in cutting down forests, poisoning lakes and rivers, oil spills, destruction of wildlife, soil contamination, and pollution of air. Thus, Hydrogen powered vehicles will have a more positive impact on the ecosystem and are a better alternative for cars to run on. Currently, gasoline is the main fuel powering our cars, and it is a non-renewable resource. On the other hand, Hydrogen Powered cars have a fuel supply that can sustain us for as long as we need it.

Hydrogen can be extracted many different ways including Steam Reforming, Partial Oxidation, Plasma Reforming, Coal, Electrolysis, Thermolysis, Water Splitting, and much more6. Currently most of the hydrogen we produce comes from fossil fuels; 48% comes from natural gas, 30% from oil, 18% from coal, and just 4% from electrolysis (An electrical current is used to separate water into oxygen and hydrogen)3. Only if renewable energy sources such as solar, wind, and others, can be harnessed to provide the energy to process hydrogen fuel can the goal of truly clean energy be achieved.

Some steps have already been made to try and achieve this goal. NREL (National Renewable Energy Laboratory), is working with Xcel Energy (an electric and natural gas service), on a wind-to-hydrogen (Wind2H2) project at the National Wind Technology Center in Colorado. The Wind2H2 uses wind turbines to produce electricity, which in turn powers electrolyzers, which expel the wind-generated electricity through water to split it into hydrogen and oxygen. The hydrogen produced can then be stored for later use7.

If more research went into this new type of technology, more methods for extracting hydrogen would be discovered, and as a result, hydrogen would become more easily produced and obtained. Additional Government funding towards hydrogen extraction research will help improve these extraction methods to become more efficient and environmentally friendly. Not only are hydrogen cars eco-friendly and have a prodigious amount of fuel for use, but the focus on research using hydrogen as fuel will also have additional benefits relating to Energy Consumption. One example is the improvement of fuel cell cost and durability.

Currently, fuel cell costs have reduced more than 80% since 2002, and 30% since 2008, according to the Department of Energy4. In 2002, the cost was $275/kW, and in 2011, it had fallen dramatically to just $49/kW4. This shows that fuel cell costs are lowering every year, and the Department of Energy aims to lower it to just $30/kW in 20174. With more research helping to drive costs down, hydrogen has the potential to become a primary energy carrier. Renewable energy sources, such as solar panels and wind turbines, can't produce energy all the time because the source they get their power from will not always be present.

But for example, in addition to electricity, they could also produce hydrogen, which can then be stored until it's needed later on. FCVs could also reduce our dependence on foreign oil since hydrogen can be derived from a wide variety of sources, such as natural gas and coal, as well as renewable resources such as water. This would make our economy less dependent on other countries and less vulnerable to oil price shocks from an increasingly fluctuating oil market. In addition to this, hydrogen fuel cell technology could also create American jobs, diminish the trade debt, and decrease the amount of oil the U.

S imports. Jobs would be produced because infrastructure would need to be developed such as building hydrogen refueling stations throughout the country (construction workers would be needed) and more engineers and scientists would be sought after to help further advance Hydrogen Fuel Cell technology. Fuel cell technology could be applied in buildings to help generate electricity and the heat generated could be used to help warm the

building during cold days. Additionally, hydrogen fuel cells would make a big difference in rural areas where people don’t have access to electricity.

As a result of hydrogen’s ability to store energy, communities that do not have access to an electric grid could become more self-sustaining in energy. Intelligent Energy, a company dedicated to delivering efficient and clean energy technology for global consumers, has already performed a trial using fuel cells in this manner, and received results concluding that the fuel cells were extremely reliable in harsh conditions8. Many types of renewable energy are at their peak efficiency during the summer months, but energy is usually needed the most during the cold, winter months.

Fortunately, a substantial amount of energy can be stored using a process called Hydrogen storage, an amount even unattainable with batteries8. The Hydrogen fuel cells can also be used to provide backup power for important equipment. This would replace current power generators, which are not as efficient and reliable as fuel cells8. From this information, we can conclude that Hydrogen Fuel cell technology has many additional applications outside of just powering cars, and can even benefit the Economy and Developing Countries such as South Africa.

In summary, FCVs use a clean form of energy that is non-harmful to the environment, their fuel supply is nearly endless, and continued research into the technology will provide many additional applications with regards to energy consumption. Hydrogen Fuel Cell powered cars will have a substantial impact on the environment (for the better) because they are non-polluting and decrease the demand for oil production. FCVs are also powered

by hydrogen gas, the most abundant element in the universe. Therefore, FCVs can be supplied with a nearly infinite amount of fuel to use for power.

Finally, Hydrogen fuel cells also have many practical applications outside of just cars. Hydrogen fuel cells can supply energy to countries without an available power grid, replace not-so-efficient generators, and even produce jobs, thus improving the economy. Hydrogen fuel cell cars have a long journey ahead of them before they reach their full potential. With the help of government funding to increase the amount of research, hydrogen fuel cell cars will continue to improve in performance and consumer availability, and they could eventually become the ideal transportation method of the future.