

Sustainable Research

Should we use hydrogen fuel cell cars in the future?

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Through careful sociological study, it is found that electric vehicles seem to be progressing for the future of cars. However, one question that is required to be answered is whether or not hydrogen fuel powered vehicles have more potential for the future and what are the reasons for why many car companies are holding it back as it is believed in some areas that it can be more sustainable and possibly more cost effective for consumers, if not be controlled in the system as being free fuel.

Hydrogen powered vehicles have been proven to function, be efficient and be free of energy for society. However, we need to understand the truth behind why hydrogen is not utilised in society today as mainstream and why we continue on to use and burn fossil fuels.

Politics, economics and society all contain association with the justification behind why we are not utilising hydrogen as a fuel.

An inventor of water powered cars strangely died.
<https://www.youtube.com/watch?v=im9KsCKaw2I>
(Hastey, 2013)

Fossil fuels are amazingly packed full of energy because of the formation of resources throughout the 1,000,000's of years during the natural material of old microorganisms and plants were compacted

and heated into solid accumulations of carbon. This is one of the justifications behind why fossil fuels are still utilised in society. However, we cannot continue to burn these fuels because they are going to be completely consumed and they are unhealthy for both the environment in terms of sustainability and for humans to inhale. In order to change to another source of power, the requirement of initially needing to problem solve how to efficiently accumulate, amend and keep the energy in advance so companies are enabled to start to consider based on the utilisation of the resource. Nonetheless, fossil energy do not necessitate so much invention.

(Blog, wordpress.uark.uark.edu, 2016)

Everyone can contribute towards sustainability, even if it is refusing a company that practices environmentally harmful business methods or litter picking on the street. We all can enable change and transformation though even the smallest contributions because it all counts. (Centre, 2009) (2009, 2009)

In 1807, hydrogen was operating engines and through the appropriate extraction techniques it's most sustainable to the environment. The element is the most resourceful on earth. However, hydrogen yet has not been available in the automotive sector. Experimentation with the functionality has been being undertaken by most manufacturing companies in the industry. 1 of these include Toyota. Some have begun to manufacture small quantities of automobiles, however in society remains years from a huge push forward. Critics suggest that this will not ever occur.

One of the intentions behind why there is deficiency of hydrogen cars on the streets is because of the developing approval of electric automobiles as the other sustainable option. Rather than utilising more minor comprehended technology it is simple and stress-free for companies to arrange electric vehicles, with the increase by 37% being sold per annum. One other explanation is infrastructure. The timeworn comparison is the chicken-and-egg problem, however it calls correct here. The question is if is not anywhere to refuel a vehicle, why possess the automobile and why construct stations to fuel if there are not any cars around. However hydrogen is distant from completed.

The initial disagreement in which critics have with hydrogen is that they contain lower efficiency in comparison to electric cars. Due to the fact that hydrogen not occurring naturally as it requires

extraction and then compression in fuel tanks. Then the energy is required to combine with oxygen in fuel cell stack in order to produce electricity which is to control the motor of the vehicle. Critics focus to this procedure when equated with a car that is electric on losing efficiency. This is where the electricity arises from a battery pack. To a degree this is correct, although hydrogen powered automobiles aren't estimated to exchange to electric cars. For manufacturers such as Toyota would rather balance hydrogen with electric energy and there is a decent justification for this and is determined to being the most efficient fuel available. "Every single manufacturer is either looking at or working on hydrogen cars" says Jon Hunt who is a marketing manager for Toyota and head of commercialisation of hydrogen fuel cell vehicles.

Jon Hunt stated that the manufacturing of lithium-ion batteries on electric automobiles is very energy-intensive.

What if that revolting pollution that originated out of the exhausts of vehicles may possibly be transparent, harmless to the environment and cleaner? Picture that rather than poisonous abrasive chemical combinations and carbon emissions, vehicles may well release a more recognizable element. Another open minded consideration is whether or not that element could be vapour. Disturbance has been influenced in the substitute automobile industry from fuel cells that are hydrogen, Hydrogen atoms are transformed to electricity including simply heat and water as by-products, the combination which creates vapour. In tandem with this being considered, it provides the impression that this would completely solve the pollution issue. However, this is not easy because the core problem through manufacturing power utilising this method, is the foundation of the hydrogen this is consumed to control these fuel cells. Co-existent techniques of manufacturing hydrogen consist of preparing it from gas that is natural. From this that of itself and from within generates carbon emissions that are of great measures. Utilising water which a plentiful resource and foundation of hydrogen has been well thought out by academics. This is because water would be a very appropriate origin of power for hydrogen fuel cells. To energise the fuel cell, water molecules being separated by withdrawing the hydrogen and utilising electricity was considered by researchers. Nevertheless, furthestmost of this power is created from the elimination of fossil fuels utilised and the

electric control could be from the network. The possibility of hydrogen automobiles seems to be criticised from all angles.

There is confidence however because a huge benefit is the fact that hydrogen is 100% one of the most rich in resources and vapours commonly included in the world naturally, and due to this the fuel origin for the energy for vehicles is resourceful. The distance is discovered to be amazing with prototypes being established to develop seventy miles per gallon (approximately). This is in comparison twenty or so which is regular for standard gasoline cars. Hydrogen vehicles are almost free of noise, seeing as they do not require to go over and done with the entire difficulties of mechanics natural inside of a burning (combustion engine). Hydrogen fuel cell engines are a significant amount more efficient because of this avoiding standard machine mechanisms, meanwhile they individually necessitate the separation of a particle. Overall from mobile phones to power plants, Hydrogen fuel cells are additionally expandable to any dimensions product they require to function. However, majority of these advantages remain heavier by the price as well as deficiency of robustness within the engines. Specifically, in gasoline stations, the transportation systems required is consisted in the heavy pricing which determines cooccur with whatever most important marketable announcement of hydrogen vehicles. Discussions undertaken remained in the whole thing in association of partaking transportable gasoline stations or huge trucks containing hydrogen that hydrogen vehicle utilisers can fill the tank up with at numerous places in which the trucks are remain existent. Perceiving as states such as California demand 15% of their automobiles to be empty of emissions by 2025, also hydrogen fuel cells are the key basis of emission-less energy, effects such as transportable replenishing fuel stations which may arise quicker than we ponder. Due to the abundant duration of replenishing fuel, Hydrogen automobiles are yet beginning to defeat vehicles that are powered solely on electricity. Tesla cars are unproductive and wasteful in terms of the duration in which they require to become fully charged which is an hour after utilising only per half an hour's worth of powering in operation. However, it requires 8 minutes through approximation that hydrogen containers need to replenish fuel. This is justifying that the hydrogen powered car has serious benefits and huge potential for the future despite what critics suggest.

Toyota established the first mainstream marketable automobile that powers off hydrogen in which then different companies undertook adaption to move in the same direction. Hyundai is leaping in the movement, communicating they're dedication to manufacturing automobiles powered by hydrogen for the future. The Intrado which is Hyundai's which smooth, trendy and innovative concept vehicle is. The Intrado contains aesthetics in which are innovative and sort of the resemblance of a batmobile. To enable for consumers to utilise the transportations, Hyundai and Toyota are forcing infrastructure and undertaking to pursue the concept to build stations to fuel the innovative vehicles. There is not any hesitation about having a large quantity of having hydrogen vehicles on the roads later on from all the excitement and impetus associated with hydrogen vehicles. What enables the fuel to be perfect for the future is unpolluted productions and the solar variety of transportable. Regardless that the functionality is yet new, these automobiles will be the machines to observe for throughout the approaching ages. Conditioning that the enthusiasm remains, optimistically someday we be able to eventually appreciate an unpolluted planet, where carbon releases from automobiles are historical products. (WordPress, 2014) (WordPress P. p., 2014)

The Technology is not only being initially utilised in cars on the roads today but also is utilised by NASA. NASA utilises hydrogen fuel to launch their shuttles into space. The most straightforward constituent is hydrogen. One electron and 1 proton are the contents of a particle of hydrogen individually. Hydrogen is not an element in which happens naturally as a gas on this planet because it is constantly integrated using different elements, although its minimalism and huge quantity. For instance H₂O (water) is an incorporation of oxygen and hydrogen. Outstandingly the hydrocarbons that enable creation of our numerous fuels being methanol, natural gas, propane and gasoline. Hydrogen possesses the potential to be divided from hydrocarbons through the submission of heat which is a procedure recognised as reforming. Presently majority of hydrogen is produced utilising this method from gas in which is natural. In order to disconnect H₂O into its constituents of hydrogen and Oxygen, a current that is electric contains the potential to be utilised. Electrolysis is what this procedure is recognised as. Another cause of hydrogen is any bacteria and algae from utilisation

of sunshine as their power origin beneath particular environments. In order to thrust the space shuttle as well as different rockets into rotation, NASA have been utilising liquid hydrogen during and after the 1970s. Hydrogen fuel cells controls the electrical structures, enabling to create an unpolluted by-product in which is clean H₂O. By means of origin of electricity as well as heat for architecture, fuel cells are an encouraging functionality for utilisation and as an electrical origin of energy for motors that run off electrical momentum in motors thrusting transportation. The functionality is greatest on uncontaminated hydrogen with fuel cells. However transformation to manufacture the hydrogen essential on behalf of fuel cells include gasoline, gas that is natural and methanol. Besides utilising a reformer, several fuel cells also are able to be powered precisely utilising methanol. Hydrogen may well as well merge alongside electrical power by means of a significant resource transporter in later years. A transporter for energy maneuverers and provides resource in utilise friendly method to those that use the product. The wind and sun are renewable power bases which cannot always manufacture energy. However, they may well for instance, create electricity and hydrogen power that is able to be reserved in anticipation to when it is required. Hydrogen contains the potential to be logistically maneuverer to places that it is required to be used (similar to electrical power). (reserved, 1999-2018)

Gasoline vapour is as well explosive as hydrogen which can alight with airbourne concentrations as low as four percent – seventy five percent which is a good deal. Regardless, gasoline burns decreased concentrations so of 1.1 percent – 3.3 percent. Gasoline is heavy in weight and hydrogen is lighter which an element which allows hydrogen to be quicker is. Gasoline evaporates slowly so when a crash occurs, it can drip out, however hydrogen fuel is kept pressurised due to the fact that it does not pursue to be a fluid. The latest hydrogen automobiles to arrive the United States' roads are going to accumulate hydrogen at 10,000 PSI (pound-force per square inch), which averagerages that conditioning that a collision were to happen between hydrogen vehicle and a gasoline automobile, where each of their fuel resevoirs were wounded, hydrogen would be the most appropriate choice of fuel. Conditioning that there were to be a fire, hydrogen would rapidly and

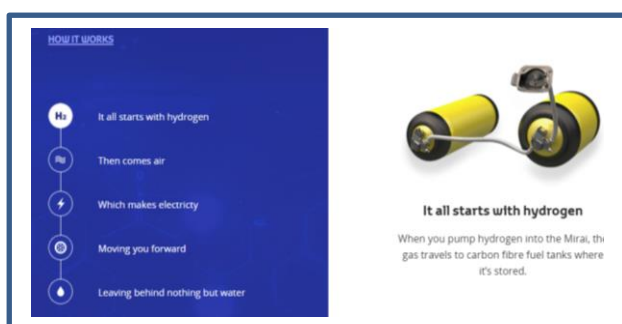
completely burn the vehicle. Nevertheless gasoline would burn at a lower speed because it sinks and vapourises. Because gasoline weighs more in comparison to air vapours, would pool around the collision area, enabling additional burning for somewhat causing fires. It would be not good, however when when incorporate a tank that is pressurised, than light than air gas like hydrogen, usually the result is going to be sissipation instead of combustion. This define that in a collision, nearly immediately it would escape into the atmosphere and that is barely like a hindenberg. The mirai is the new hydrogen car that is currently being driven on the roads today by Toyota. Toyota are in hope that these royalty free patterns will burn hydrogen fuel future and spent the last decade reducing the cost of fuel cell production by 95%. NASA utilises helium to release out the fluid nitrogen into the atmosphere yet so that it rapidly disintegrates. Helium is a noble gas that defines that it is tremendously steady and in habitation, potentially hydrogen fuelling systems will adapt to that also.

Youtube video title: Will your hydrogen car explode? (Seeker, 2015)



The Toyota Mirai functions with hydrogen + oxygen – electrtity + water.

<https://toyota.co.uk/new-cars/new-mirai/landing.json#/youtube/tL6guqDQKVL> (PLC, 2016)



Conclusion

Bibliography (Calibri 8pt)

- 2009, C. H. (2009). *What is sustainability?* Retrieved from globalfootprints.org: <http://www.globalfootprints.org/sustainability>
- Blog, U. o. (2016 , July 20). *wordpress.uark.uark.edu*. Retrieved from <https://wordpress.uark.edu/sustain/2016/07/20/3-reasons-we-are-still-using-fossil-fuels/> : <https://wordpress.uark.edu/sustain/2016/07/20/3-reasons-we-are-still-using-fossil-fuels/>
- Blog, U. o. (July 20, 2016). *3 Reasons We Are Still Using Fossil Fuels*. Linden Cheek .
- Centre, H. E. (2009). *What is Sustainability?* Retrieved from Global Footprints : <http://www.globalfootprints.org/sustainability>
- Hastey, E. (2013, Feb 8). *Inventor mysteriously died! Why don't we have water powered cars yet? FREE ENERGY TESLA*. Retrieved from [www.youtube.com](http://www.youtube.com/watch?v=im9KsCKaw2I): <https://www.youtube.com/watch?v=im9KsCKaw2I>
- PLC, ©. T. (2016). *Mirai*. Retrieved from www.toyota.co.uk: <https://www.toyota.co.uk/new-cars/new-mirai/landing.json#>
- reserved, ©. C.-2.-A. (1999-2018). *Hydrogen Energy*. Retrieved from renewableenergyworld.com : <https://www.renewableenergyworld.com/hydrogen/tech.html>
- Seeker. (2015, Jan 14). *youtube.com*. Retrieved from Will Your Hydrogen Car Explode?: <https://www.youtube.com/watch?v=YJBzEYduKK8>
- WordPress. (2014, March 6). *The Mellow Fellow*. Retrieved from sites.psu.edu: <https://sites.psu.edu/rclbhat/tag/hydrogen/>
- WordPress, P. p. (2014, March 6). *The Mellow Fellow*. Retrieved from sites.psu.edu: <https://sites.psu.edu/rclbhat/tag/hydrogen/>