

## The Fuel of the Future: Hydrogen Energy

Commuting to school in a SUV, flickering the lights on in the evening, and turning on the air conditioning on a hot summer day - the very comforts that Americans take for granted. However, the fuel that provides the power to support these comforts and the economy cannot last forever. If no immediate actions are taken, exhaustion of the fuel will lead to an apocalyptic future.

According the U.S. Department of Energy, “Fossil fuels – coal, oil and natural gas - currently provide more than 85% of all the energy consumed in the United States, nearly two-thirds of our electricity, and virtually all of our transportation fuels.” This total dependence on fossil fuels is detrimental, as worldwide demand for fossil fuels is projected to surpass the supply of fossil fuels in the coming decades. The low supply and great demand have lead to increasingly higher prices on fossil fuels, hurting the economy of many nations, including the United States. Moreover, fossil fuels have a damaging effect on the environment; many scientists believe that fossil fuels are key to producing the emissions that cause global warming, an ecological catastrophe.

However, the world is not without hope. One of the most anticipated energy alternatives to fossil fuels is hydrogen energy. Currently, the focus of hydrogen energy research focuses on applications to power automobiles. Automobiles are one of the principal users of energy resources. “The number of vehicles worldwide, now 750 million, is expected to triple by 2050” (Ogden, 2006). Thus, if automobiles can shift to the use of hydrogen energy than relying on fossil fuels, the dependency of society on fossil fuels will greatly decrease, which will benefit the environment and the economy for a brighter future.

Hydrogen energy provides many advantages over fossil fuels; hydrogen energy is flexible, renewable, eco-friendly, and efficient. For example, chemically, hydrogen energy can be produced from a variety of sources, like biomass or water. Hydrogen energy can also be conveniently stored, so it can be utilized when needed in any desired destination. Furthermore, hydrogen energy can be produced through several methods that produce virtually little or no greenhouse gas emissions. For instance, engineers could either use electrolysis, which separates hydrogen from water, or biomass gasification, which heats organic substances, like wastes to release hydrogen. In order to make use of hydrogen energy to fuel automobiles, fuel cells, or hydrogen “batteries” that make electricity, need to be developed. These fuel cells are more efficient than current gasoline engines. Therefore, hydrogen energy would solve many of the problems associated with the use of fossil fuels and provide an energy source to power the economy and society.

Hydrogen energy is still not without some challenges that engineers must face. The electrolysis and biomass gasification processes are still too expensive to be attractive to today’s consumers. Currently, the costs for hydrogen production are six to ten dollars for every kilogram, meaning that the cost for hydrogen automobile fuel cells would be about one thousand five hundred to two thousand dollars, which is ten times the cost needed to be competitive in the global market. So, cheaper fuel cells need to be developed. Other possible solutions to initiate the hydrogen energy economy with lower cost issues include producing hybrid cars with internal combustion engines that use hydrogen energy and converting conventional automobiles to use hydrogen fuel. Engineers predict that a car manufacturing company can convert 100,000 cars to hydrogen fuel in a year, and the conversion for each hydrogen car would cost less than

two thousand five hundred dollars (Cashman, Logue, 2004). As of now, no conversion processes exist. All in all, according to the National Research Council and the National Academy of Engineering, with improved technologies and large-scale manufacturing of hydrogen energy in the future, the cost for hydrogen could be reduced to two to four dollars for every kilogram. So, it is predicted that hydrogen could cost less than gasoline in powering automobiles, which will provide a boost to the global economy (Ogden, 2006).

Hydrogen energy truly has great potential as a major energy source for the future. However, to make it a reality, politicians need to place a greater emphasis on hydrogen energy. Engineers play a vital and major role in designing less complex methods to produce hydrogen energy cheaply, less expensive hydrogen fuel cells, and more efficient conversion processes for conventional automobiles to use hydrogen energy. A society and economy fueled by hydrogen energy will be extremely promising and an apocalyptic future can be averted.

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