

Hydrogen fueling station cooperatives: The solution to the hydrogen infrastructure “chicken and egg” problem

~ Greg Blencoe, Hydrogen Discoveries, 1/27/09

Hydrogen fuel cell vehicles are much closer to being commercialized than most people realize. While vocal hydrogen critics cling to the hope that economical hydrogen fuel cell cars are decades away, the evidence clearly shows that this is not true.

Current activity with hydrogen fuel cell vehicles

There is so much activity going on with hydrogen fuel cell vehicles right now.

GM's Project Driveway hydrogen fuel cell vehicle demonstration program started back in October 2007. One hundred Chevy Equinox hydrogen fuel cell vehicles are being tested by the general public in Los Angeles, New York, and Washington, D.C.

The Honda FCX Clarity hydrogen fuel cell car leasing program started last summer. Two hundred FCX Clarity hydrogen fuel cell cars will be produced between 2008 and 2011. Last June, Honda rolled the first hydrogen fuel cell car off the production line in Japan. Honda has built the world's first dedicated fuel cell car production facility.

Furthermore, the Hydrogen Road Tour 2008 was a huge success. Hydrogen cars from nine companies made 31 stops over two weeks on the cross-country trip from Maine to California. The purpose of the tour was to showcase the hydrogen technology and demonstrate the need to build the hydrogen fueling infrastructure.

What the car companies are saying about hydrogen fuel cell vehicles

Here are quotes from Toyota, Honda, Hyundai, Daimler, and GM about hydrogen fuel cell vehicles:

Toyota

“‘Hydrogen fuel cell vehicles are ready to go,’ said Bill Reinert, Toyota’s national manager for advanced technology. ‘But there’s no place to fuel them.’”

New York Times blog post, September 26, 2008

“Masatami Takimoto, a Toyota executive vice president and board member, disclosed the company’s hydrogen plans in an interview at the (Detroit auto) show. ‘By 2015, we will have a full-fledged commercialization effort,’ Mr. Takimoto said.”

New York Times blog post, January 12, 2009

Honda

“He (Honda research chief Masaaki Kato) said Honda believes it will be easier, less costly and quicker to perfect the fuel-cell electric vehicle (rather than plug-in battery vehicles, a technology which Honda is not even pursuing)...”

Edmunds Green Car Advisor blog
September 15, 2008

Hyundai

“According to the latest information we just received, the company will speed up its research and development of fuel cell powered vehicles by investing even more money as it did until now. As a part of this strategy, Hyundai Motor Company announced it plans to unveil a commercial version of its first mass-production hydrogen fuel-cell (FCEV) vehicle by 2012.

In the first year, Hyundai plans to build about 1,000 units and then slowly increase the number each year until it meets the goal of 30,000 units by 2018.”

Hyundai-blog.com
October 28, 2008

Daimler

“Matthias Brock from Daimler in Stuttgart said he believes that the fuel cell is very promising when it comes to zero-emission driving in local areas. Mercedes has around 100 test vehicles underway -- the world's largest fleet of fuel cell vehicles. The company is currently working on a B-class with fuel cell power which could be produced in limited numbers from 2010.

‘We estimate that between 2012 and 2015 the car could be ready for series (mass) production,’ Brock said.”

DW-World.de
September 3, 2008

GM

According to Marybeth Stanek, GM's director of fuel cell commercialization, the knowledge being gained (from the Project Driveway demonstration program) should help the automaker in achieving its goal to have some kind of production version hydrogen FCV in its showrooms by 2012. “The vehicles are performing very well and we are learning a great deal about fuel cell robustness and how to make this program work for real customers.””

KBBGreen blog
Early January 2009

Myths surrounding the cost of hydrogen fuel cell vehicles

When the cost of hydrogen fuel cell cars is discussed, hydrogen critics like to boast that “They cost \$1 million.” This is extremely misleading. A couple of prototypes that are built by hand do indeed cost around \$1 million. But what really matters is what hydrogen fuel cell cars will cost when they are mass produced.

The best evidence for showing that hydrogen fuel cell vehicles will be economical are the plans mentioned above that Toyota, Honda, Hyundai, Daimler, and GM have for commercializing the vehicles. Why would all of these companies have plans to bring hydrogen fuel cell cars to market if they were not going to be economically viable?

Furthermore, the issue of the amount of platinum (which is expensive) needed for hydrogen fuel cells is constantly brought up when the cost of fuel cells is discussed. However, platinum-free fuel cells are being developed.

Each car company is usually very secretive about their hydrogen fuel cell technology. Therefore, there have not been any big announcements from any of the car companies regarding platinum-free fuel cells they are developing. But this does not mean they are not being developed behind the scenes.

For example, Toyota started their in-house hydrogen fuel cell program back in 1992 (when I was a senior in high school!). Does anybody really believe that over the past 16 or 17 years Toyota has not developed a platinum-free fuel cell?

However, here are some examples of work on platinum-free fuel cells that have been publicized.

Nisshinbo Industries, Inc. (Japan) has developed a fuel cell that uses carbon as the catalyst instead of platinum. The cost of the carbon catalyst is estimated to be just one-tenth of what using platinum would be.

Scientists at Monash University (Australia) have come up with a method of using Gore-Tex material in fuel cells to replace some of the platinum. And scientists at Wuhan University in China are developing a fuel cell that uses nickel instead of platinum as a catalyst.

Moreover, Larry Burns from GM addressed the issue of the cost of hydrogen fuel cell cars in the following excerpt from a Korea Herald article that was published back in November 2006:

“Hydrogen fuel cell cars will cost the same as their gasoline counterparts once they reach a production volume of 1 million units, General Motors Corp.’s head of research said yesterday.

‘This would be just a ninth of the vehicles GM produces each year and one sixty-sixth of the total autos built worldwide,’ Larry Burns, General Motors Corp. vice president of R&D and strategic planning, told reporters attending the carmaker’s Tech Tour 2006 in the Chinese city (Shanghai). ‘Lack of scale is the primary reason for the high costs of fuel cell vehicles,’ he said.

GM aims to design and validate a fuel cell system that is competitive in terms of performance, durability and cost at volume of \$50 per kilowatt (of power generated) by 2010...

(Note: Internal combustion engines cost about \$30 per kilowatt.)

GM is striving to minimize the requirement of the costly platinum used in its hydrogen fuel cell vehicle to cut production costs for commercialization.

‘The key is to spread platinum on the fuel cell membrane as evenly as possible via a catalyst-thrift technology to meet cost and durability targets,’ Burns said. ‘We are also investing in other materials that can replace platinum.’”

Hydrogen fueling station cooperatives

With hydrogen cars making tremendous advancements, the focus has now turned to getting the hydrogen fueling infrastructure built. The truth is that the car companies are very frustrated that neither the oil companies nor the federal government has stepped up to build the hydrogen fueling infrastructure.

In order to break this logjam, I am proposing the following idea that would eliminate the need to depend on the oil companies or the federal government to get the hydrogen fueling infrastructure built.

The idea is to get 1000 people that live reasonably close to each other to agree to buy a hydrogen car and finance a hydrogen fueling station that will be built close to where they live. A figure that is often used for the cost of a hydrogen fueling station is \$2 million. This would translate to \$2000 per person.

Each person would pay the extra \$2000 when they purchase a hydrogen car. And then they would own 1/1000th of the hydrogen fueling station which would be a cooperative.

The hydrogen fueling station could be run by members of the cooperative or the operation of the facility could be outsourced. Just like with gas stations today, this cost would be covered by money made from fuel and convenience store sales.

Once the hydrogen fueling station is up and running, the people who paid the \$2000 and own part of it would get a “Member” fuel price. Any other people who buy hydrogen cars after them (and did not pay \$2000 for the hydrogen fueling station) would have to pay a “Non-member” fuel price which might be something like \$1 more per kilogram of hydrogen (e.g. \$7 instead of \$6).

Any profits from the hydrogen fueling station could be paid back to the 1000 owners every quarter or year in the form of dividend checks. And eventually the hydrogen fueling station could be sold and each person would receive 1/1000th of that amount. Therefore, each person would make back part or perhaps even all of the \$2000 initial investment over time.

One of the amazing things is that this could pretty much be done anywhere there are 1000 people who live pretty close to each other who want to do this. Furthermore, the idea is scalable.

The bottom line is that hydrogen fueling station cooperatives solve the hydrogen infrastructure “chicken and egg” problem, because the cars and the fueling stations would come at the same time!

A plan for implementing this idea

Here is how I think the car companies should use hydrogen fueling station cooperatives to get tens of thousands of hydrogen fuel cell cars on the road by 2015:

Toyota, Honda, Hyundai, Daimler, and GM could get together and make a joint announcement to agree to produce 10,000 hydrogen fuel cell vehicles each by 2015. The hydrogen fuel cell vehicles (50,000 of them) would be sold to customers who live anywhere in the Los Angeles metro area. Each person would agree to pay both for the hydrogen fuel cell vehicle and \$2000 extra for their portion of the hydrogen fueling stations.

A cooperative would be set up with the hydrogen fueling station proceeds and 50 hydrogen fueling stations would be built across the Los Angeles metro area. Each person could fuel their vehicle at any of the 50 fueling stations. This would allow them to drive their vehicles all around Los Angeles.

The car companies would likely have to take deposits from people for part of the cost of the hydrogen car (which would likely be several thousand dollars) and the entire amount to cover the fueling stations (\$2000).

The deposits would likely be collected 2 or 2 ½ years before the cars and fueling stations are ready. It would likely take around that amount of time to build the cars and fueling stations. This is especially true the first time this is done.

If 50,000 hydrogen fuel cell cars were on the road in Los Angeles (or any other big city in the world) by 2015, the hydrogen economy would be off to the races.