

Taipei Times

Hydrogen is the fuel of the next generation

June 23, 2006

Page 9

Hydrogen -- one of the most abundant elements -- can be harnessed to produce energy because of its instability.

But that same quality, which helps it produce energy when it combines with oxygen, provides its greatest problem, since at high concentrations, it can explode, or suffocate a human being in an enclosed space, safety experts say.

Nonetheless, it is regarded as the perfect fuel, because its main byproduct is water instead of carbon emissions which are blamed for global warming.

And there are several hubs of international activity -- in Japan, Europe and California -- that are determined to prove the idea can work.

DaimlerChrysler, Hyundai, Nissan, Toyota, Volkswagen, Ford and other auto manufacturers have all produced test vehicles powered by fuel cells.

General Motors' goal is to be the first automaker to sell 1 million fuel cell vehicles, according to a California initiative.

Symbolic of the huge technological challenges ahead, the California Fuel Cell Partnership (CFCP) -- which has less than 200 light duty fuel-celled vehicles on the roads in California -- has set a goal of only 300 to be placed in fleet demonstration projects.

CFCP is also promoting the development of hydrogen combustion engines, with the hopes of having 2,000 such vehicles on the roads by 2010.

California has already opened 22 hydrogen fuelling stations, with plans for another 15. CFCP is coordinating cooperation among all its 31 members, who include DaimlerChrysler, Ford, Hyundai, Nissan, Honda, Toyota and a number of fuel companies.

At the heart of many of the new vehicle developments is the Canadian-based Ballard Power Systems Inc, which has partnered with Mercedes-Benz to deploy 30 busses around Europe that are powered with 205 kilowatt engines. Mercedes Benz has a stake in the company, but Ballard has also produced fuel cells for other car makers.

The busses are undergoing a two-year field trial in London, Luxembourg, Hamburg, Barcelona, Amsterdam, Iceland, Stockholm, Stuttgart and Perth, Australia.

Ford has built fuel-cell-powered vehicles for the city of Vancouver, Canada. And Brazil's Sao Paulo, as well as Tokyo, Beijing and Mexico City are also planning to test fuel-cell vehicles in their public transport programs.

But Robert Rose, a founder of the Breakthrough Technologies Institute and a leading advocate for fuel cell technology, warned recently in the online *Green Car* journal of remaining "substantial challenges ahead."

When the need is great enough, he wrote, "people will find a way to make money providing [hydrogen], to do so safely and in a manner consistent with best environmental practise."

But he also pointed out the need for a new "man on the moon" style commitment from the government -- a sum much greater than the modest US\$1.2-billion hydrogen fuel initiative launched by US President George W. Bush in 2003.

Rose dismissed as insufficient even a US\$5.5 billion program for the US endorsed by 20 technical organizations in 2002.

"If we are going to break our energy addiction, we will need 10 times that amount -- US\$50 billion to US\$60 billion in the US and three to four times that worldwide -- over the next 15 years," he said.

In order to overcome hydrogen's volatility, engineers at the University of Florida at Gainesville are trying to figure out how to produce a tiny sensor device to detect hydrogen leaks and sound the alarm by wireless communication.

"You need lots of hydrogen sensors to detect leaks, but you don't want to have to maintain them or change the battery every couple of months," said Jenshan Lin, an associate professor of electrical and computer engineering, in a recent research paper. "Our sensor can operate completely independently."

Lin has developed sensors as part of NASA's hydrogen research.