

The Hydrogen Car Revolution: *Where will it go?*

By Brian McKenna

"Engineers of the world unite! You have nothing to lose but your chains!"

Bill Ford, the CEO of Ford Motors, might well have proclaimed those stirring lines to the estimated 40,000 engineers at the Society for Automotive Engineers conference in Detroit on March 3-6, encouraging them on to revolutionary feats of invention. Ford, the great grandson of Henry Ford, has gone so far as to say, "I believe fuel cells will [one day] finally end the hundred year reign of the internal combustion engine."

Engineers are portrayed as the cultural wizards who can make it so.

In this post-9/11 world, the Big Three automakers are touting the virtues of a technology – the hydrogen fuel cell – that will let a car run on the electricity derived from combining the two elements of water, "inflammable air" (hydrogen) and "life-sustaining air" (oxygen). Instead of exhaust, the main byproduct is H₂O – good enough to quench the thirst of Space Shuttle astronauts.

It's the golden goose, an alchemist's dream. Or so it seems.

In his January 30, 2003, State

of the Union address, President George W. Bush riveted attention to the quest, announcing a \$1.7 billion FreedomCAR and Fuel Initiative that by 2020 would, "reverse America's growing dependence on foreign oil by developing the technology needed for commercially



GM Hy-wire fuel cell concept vehicle.

Photo: General Motors

viable hydrogen-powered fuel cells – a way to power cars, trucks, homes and businesses that produces no pollution and no greenhouse gases."

A few weeks later, on February 14, 2003, a Department of Energy official, Douglas Faulkner, came to Ann Arbor to exclaim before a packed audience: "We stand on the cusp of revolutionary change in this country and the world."

Michigan has erupted with hydrogen fever.

Not ready for prime time

Of course significant work has progressed on fuel cells for years.

By February 2003, automakers had spent more than \$2 billion to create 33 vehicle models that were powered – in whole or in part – by the hydrogen-powered fuel cell, according to the U.S. Fuel Cell Council. Daimler Chrysler has the NeCar, General Motors has the

Hywire, and Ford has the Focus FCV.

Hydrogen vehicles are not yet in mass production owing to several formidable constraints including high-cost, design difficulties, technological troubles, and the lack of a supportive fueling infrastructure. But the consensus is that it's only a matter of time before these hydro

cruisers are commercially available to a mass public.

Left or right?

For some on the left, the hydrogen fuel cell is seen as the country's salvation. *E, The Environmental Magazine* billboarded "The Coming Hydrogen Economy" on its January/February 2003 cover, asking, "Can Hydrogen Fuel Deliver Us from Oil, War and Terrorism?" The answer, provided by well-known ecologists like Jeremy Rifkin and Amory Lovins, is a qualified yes (see "H-Power: The 'People's Energy?'" on page 6 for more of Rifkin's views).

Rifkin and Lovins are hopeful that hydrogen can be produced from renewable energy sources like solar, wind, thermal, tidal, and biomass, and not fossil fuels like natural gas, oil and coal, as it mostly is today. Replacing the Western world's 100 million-plus automobiles with hydrogen-powered vehicles could trigger the long-awaited dawn of a sustainable economy. And for Rifkin it may even shepherd in "the next great economic and social revolution" of decentralized democracy.

On the right, people like former governor John Engler are equally as excited. On April 18, 2002, in one of his last official acts as governor, Engler broke ground on NextEnergy, "a comprehensive economic development plan to make Michigan a world leader in the research, development, commercialization and manufacture of alternative energy technologies such as hydrogen fuel cells." The 40,000 square-foot facility, affiliated with Wayne State University's Technology Park in Detroit, is due to open in the summer of 2004.

Said Engler: "We must be willing to embrace the future, and the future is alternative energy. As we always have, Michigan will lead. Michigan will build it, and they will come."

So there we have it: a "revolution" supported by influential segments of the left and the right. Hmmm.

Neither left nor right

Hydrogen is neither right nor left. It is, however, the most ubiquitous gas in nature, constituting almost 90 percent of all the atoms in the universe. The stuff of stars, it has been a principal fuel for rock-

ets since the 1930s. It does have some bad associations like the 1937 Hindenburg Disaster and the hydrogen bomb. Also, it's rarely found naturally on earth, so it has to be carefully extracted. And that's expensive. Producers find it important enough to extract over 100,000 metric tons a day (mostly from natural gas) and use it to make ammonia, tungsten (to improve light bulb efficiency), margarine for your morning toast, and to remove sulfur from petroleum. In fact, petroleum refineries consume approximately 45 percent of the available hydrogen.

Clearly then, while hydrogen gas is natural; its cultural uses are not. The amount of hydrogen required for a hydrogen economy of cars would be astronomical, and sources will have to be identified. Increasingly Michigan, as the auto capitol of the world, is a central place where these energy policies are playing out. Sixty percent of the country's automotive engineers live or work here. Will the hydrogen car be for ill or will? Will the renewable car be built on renewable energies? Are we really heading for a revolution?

Hydrogen later or hybrid now?

For most of the 1990s the Clinton administration backed a \$1.5 billion program to create a car that got up to 80 miles per gallon. It was called the Partnership for a New Generation of Vehicles, or Supercar Program. To date it has failed to generate any Big Three fuel-efficient vehicles. Ironically, what the country got instead was a dramatic rise in light truck production - reaching, for the first time in U.S. auto sales history, 50.6 percent of the market, while fuel economy

dropped to its lowest in 20 years, officially 23.8 mpg in 1999, according to the Environmental Protection Agency.

Meanwhile, the Japanese doubled their research and development efforts and in 1997 Toyota shocked the automotive world with the Prius, which was rated over 50 mpg for fuel economy in the city when it reached U.S. showrooms in 2001, and produced half the carbon dioxide of a conventional car. The Prius is known in the business as a "hybrid," a half-gasoline, half-electric-powered automobile that was far more fuel-efficient and far less polluting than any vehicle of its time.

Instead of the hybrid in 2003, the public is being sold hydrogen for 2020. What gives?

"It's all very confusing for the American public," said Jerry Mader, Business Development Manager for the Center for Automotive Research in Ann Arbor, in a recent interview. "They see all this press on a hydrogen economy and think somebody is hiding this from them. Why is it not here already?" Mader thinks that there should be "more of a balance" between the hydrogen future and something to offer people right now. "If they saw incremental improvements being made," the public would have more faith in the auto industry and the government, he said.

Mader appeared on *NBC Nightly News with Tom Brokaw* a few weeks ago, "and all they wanted to know was when the hydrogen car would be available for the public." Most of an hour-long interview recorded before the show, in which he made the above points, was not used. Mader is working behind the scenes to

H-Power: 'The People's Energy'?

Rifkin's vision

In his popular new book, "The Hydrogen Economy," Jeremy Rifkin says that we are fast approaching a critical watershed in fossil fuel availability "with dire consequences for industrial civilization." He suggests that there may be a sharp decline in global oil production as soon as 2010. He paints a portrait in which Islamic nations may threaten Western access to Mideast oil causing the U.S. to rely more on coal, tar sand, and heavy oil. This would not only worsen environmental health but also "make industrial life vulnerable to massive disruptions and even collapse," according to Rifkin.

Whether or not you accept this outlook, Rifkin correctly identifies the social amnesia about energy in U.S. culture that has contributed to this impasse. Our food, our cars, our heat, our electricity (that fires our computers and brightens our abodes) only exist, in their current forms, because of the continuous throughput of oil, and to a lesser extent, natural gas and coal. Citizens tend to think about the underpinnings of "our contemporary social architecture" only when there is a crisis, like the 1967 New York electrical blackout or the 1973 OPEC oil embargo. The anxiety about gasoline jumping a dime here or there at the pump is misplaced. The entire country is Oil Inc., but largely ignorant of it.

Rifkin argues that a vigorous turn towards a hydrogen-based economy now will prevent a future societal collapse. With hydrogen, he says, "every human being could become the producer as well as consumer of his or her own energy," making possible "a vast distribution in power [which] could make obsolete our big-scale polluting oil network." That is true because the

technology allows for individual production. This could help create, "the first truly democratic energy regime in history."

Crucial for whether hydrogen becomes "the people's energy" is how the gas is harnessed in its early stages. It depends, Rifkin says, on a movement of locally generated networks of publicly owned utilities and non-profits establishing distributed-generation associations (DGA) extracting the gas from renewable forms of energy (like wind, water and solar) in every country.

Johnston's reality

In a recent interview, environmental anthropologist Barbara Johnston, PhD, said, "When you examine the structure of capital in emerging water markets – it is the large energy corporations that are involved ... It is my sense that there are strong intersections between the current players in today's energy markets, and formative efforts to control the 'blue gold'."

For example, RWE, a German energy transnational, is now the owner of large water companies in Illinois, Indiana, Ohio, and Pennsylvania since it bought American Water Works in 2002. In fact, the energy transnational is now the biggest owner of water utilities in the country. The move has many communities concerned about the future of their water supplies. There is an important hydrogen connection here.

RWE, built on coal power in the 1890s and a major player in the nuclear waste markets, intends to be at the top of the field of fuel cell power units as well. Beginning in 2005 RWE plans to market fuel cell products for homes and commerce. About 2008 the division is expected to make money. The company hopes that by 2015 their market share in

Germany in the field of distributed energy technology will be ten percent.

Indeed, the European Union, itself a major force in the hydrogen economy, with more than a \$2 billion commitment (Rifkin is an advisor to the EU), suggests that large hydroelectric dams be built in Greenland and Iceland where they don't need the electricity and could use the surplus electricity to strip hydrogen from water. It's relatively cheap.

Controlling the "blue gold"

Johnston notes that in February, "the World Bank – a major force in the privatization of water systems worldwide – announced their 'new' water resource investment strategy which boosts spending on big dams, inter-basin transfers, and other water megaprojects." Last year the Bush Administration pushed through Congress a water resources act encouraging privatization of public utilities (linked to development and improvement funds) and also pushed changes in IRS code to create incentives for privatization.

Johnston further notes, "Developing hydrogen fuel ... requires fundamental transformation in the energy industry itself. Until recently, most of the cheap sources of energy (hydroelectric) have been owned by public utilities. From an energy industry point of view, if the future is hydrogen, than substantive transformations need to take place in loci of control over potential hydrogen production facilities if profit is to be made. ... NAFTA, GATT, and the privatization policies of the World Bank, the U.S., the EU – work in coordinated fashion to assist corporate takeovers of large scale public hydro-energy systems around the world."

—by Brian McKenna

convince the Big Three to make fuel-efficient improvements now.

Fantasyland politics

It will be a challenge, because Bush's rhetoric contradicts his actions. Although he says that he wants to cut dependence on foreign oil and curb global warming, his administration is suing California to kill its higher mileage requirements, which would do just that.

Similarly, as the *Detroit Free Press* reported on March 5, the Administration is considering weakening New Source Review, a Clean Air Act program requiring antiquated power plants and factories to install modern pollution control equipment. Under the Engler administration Michigan has fought to keep these old plants – like Lansing's Board of Water and Light – in production.

Moreover, the administration's FreedomCAR program funnels millions to Detroit without requiring that they produce a single fuel-cell vehicle for the public to purchase. Could it be that the auto industry is using the promise of future fuel cells as a shield against using existing technology to dramatically cut our oil dependence, and pollution, today?

Jack Doyle, author of "Taken For A Ride: Detroit's Big Three & The Politics of Pollution," thinks so. He sees the hydrogen initiative as a smokescreen. "It's simply more of Detroit's fantasyland politics, designed to keep Congress

from enacting tough fuel economy standards," said Doyle in a March 6 article from TomPaine.com, a public interest journal: "Every time Congress and the public get close to thinking that real fuel economy



Daimler Chrysler NeCar fuel cell vehicle

Photo: Daimler Chrysler

is a good idea, Detroit rolls out some whiz-bang autorama to provide the illusion of progress. Bush's proposal to provide for clean cars – which is laudable on its face – is but the latest in a long line of Detroit-White House 'partnerships' dating to the Nixon-era that only provide diversion and political cover, not actual clean cars."

It's fuel economy, stupid

Doyle concludes: "The historical record is full of Big Three technological neglect and foot-dragging. Congress would do well not to be fooled by George Bush's hydrogen car pie-in-the-sky rhetoric. Raising national fuel economy standards to the 40- to 50-mpg level for all cars, SUVs, and light trucks ought to be the goal in five years, not 10 – especially with hybrid technologies here now. Tough fuel economy standards ought to

be the floor from which all new automotive technology builds – whether hybrid, fuel cell, or conventional vehicle. The only language Detroit understands is the force of law. Anything less will cost the nation dearly in continued capital outflow, lost technological leadership, further pollution, and damaged stature abroad."

Indeed, a study released March 5 by MIT's Laboratory for Energy and the Environment found that hybrid cars are greener than hydrogen cars. The authors said that hybrid cars would outpace the environmental benefits of hydro-

gen fuel-cell cars until at least 2020. That's because producing hydrogen today primarily uses natural gas or gasoline. If hydrogen were derived from wind and solar today, then this would not be so.

The fear factor

Michigan created NextEnergy in part due to fear. According to a NextEnergy press release, "In addition to environmental concerns and the risk of continued dependence on foreign oil, NextEnergy was created in response to growing evidence that the internal combustion engine eventually may be phased out. This phase out could result in the loss of about 200,000 Michigan jobs and \$10 billion to the state's economy."

That is true for all major sectors of the culture. The federal government helps to manage U.S. corporate culture and protects their

interests abroad. Its leaders are keenly aware of international competition and fear losing ground.

The European Union is committed to spending \$2 billion to support its hydrogen economy. And there is a chance that China – which does not have a multi-billion dollar investment in a fossil

fuel infrastructure – could leapfrog into a hydrogen economy before the United States. Already its natural-gas bus program is creating the infrastructure for using gaseous fuels.

Whose revolution, theirs or ours?

The so-called hydrogen revolution is, in fact, yet another in wave upon wave of technical revolutions tied to capitalism, the most revolutionary force in human history. There was the jet age, the space age, the computer revolution, the Internet revolution, the revolution

in communications media and so on. In short, there is a continual transformation in the forces of production. Flowing from this is an American ideology that sees deliverance from our social problems in technical things, which often becomes a fetish, distracting us from the real issues.

By themselves, engineers are not the solution to U.S. energy woes.

Too often engineers and other specialists exclusively serve the needs of a hierarchical social order, without paying sufficient attention to the bigger picture. In this context, we need philosophers, humanists, journalists, social scientists, and involved citizens, to help us engage in a broader cultural politics.

We can't be seduced by slogans. The only choice is to educate ourselves to better prepare for the automotive struggles ahead.



*Ford Focus Fuel Cell Vehicle (FCV)
Photo: Ford Motor Company*