

# Automakers see future in fuel cells, not gas/electric hybrid

By David Kiley  
USA TODAY

**DETROIT** — Widespread agreement that the hydrogen fuel cell will replace the internal combustion engine over the next 30 years is making it difficult for automakers to justify funding development of the gas-oline/electric hybrid and electric vehicle technology.

The latest evidence: The Bush administration committed Wednesday to help fund hydrogen fuel-cell vehicles to the exclusion of hybrids and electric cars.

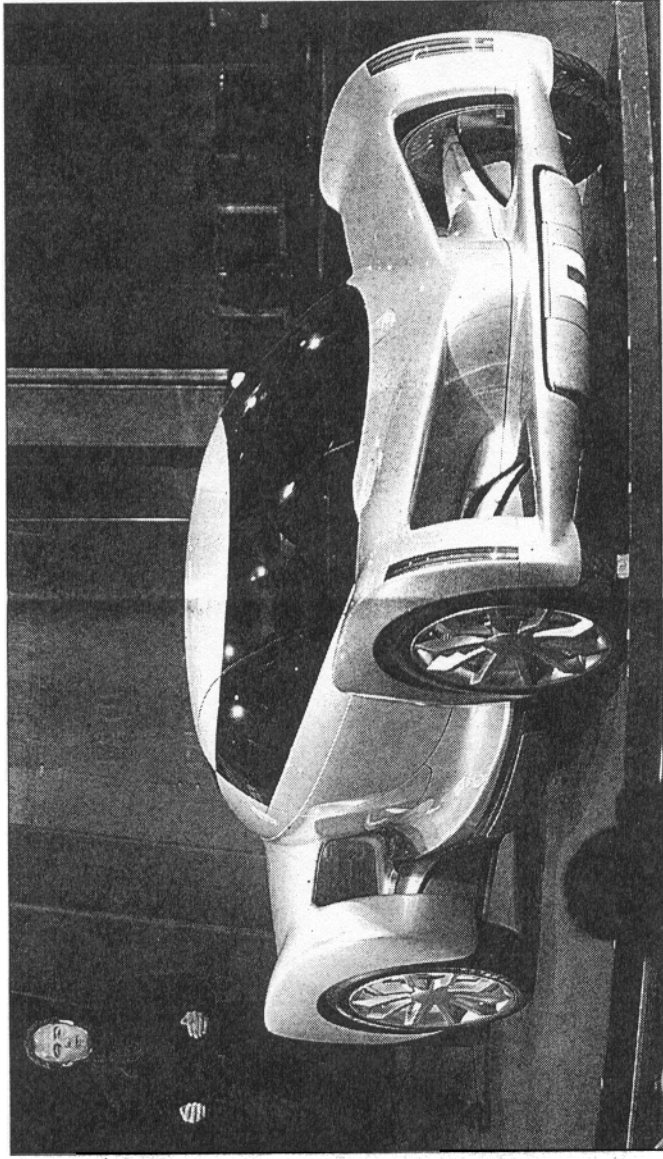
The Energy Department's program replaces a Clinton-era program that spread \$1.5 billion over several alternative fuel technologies in an attempt to create a car that could go 80 miles on a gallon of gas, a goal never reached.

Energy Secretary Spencer Abraham said the amount of funding for the fuel-cell program will be announced later this year.

Some automakers already had started putting emphasis on fuel cells, which combine hydrogen and oxygen to produce energy without the pollution of gasoline.

"We are working hard for lower emissions and better fuel economy," General Motors Chief Executive G. Richard Wagoner said this week at the North American International Auto Show here. "We have several ways to improve, but hydrogen fuel cells by far represent the bulk of where we want to invest."

At the auto show, GM unveiled a concept vehicle called Autonomy. GM says that using Autonomy, rather than retrofitting a current car or truck with a fuel cell, shows the direction of future hydrogen-powered vehicle design. The automaker says that any number of car or truck tops could be installed on Autonomy's fuel-cell platform.



Rolling out: Larry Burns, GM's vice president of research, development and planning, shows off the Autonomy concept vehicle. The automaker says that any number of car or truck bodies could be placed on top of Autonomy's fuel-cell platform.

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GM thinks it would need only three or four fuel-cell platforms of different lengths to accommodate any vehicle it sells. It needs 10 to 12 platforms and chassis today for its internal combustion vehicles.

Toyota and Honda each have gas/electric hybrids on the road today, although they sell in small numbers and at no profit.

Toyota's Prius is a small sedan, and Honda's insight is a two-seater. Honda is adding a hybrid Civic to its lineup this year. Ford Motor will have a hybrid Escape SUV in showrooms by late next year. GM will offer hybrid versions of its full-size pickups in 2004, boosting fuel economy 15%.

But hybrids have little promise for the large trucks and SUVs that Americans de-

mand. And critics of hybrid technology note that the small vehicles it's in are already the most fuel efficient on the road.

In bigger pickups and SUVs, hybrid technology will improve fuel economy by perhaps 20%. That boosts a typical SUV from 17 miles per gallon to 20.

Worse yet, automakers say, would be continued investment in electric vehicles,

which have limited range and can only be used in very small, light vehicles.

Because of a California mandate that big automakers have zero-emission vehicles on the road next year — long before fuel cells are ready — Ford and Chrysler Group have begun selling small, electric, golf-cartlike vehicles to retirement and resort communities. GM and Chrysler parent DaimlerChrysler have sued the state.

"Putting golf carts on the road isn't a solution to anything," Wagoner says.

Still, automakers say they aren't putting off attempts at better fuel economy until fuel-cell vehicles and their needed infrastructure are in place.

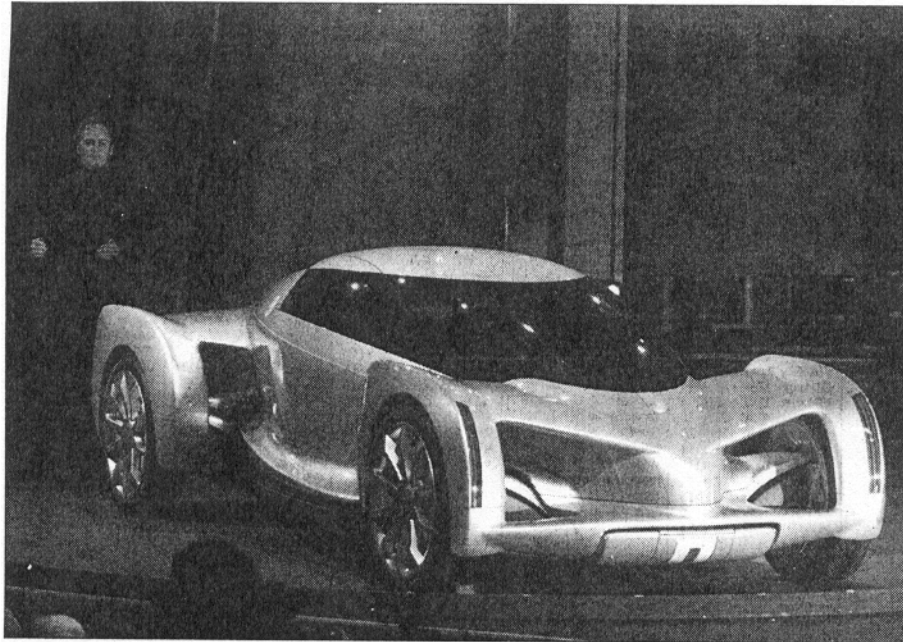
Besides the hybrid Escape, Ford is pushing to improve fuel economy of its SUV fleet by 25% by 2005 with lighter materials and design changes. But Ford recently canceled plans for a hybrid version of Explorer, the best-selling SUV, because of cost cutting and poor test results. And the automaker says meeting the 25% fuel economy improvement goal won't be easy.

"We are still pushing for it, but we are really on the ragged edge," Ford Chairman and CEO Bill Ford said this week. "We are dependent on the technology we have at our disposal ... and it is going to be tougher than we thought."

Fuel-cell developers, many of which don't aim products at transportation, saw shares skyrocket Tuesday before the announcement and fall off again Wednesday.

Plug Power was off 13% to \$10.50; Fuel Cell Energy, down 12% to \$19.25; H Power Systems, down 8% to \$37.3. But Ballard Power Systems, which is working with several automakers on fuel cells, was up 15% Tuesday and another 3%, to \$35.95, Wednesday.

Contributing: Wire reports



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Larry Burns, General Motors vice president of research, development and planning stands behind the AUTOmomy with a passenger vehicle shell attached Jan. 7, at the North American International Auto Show in Detroit.

# New fuel cell cars debut, hailed as wave of future

By Ted Shelsby  
The Baltimore Sun

The automobile is poised for its most profound change since Karl Benz built the first horseless carriage in 1885.

General Motors Corp. offered a peek into the industry's future last week at the Detroit Auto Show when it took the wraps off its prototype hydrogen-fed fuel cell vehicle featuring "drive-by-wire" technology.

Analysts said it amounts to the reinvention of the automobile.

"Awesome," said David Cole, director of the Center for Automotive Research in Ann Arbor, Mich. "This is a giant leap forward in automotive conceptual thinking."

Called AUTOmomy, GM's concept not only has Detroit buzzing, but it also has Washington rethinking its approach to the development of more fuel-efficient cars and trucks.

AUTOmomy is the first vehicle designed from the ground up around a fuel cell propulsion system. It features what GM calls a "skateboard" chassis that can be adapted to dozens of different bodies to accommodate changes in lifestyles and differing transportation needs worldwide.

The fuel-cell vehicle - which would emit only water from its tailpipe - is being hailed as a technology godsend designed to end auto pollution and free the United States of dependence on imported oil.

Two days after GM unveiled its concept vehicle, U.S. Energy Secretary Spencer Abraham took the platform at the Detroit show

## AUTOmomy is the first vehicle designed from the ground up around a fuel cell system.

to announce that the Bush administration had formed a new partnership with domestic automakers to stimulate the development of fuel-cell cars.

He said the plan was designed "to promote the development of hydrogen as a primary fuel for cars and trucks, as part of our effort to reduce American dependence on foreign oil."

He noted that the United States imports 55 percent of its oil, and transportation accounts for 67 percent of the petroleum used in the country.

Mr. Abraham's comments marked a shift in federal policy away from its longtime support for a government/industry partnership to develop an 80-mile-per-gallon sedan by 2004 - mostly centered on small, hybrid cars that run on gasoline and electricity.

"We think AUTOmomy is a better approach," said Mohsen Shabana, chief engineer of GM's fuel cell program. He cautioned, however, that it may be another decade before a competitively priced fuel-cell car makes it to the showroom.

Mr. Shabana said that even in volume production, a fuel cell propulsion system would cost

\$25,000 to \$35,000 today - a fraction of the \$300,000 it would have cost five years ago but still roughly 10 times as much as a V-6 engine currently used in many cars and trucks.

"We have got to get the fuel cell price down," he said.

Fuel cells create electricity through a chemical reaction between hydrogen and oxygen. The electricity is used to power the vehicle.

GM's concept could revolutionize the auto industry. The drive-by-wire concept would replace most mechanical and hydraulic systems, such as steering and braking, with electronics.

Mr. Shabana, the GM engineer, said the company's plan is to produce millions of chassis designed to last for 20 years. It envisions small satellite assembly plants around the world producing bodies for the vehicles designed to meet particular needs.

A customer who needed a pickup truck for work, for instance, would be able rent a mini-van body for a week to take the family on vacation. The van body would fit on the same chassis.

A bachelor could replace his sports car body with that of a full-size sedan after marrying and starting a family.

"Most of the investment would be in the chassis," Mr. Shabana said. "That's where the hardware is. It would be like ordering a home computer, but instead of it saying 'Intel inside,' it would say 'GM inside.'"

GM is seeking 24 patents covering technologies and manufacturing processes related to its concept.

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# Fill 'er up - with borax? Chrysler testing new fuel cell

By David Kiley  
USA TODAY

DETROIT — DaimlerChrysler says it is developing technology to power vehicles with hydrogen fuel cells that use a mixture of sodium borohydride, commonly known as borax, and water.

The borax and water deliver hydrogen to the fuel cell.

It's an environmentally friendly technology. If every car in the USA were powered by the system by 2020, it would consume only about 5% of the world's borax supply. And nearly all of it would be recycled. The system also produces no emissions and no greenhouse gases.

Borax, a chalky mineral, is dug out of dry lake beds. Besides Borax brand detergent, borates, a term used to describe a variety of borax-based compounds, find their way into everything from cookware to medicine.

A Chrysler minivan currently is being tested with the fuel cell. It takes in a tank full of borax infused with hydrogen plus water. A transformer in the engine siphons off the hydrogen to power a fuel cell. The spent borax is held onboard until the tank is refilled. The driver then pumps the old borax into a holding tank.

The minivan has a range of 300 miles per tank, comparable to a gasoline-powered vehicle.

Thomas Moore, vice president of DaimlerChrysler's technical affairs research and development group, says the automaker likes the fact that the borax can be recycled and the small space the system takes up in the vehicle.

"We aren't saying this is the technology we are going with over all others," Moore says. "But we find it compelling, especially since the system has a longer range than any other fuel cell we know of to date."

Jacob Brouwer of the National Fuel Cell Research Center at the University of California at Irvine says a borax delivery system has as good a chance at becoming one of the surviving fuel cell technologies as compressed hydrogen. "Like with any alternative fuels, the cost of the infrastructure is the big question," he says.

Scientists and automakers expect fast growth in hydrogen fuel cell technology from 2010 to 2020, with as many as three delivery systems for hydrogen in use. Most fuel cell technology being developed relies on compressed hydrogen tanks or systems that convert gasoline to hydrogen for delivery.

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