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As seen in



Money

September 25, 2003

GM, Honda see future in fuel cells that power homes

Electricity issues could be relieved

David Kiley
USA TODAY

DETROIT — Larry Burns couldn't help but smile as he drove home to a dark and sweaty house with no well water and melting ice cream during August's massive power blackout.

The research and development chief for General Motors has been saying for more than two years that the technology the automaker plans to use to market hydrogen cars by the end of the decade also can solve most of the problems the USA has with its antiquated electric power grid.

Fuel cells use the chemical reaction between hydrogen and oxygen to generate electricity, which gets used as it's made or stored in a battery.

When it comes to hydrogen power, cars are far from the only business GM — and Japanese automaker Honda — see in their futures. Both are weighing the potentially huge payback of using their well-known brand names and distribution networks to persuade businesses and eventually homeowners to put GM- and Honda-branded hydrogen fuel cells in their basements and garages to power lights and appliances. They say that could happen long before consumers put hydrogen vehicles in their driveways.

"We are asking ourselves: If we have the defining technology for fuel-cell vehicles, should we also become the Intel of this business with 'GM Inside' being the brand that creates widespread acceptance of hydrogen power in all its forms," Burns says.

GM will be ready to enter the market in about four years but is still weighing whether to manufacture stationary fuel cells on its own, or license the technology to others.

Home fuel cells also are a logical step for Honda, a company that already has its brand on gasoline/diesel and battery-powered generators as well as small-engine products from snowblowers to weed trimmers, says Ben Knight, research and development chief for the automaker.

"Honda thinks of hydrogen as a system for the customer, not just a car," he says.

Honda was the first to get a fuel-cell car certified for road driving by the federal government. It plans to sell about 15 FCX hydrogen vehicles in a California pilot program next year.

GM has allowed journalists and others to drive its Hy-wire hydrogen car under controlled tests. It doesn't plan to sell a hydrogen vehicle to any customers until probably 2008-10.

But GM has moved up by six months — to this fall — a deal to supply up to 500 hydrogen fuel cells for Dow Chemical's Freeport, Texas, chemical complex, capturing waste hydrogen from the plant and generating enough electricity to power 25,000 homes.

GM and Dow are talking about similar deals elsewhere in the USA and Europe.

GM is using the deal to test fuel cells destined for Chevys and Buicks. But it's also out to pique interest among other commercial users besides Dow. As prices come down for generating power from hydrogen, smaller businesses, like restaurants, will be tempted to buy fuel cells, Burns predicts.

Burns says home fuel cells could save investment in the power grid over the next several decades because power outages can be avoided if the load at peak usage times is decreased by as little as 10%.

AS SEEN IN USA TODAY'S MONEY SECTION SEPTEMBER 25, 2003

"Nobody is looking to fuel cells to replace the grid — or gasoline vehicles. But a faster transition, helped by tax incentives for companies and consumers, could save a lot of grid investment," he says.

Hydrogen is created by either sending an electric current into water, known as electrolyzing, with electricity from the grid, or processing it out of other sources like natural gas, propane, methanol or agricultural waste.

Homeowners and small businesses with a stationary fuel cell or a fuel-cell car could make hydrogen from natural gas or by electrolyzing water at off-peak hours, storing it in a tank, then using it to create electricity during peak times, reducing the drain on the grid. House current could be drawn from either a car or a stationery fuel cell. Many alternative-power enthusiasts likely will have both.

Fuel-cell owners also would be able to feed excess power back to the grid for credits toward their electric bills.

Hydrogen cars with a full tank of fuel pack 10 times the

power an average house needs to run for a day.

Sounds great, but the economics of the scheme have a long way to go.

Pricing of fuel cells is difficult to predict, but manufacturers know homeowners won't be interested beyond \$3,000 to \$5,000 for the appliance.

Honda's FCX hydrogen car costs \$3 million right now. A fuel cell from UTC Fuel Cells, a South Windsor, Conn., company that provides either off-the-grid or backup power to New York City's Central Park police station and other customers, costs \$900,000. UTC has sold 250 fuel cells, each made by hand, in 14 years.

"We have a long way to go before the price of fuel cells can compete against the grid rates," says UTC Chief Executive Jan van Dokkum. "But 80% of the cost disadvantage can be solved through sales volume and economies of scale, so we need hydrogen automobiles to generate the volume."



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APPLICATIONS: *knowledge, synthesis, design, research*

DISCUSSION: What technology does General Motors research and development chief Larry Burns believe will solve most of the USA's electric power grid problems? How do fuel cells work? What other outlets — aside from vehicles — do automakers hope to distribute their alternate energy sources in? How is GM generating interest in its hydrogen fuel cells?

ACTIVITY: According to the U.S. Department of Energy, "fuel cells are very high-efficiency and multi-fuel power generators that require neither the burning of conventional fuels nor the mechanical equipment of conventional power generators. They produce electricity through a chemical reaction involving their construction materials and a fuel." Through research, explain the differences between an electric power grid and a hydrogen fuel cell. If possible, create a graphic that illustrates how each source generates and delivers power. Compare and contrast your findings and interpretations in class.

*Source: www.energy.gov



VOCABULARY

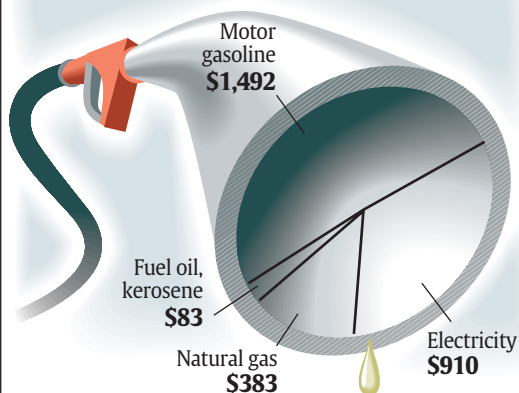
1. hydrogen
2. antiquated
3. power grid
4. fuels cells
5. pique
6. electrolyzing

Focus on: Energy

USA TODAY Snapshots®

Where your energy dollar goes

The average U.S. household spent \$2,868 on energy use in 2000. How it was spent:



Source: Energy Information Administration

By Sam Ward, USA TODAY

APPLICATIONS: *social studies, math, research, comparison, graphic organizer*

How much did the average U.S. household spend per month on energy in 2000? What percentage of a household's energy expenses went toward automobile fuel? How much did Americans spend per month to gas up their cars?

Fossil fuels such as oil, coal, natural gas and kerosene are considered non-renewable resources, which means supplies are finite, with known domestic supplies projected to

last no more than another 10 generations. Renewable energy resources — such as water, wind and heat from the sun — can generate energy (electricity and heat) indefinitely.* Create a graphic organizer that compares and contrasts renewable and non-renewable resources. (Do outside research, as necessary.) Which are more practical? More efficient? More cost-effective? Which do you favor? Why?

*Source: Energy Information Administration