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HYDROGEN | TRANSFORMING SOUTH CAROLINA

Imagine a world where nothing is plugged in Columbia might get glimpse into future when it becomes Hydrogen City USA

By C. GRANT JACKSON
gjackson@thestate.com

Here's a peek at the future ...

Cars and buses fueled by hydrogen cruise Columbia's streets, stopping at a local hydrogen filling station to "gas" up.

Police officers patrol the Vista on hydrogen fuel cell-powered Segway personal transporters designed by a USC professor.

Fuel cells, looking like oversized air-conditioning units, perch on scattered downtown rooftops, powering some USC buildings, downtown condos and apartments.

Even the scoreboard at USC's new baseball stadium is powered by fuel cells.

The gee-whiz applications are windows into the future — ideas of how much the technology could change modern life.

There still are plenty of scientific and technical hurdles that need to be overcome. But hydrogen and fuel cell technology could reverberate through our lives and our economy.

"It could be so revolutionary that it's hard for a scientist to think about the possibilities without feeling like he's dreaming," said John Van Zee, director of the National Science Foundation center for joint industry-university fuel cell research, located at USC.

The target date for at least demonstrating the innovations above — some of which are already up and running — is the 2009 National Hydrogen Association meeting to be hosted by Columbia.

For at least that weekend, Colatown will become Hydrogen City USA and an international showcase for fuel cell technology.

Some call the event Columbia's technology Olympics.

"This convention will be the most significant event in Columbia's economic history," said Mayor Bob Coble. "This is the largest convention we have ever had, and the most important."

TOOLING AROUND TOWN

Local leaders gearing up for the conference have launched the Greater Columbia Fuel Cell Challenge, asking companies for demonstration projects the city can show off.

Fuel cells are clearly still a nascent commercial market, and the USC-Columbia Fuel Cell Collaborative, which is sponsoring the challenge, is offering money to the products' developers.

The biggest project on tap for 2009 is a hydrogen refueling station that would serve the 40 futuristic cars expected to roll in as part of the conference.

Having the "gas" station pumping by July 1, 2008, is a top priority for the city.

What could pull up to the pumps first?

How about a Beemer?

South Carolina, of course, is home to BMW's only U.S. plant.

During last week's national hydrogen conference, in San Antonio, the company introduced the Hydrogen 7, the world's first hydrogen-powered luxury car. (European journalists test-drove the car in December in Germany.)

Limited editions of the car will be built in Europe and eventually sold in the United States. But it will be a decade or more before hydrogen-powered vehicles made by BMW or other companies are common, experts say.

The Hydrogen 7 is a bi-fuel car, burning hydrogen or gasoline. When running on hydrogen, it produces no greenhouse gases or toxic emissions, only water and heat.

Also by the spring of 2009, a hybrid-electric fuel cell bus should be cruising USC's campus.

The bus is part of the National Fuel Cell Bus Program. Bringing it to Columbia is a joint venture of USC, the S.C. Research Authority and the Central Midlands Regional Transit Authority.

The 37-passenger bus should run campus and city shuttle routes for up to a year.

And it will, in all likelihood, be the first opportunity for many people to ride in a hydrogen-powered vehicle.

The coolest hydrogen-powered ride in town, however, could be an H-powered Segway.

John Weidner, a USC professor of chemical engineering, is working on a demonstration project to put fuel cells in the trendy personal transporters.

The two-wheeled, mechanized scooter hit the market in 2002 and is already being used by police departments in cities such as Asheville, N.C.. Using fuel cells rather than electric batteries could give the transporter a larger range.

By 2009, Weidner hopes to have six fuel cell Segways to be used around the USC campus.

And he has turned the project into a business, so there could be orders for more.

Former graduate student Vijay Sethuraman worked with Van Zee on the project and earned a doctorate in chemical engineering in December. Sethuraman decided to stay in Columbia because of the buzz created by USC's focus on fuel cell research and development.

Weidner thought that was perfect.

"Part of the challenge was to start businesses based upon our research," Weidner said. "He wanted to know if there was a way to start a business and stay in the area and work on fuel cells. I told him that was exactly what Innovista (USC's research campus) is trying to do — to keep our talent base here."

Spinning off companies also can mean money for USC, which can share in the licensing or profits of the technology or the product developed.

PORTABLE POWER

While cars are the first thing people think of when they think of hydrogen, the earliest and most widespread use of fuel cells will likely come in a smaller package.

Portable power in the form of battery packs is expected to be among the first commercially viable uses.

Two projects are already under way in Columbia.

ETV is using hydrogen-powered batteries instead of conventional battery packs in a couple of video cameras. The hydrogen batteries are lighter and can be recharged more rapidly than the conventional packs.

ETV has used the cameras to cover a number of events, including a news conference at the State House. A crew recently used one of the cameras while shadowing state education Superintendent Jim Rex.

The Columbia Department of Homeland Security also has a fuel cell emergency power system, essentially a portable generator, for first-responders and police.

Everyday use, though, is still a high priority for researchers. Think small electronic devices: laptop computers, cell phones and BlackBerry devices.

"I actually think this new generation of information-on-demand will mean more than just better batteries," Van Zee said. "Most of us are looking for a way to free ourselves from the electrical outlet. Fuel cells have the possibility to do that."

HOMES AND OFFICES

Fuel cells also could transform the way people power their homes, severing their relationship with power companies.

Fuel cell systems the size of typical heat pumps, using hydrogen stored in a vessel resembling a propane tank, could produce enough electricity to run everything from washing machines to plasma TVs.

The only reason a hydrogen house would be on the power grid would be to sell electricity back to the utility company — a concept called net metering.

The same concept can apply to the workplace.

Benedict College soon will have a 5-kilowatt hydrogen fuel cell backup power system at its Project Sustain community center near the campus.

The unit also will be used as a teaching tool by Benedict faculty.

USC, since Fall 2004, has had a 5-kilowatt fuel cell in use, providing some of the power for USC's Green Dorm, in the West Quad on Sumter Street.

USC president Andrew Sorensen has challenged faculty, staff and students to come up with one fuel cell or other alternative energy project a year.

The first such project could be the scoreboard at USC's new baseball program — a key entertainment venue for the Innovista campus and the city's waterfront district near the Congaree River.

Hydrogen could be what makes the scoreboard flash.

But what hydrogen means to South Carolina can't stop at the glitz and gee whiz.

"The vision also must include new opportunities for people to work in South Carolina," Van Zee said. "That will be the means for economic growth in the future."

Staff writer James T. Hammond contributed.