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Charting the hydrogen highway

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COLUMBIA -- Anything imaginable that uses electricity could one day be powered by hydrogen fuel cells, and this capital city could be a nexus of that new technology in the Southeast.

Cellular phone towers, laptops and handheld electronics, backup generators, heating units, lamps and, of course, automobiles: To those who follow the emergence of the hydrogen economy, the world is on the cusp of an energy revolution.

Columbia was the setting for a recent three-day conference called FuelCellSouth, a gathering of visionaries -- fuel cell vendors, academics, politicians, experts and industry representatives -- many of whom admittedly have a vested interest in seeing their hydrogen dreams become a reality.

It many ways it was fact sprinkled with speculation, theory versus the knowledge that has practical applications today.

Together, it also provided a state of the industry in South Carolina and across the region.

"Ready," said John Van Zee, director of the University of South Carolina's Center for Fuel Cells.

"That doesn't mean we'll have fuel cells

tomorrow, but what we're creating with this conference, with this congressman, is the awareness that something needs to happen sooner rather than later."

Republican U.S. Rep. Bob Inglis, who champions hydrogen and has proposed H-Prize legislation to Congress, gave a brief overview of the state's hydrogen and fuel cell research during a live webcast.

"How far away is the hydrogen economy? Not as far as you think," Inglis said. "People don't think in terms of 20 to 30 years. They put that on the back burner, so far that it's off the stove. But there are people who invest in hydrogen and fuel cells right now, some of which are in this crowd. It's not theoretical."

Businessmen from across the country would look at the technology here, collect industry intelligence and then talk about who really had built the better mousetrap -- or, in this case, fuel cell. Think water-cooler discussions that could build an industry.

FuelCellSouth Executive Director Tom Militello said he knew of at least five business ventures that found a final partner at the conference, allowing them to carry their respective projects to the next level. About three-quarters of the 250-plus attendees this year came from outside South Carolina.

And while dozens of Columbia-area businesspeople and representatives of fuel cell interests across North America brainstormed ideas on how to make the Palmetto State's capital "the highest concentration of fuel cell deployment in the world," a small contingent of teachers learned how to use model hydrogen cars for chemistry and physics experiments.

"We were really just looking for something new for the kids, something to show them, something to inspire them," said Abe Raghib, a Greer High School chemistry teacher.

Just in case

A hydrogen economy -- a world where the abundant yet hard-to-produce invisible gas powers cars, homes and all sorts of other things -- might not happen.

But it might. And so, every major automobile manufacturer in the world has begun hydrogen programs, with some companies, like Mazda, already leasing hydrogen cars and others, like BMW, stepping up the production of such vehicles.

Oil companies are watching it, too. Chevron, for instance, is doing its own hydrogen research, and is involved in hydrogen fueling station programs in California and Florida.

The problem is that a gap will emerge in the supply and demand of gasoline.

"The issue's not really that there's a gap. The really important point is we're going to fill that gap with something. What's it going to be?" said Puneet Verma, with Chevron Technology Ventures.

"Decisions have got to be made, because they can't be made the day before. And hydrogen is only one alternative fuel. There's a whole gamut. We're not saying it's going to be hydrogen. We're saying it might be hydrogen."

With soaring gas prices today, the U.S. Department of Energy has set a goal of hydrogen prices between \$2 and \$3 per gallon in 2015 -- and the federal government, ironically, estimates gasoline prices to have fallen to \$1.29 per gallon by then.

But hydrogen has a "portfolio" of benefits that will solve problems in three major areas: the environment, the economy and energy security, said Shannon Baxter-Clemmons.

Baxter-Clemmons, 37, is California's assistant secretary for hydrogen and alternative fuel policy. She says no other alternative fuel is going to solve long-term problems in those three areas.

She mentioned hydrogen efforts in South Carolina as leading the nation, along with those in Florida, Michigan, New York, Connecticut and California. Globally, the United States is finding competitors in Canada, Germany, Iceland and Japan. (Iceland wants to have the world's first fully functional hydrogen economy.)

Following her presentation on lessons learned in California's hydrogen highway initiative, Baxter-

Clemmons dressed down and blended in to a three-hour brainstorming session on how to make Columbia a center of fuel cell activity in people's daily lives.

"Make a bold policy statement, and people will hear that," she said, as a microphone was passed around for comments. "It will resonate. And they will look to you for leadership."

Lines in the sand

FuelCellSouth, at its core, was about challenges -- and not just in the world of research, though efforts at Clemson University's International Center for Automotive Research in Greenville, the University of South Carolina's Fuel Cell Program and the Savannah River National Lab in Aiken were all plugged.

(bullet) The Savannah River Site, for instance, earlier this year hosted a statewide competition for middle school students to create a city of the future. They had to write an essay, build a computer model of the city and give a presentation. Each city had to have a hydrogen component.

A city built by students from the Anderson Home School Association won the top prize overall. A group of students from New Ellenton Middle School in Aiken won the hydrogen prize. Students there used empty soft drink bottles to create mock hydrogen tanks that would fuel their futuristic metropolis.

"We knew gasoline was expensive," said Colleen Welch, 13. "We didn't know they were actually starting to make hydrogen."

(bullet) Harris Pastides, the University of South Carolina's vice president for research and health sciences, expressed interest in working with Inglis to use the congressman's H-Prize as a model for similar public- and private-funded awards for hydrogen breakthroughs in the college and, perhaps, high school level.

(bullet) And, the brainstorming session for the Greater Columbia Fuel Cell Challenge capped the event. Engenuity SC, the city of Columbia and the University of South Carolina are among those spearheading the project.

Political and business leaders expressed interest in tapping into a federal fuel-cell bus program. They talked about integrating fuel cell-powered generators into emergency response plans. Practical applications like fuel-cell powered street lights and fountains have been suggested before. And Vicky Zhang, with the Canadian firm Hydrogenics, discussed efforts to build a hydrogen village in Toronto.

"A fuel cell is boring," said Eileen Schmura, a senior engineer with Pittsburgh-based Concurrent Technologies Corp. "It's a box. It doesn't move. But if you say, 'I want to go try this treadmill, or water scooter,' and it's powered by a fuel cell, that's exciting."

The goal was to look at things that have been tried, those that are now being researched, and those that could become feasible in the future, Militello said.

"You have to have leadership somewhere. Someone has to start it," Van Zee said. "If Spartanburg wanted to do this, that'd be great. If Charleston wanted to do this, great. Are we going to be passive about this, or are we going to be assertive as a community?"

Requests for proposals to make some of the ideas discussed this week a reality should be issued this summer.

"I head several people challenge us to do something," McLean said. "Let me just say, keep an eye on us."

FuelCellSouth over the last three years has been able to pool isolated research and business efforts across the region, showcase them to the rest of the country and, most recently, "raise the bar" for the southeast in developing a network of hydrogen highways, Militello said.

Smaller conferences will be hosted in other southeastern cities throughout the year.

"We each compete for industrial dollars, federal dollars, state dollars (but) there's a bigger issue at hand here," Militello said. "We're addicted to oil, we expect to have cheap electricity, and we're dealing in a global economy now where we can't control our price -- through our military, through fiscal policy, and certainly not through our consumer behavior. In the '70s, we thought if you conserve, you could control the price. The demand is so high now globally that even if we were to reduce a little bit it wouldn't have a major impact on the price of oil.

"So, what I see this doing is raising the awareness that we need to think about an alternative source of energy."

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