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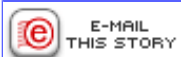
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# UAF tests fuel cell that may revolutionize Bush energy

## CLEAN, SMALL: But technology is unproven and rather expensive.

By DAN RICE

Fairbanks Daily News-Miner

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FAIRBANKS -- In a recent demonstration of a fuel cell power device, University of Alaska Fairbanks researcher Dennis Witmer held up a small patch of material for Chancellor Marshall Lind and other onlookers, searching for an easy way to explain the material's application.

"You ever teach physics?" Witmer asked Lind before launching into a complicated explanation of the latest fuel cell acquired by UAF's Arctic Energy Technology Development Laboratory.

Fuel cells, which create electricity and heat through conversion of energy sources like methanol or natural gas, are potentially advantageous power sources because of their ability to produce efficient electricity with minimal maintenance and next to no emissions.

Researchers and manufacturers have experimented with several models of fuel cells in recent years in an effort to improve the largely unproven technology.

The fuel cell Witmer demonstrated is distinguished by its use of a proton exchange membrane, the small patch of material that he showed to Lind and others. The fuel cell runs on methanol, which is converted into hydrogen by a device called a reformer. The reformer then sends the converted hydrogen into the fuel cell.

Electricity is created when the proton exchange membrane separates the electrons from the



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hydrogen, producing electrically charged ions.

The fuel cell can continuously produce as much as one kilowatt of electricity, which is about enough to power an average Fairbanks home, Witmer said.

Fuel cells could prove especially valuable in Alaska as power sources, Witmer said, because of their potential to provide efficient energy in areas not linked to a power grid.

Researchers have used experimental fuel cells that ran on diesel in rural Alaska communities in the past, Witmer said. However, the methanol-powered fuel cell is more promising because it will likely present less complications than diesel power during the conversion process into hydrogen.

"The diesel fuel is very difficult to crack apart and reform," Witmer said.

While fuel cells hold promise, he said, they face plenty of barriers, such as their high cost -- UAF's new cell cost \$160,000 -- and their tendency to quit working after sometimes only months of operation.

UAF's new fuel cell, manufactured by Schatz Energy Research Center at Humboldt State University in California, is no bigger than an average computer monitor and is linked to a maze of tubes and wires. An Internet connection allows researchers to view data on the fuel cell's performance from a nearby computer screen.

Tom Johnson, a research engineer for the UAF Energy Center, where the fuel cell is set up, said the machinery came pre-assembled for the most part.

"This is very much a flip-on-the-switch-and-turn-on-the-key system," he said. "You press a few buttons and it comes on."

The new fuel cell is the second one UAF is testing. In August, university researchers started up a fuel cell in the Fairbanks Natural Gas building. That cell runs on natural gas and does not include a proton exchange membrane.

Witmer said the cell, a solid oxide model, has been running continuously since its August start, which is promising, considering the long-term functionality of fuel cells is one of the biggest questions about the technology.

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