Hydrogen-powered buses coming to Big Island

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Hawaii
June 24, 2014 - 1:01am

Hawaii Island could be less than a year away from having some of the first hydrogen-powered buses in the state on its roadways.

As part of a pilot project spearheaded by the Hawaii Natural Energy Institute, three shuttle buses will be converted to hydrogen power.

Two will be provided to Hawaii Volcanoes National Park, while the third goes to the Hawaii County Mass Transit Agency, also known as Hele-On.

Conversion of the buses for the national park is nearing completion, said Mitch Ewan, HNEI hydrogen systems program manager.

Last week, the Hawaii Center for Advanced Transportation Technologies, a partner with the project, awarded a $707,500 contract to U.S. Hybrid to convert a 25-passenger shuttle for the transit agency.

Within the vehicle, fuel cells convert hydrogen to electricity, which drives the engine. The byproduct is steam.

Initially, the buses were anticipated to be provided by early 2013.

Ewan attributed the delay to difficulties in establishing a supplier for the hydrogen.

The hydrogen would be provided through a process known as electrolysis, which involves sending electricity through water to separate hydrogen from oxygen.

Puna Geothermal Venture has been identified as a potential supplier of the electricity for that process and a host for a filling station. Ewan said PGV remains a candidate but no agreements have been finalized.

“It’s just because people are wanting to be careful,” he said.

Ewan said he expects that issue to be resolved by the time the bus is ready for Hele-On, estimated around May 2015.

That may not be in time for completion of the buses for the national park, though he said some time will be needed to test the vehicles and add filters for sulfur dioxide emitted from Kilauea.

“We want to make sure everything is working well,” Ewan said. “It’s easier to fix it over here than on the Big Island.”

HNEI is a research unit under the University of Hawaii at Manoa.

Ewan said HNEI will cover the cost of the hydrogen for the first two years. Afterward, it would be up to the agencies to decide whether to continue using the buses, he said.

The buses themselves are gifted.

Cost of the fuel will depend largely on the cost of electricity used to collect hydrogen from water, Ewan said.

Different measurement units are used for hydrogen and gasoline, which can make cost comparisons difficult.

But at 10 cents a kilowatt hour, the cost of using hydrogen could be equivalent to $6 dollars a gallon for gasoline, Ewan estimated. The electric engines the hydrogen powers are more efficient, which essentially cuts that cost in half, to
roughly $3 a gallon for comparison purposes, he said.

Another benefit is the absence of pollutants.

The buses can drive for up to 150 miles on a “full charge of hydrogen,” Stan Osserman, HCATT director, said. They can also recharge through braking.

But why not just use electric vehicles that don’t require hydrogen?

Osserman said a benefit of hydrogen-powered vehicles is they tend to have greater range than electric-only vehicles, and don’t require lengthy charge times.

Hydrogen essentially acts as a battery for the electric engine.

But he said both types are needed to get away from gasoline.

“It’s going to be a combination,” Osserman said.

The cost of the vehicles are also expected to go down over time.

The buses used for the project have a high cost because a new vehicle is being acquired and then converted to handle hydrogen.

“Nobody is building them (of this size) from the ground-up yet” as hydrogen-powered vehicles, Ewan said.

Osserman said the Big Island’s abundance of renewable resources makes it a promising place for using hydrogen-powered vehicles, which is why the buses are being located here.

Since producing hydrogen takes electricity, the center, which operates under the state’s High Technology Development Corporation, wants to see that energy come solely from renewable sources, he said.

“If you start with clean energy, whether geothermal or solar or wind, and you make hydrogen, your end product is water and you have zero carbon footprint,” Osserman said.

HNEI has $5 million for the project, which comes from a variety of sources, including the U.S. Department of Energy, Office of Naval Research, and state hydrogen fund and fuel taxes.

That money is also being used on another project that involves using hydrogen to stabilize the electric grid.

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