Running on water? Fuel system experiment comes close

Hydrogen injections offer boost in mileage — and opportunity

By Rick Barrett of the Journal Sentinel

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It might go against the adage "oil and water don't mix," but a University of Wisconsin professor and the City of Beloit's fleet manager are experimenting with technology that allows motor scooters, cars and trucks to use a combination of gasoline and water as fuel.

They're testing a system that uses voltage from a vehicle's battery and alternator to split water into hydrogen and oxygen. Those molecules are then burned as supplemental fuel - reducing the amount of gasoline needed and resulting in a cleaner-running engine.

The system has been used to power a Vespa scooter with distilled water. A hydrogen booster also has been used to reduce gasoline consumption in a Beloit police car, a garbage-collection truck and municipal pickup trucks.

The modified vehicles can get a 20% or better increase in fuel mileage. They also produce fewer greenhouse gases.

"We are getting some positive results. Eventually it would be nice to run a vehicle completely on water," said Dan Lutz, fleet supervisor of Beloit's Department of Public Works.

Lutz and Marc Anderson, a UW-Madison engineering professor, are testing hydrogen-based fuel systems for use in a variety of vehicles.

Anderson's freshman engineering class has been involved in the work that uses distilled water and a device called an electrolyzer to create hydrogen that's fed into the combustion chamber of a vehicle's engine.

"I usually ask my freshmen to do things that they think they are incapable of doing. It's like throwing them into deep water and seeing how well they swim," Anderson said.

In this case, the freshmen are swimming quite well.

They have helped build a fuel cell and coated it with a material that improves its performance and efficiency.

There's a patent pending on the coating through the University of Wisconsin Alumni Research Foundation.

The students have worked with Lutz, as well as Anderson, to gain real-world experience.

Lutz has gone to Madison every Wednesday night to help the students develop hydrogen-based technologies.

"We canceled class the Wednesday before Thanksgiving, and several students still came into the lab because they didn't want to miss a week," he said.

Beloit has benefited from the UW-Madison research and more than a year of testing hydrogen boosters - including units it bought from a company that went out of business.

"This technology has a long way to go," Lutz said. "There is equipment you can buy to do this now, but a lot of it doesn't work very well. We have had people come here from as far as Taiwan to see what we are doing."

An old process

The science behind getting hydrogen and oxygen from water, through electrolysis, has been around since the 1800s.

But it's no small feat to develop a system that generates a hydrogen fuel mix from a tank of water aboard a running vehicle.

"We are creating it, on the fly, as the vehicle needs it," Anderson said.

Hydrogen is a more efficient fuel than gasoline, according to scientists.

But getting a source of the gas that can be safely carried on a motor vehicle has been challenging.

It is usually extracted from natural gas, which is not renewable, rather than water.

Ohio University has experimented with extracting hydrogen and nitrogen from ammonia in urine.

But traditional systems for "cracking" ammonia require too much heat, take too long, and don't work if contaminated with impurities, according to a 2006 Department of Energy study.

Distilled water, or plain tap water, might be a better energy source.

Anderson said his electrolyzer could be ready for the marketplace in a couple of years, provided someone spent several million dollars to develop it.

"Frankly, if Wisconsin got behind this, we could convert the old GM plant (in Janesville) into an electrolyzer plant and turn out vehicles that run on water," he said.

The technology could hold more promise than electric cars, which have a shortcoming of batteries that can only store a limited amount of energy.

"It's conceivable that we could get a lot of energy out of water," Anderson said.