

Hydrogen

The Gazette

Saturday, September 17, 2005

CREDIT: JOHN MAHONEY, THE GAZETTE

Peter Romaniuk of Innovative Hydrogen Solutions looks over his company's machine, which the company claims eliminates almost all emissions from gasoline-powered vehicles. The company says it is developing a version of the machine that will be one-eighth the size of the current prototype and that should be ready by next year.

Joe Williams Sr. believes he has the machine that will help save the world. It will make the sky blue, allow everyone to breathe easier, and, in a time of skyrocketing fuel prices, save us all money.

Yes, it's hard to believe. Williams is a Winnipeg boy who cut his business teeth managing McDonald's and Burger King franchises. Even now, he employs only 15 people in his Toronto and Manitoba offices. He entered this save-the-world field only 11 years ago and has invested just \$7.5 million in his product.

But before you sniff skeptically and skip to the next story, read on.

Because if Joe Williams turns out to be right, "I think Bill Gates and our group will be shaking hands," he says. "It's that big."

"It" is his Hydrogen Generating Module, or H2N-Gen for short.

Smaller than a DVD player - small enough to sit comfortably under the hood of any truck or car - it could be big enough to solve the world's greenhouse gas emission problems, at least for the near future. In fact, it could make the Kyoto protocol obsolete. Basically, the H2N-Gen contains a small reservoir of distilled water and other chemicals such as potassium hydroxide. A current is run from the car battery through the liquid. This process of electrolysis creates hydrogen and oxygen gases which are then fed into the engine's intake manifold where they mix with the gasoline vapours.

It's a scientific fact that adding hydrogen to a combustion chamber will cause a cleaner burn. The challenge has always been to find a way to get the hydrogen gas into the combustion chamber in a safe, reliable and cost-effective way.

Williams claims he has achieved this with his H2N-Gen. His product, he said, produces a more complete burn, greatly increasing efficiency and reducing fuel consumption by 10 to 40 per cent - and pollutants by up to 100 per cent.

Most internal combustion engines operate at about 35 per cent efficiency. This means that only 35 per cent of the fuel is fully burned. The rest either turns to carbon corroding the engine or goes out the exhaust pipe as greenhouse gases.

The H2N-Gen increases burn efficiency to at least 97 per cent, Williams said. This saves fuel and greatly reduces emissions.

It also means less engine maintenance and oil changes. The only thing the vehicle owner has to do is refill the unit with distilled water once every 80 hours of engine use. Tests show the unit itself should last for at least 10 years, Williams said. It can be attached to any kind of internal combustion engine: diesel, gasoline, propane/natural gas.

Also, because the H2N-Gen manufactures only enough hydrogen to feed the engine at a given time, there is no dangerous onboard storage of hydrogen gas and no hydrogen under pressure.

Williams said his product, if it works as well as he claims, will serve as a bridge between the present and the time when the combustion engine is relegated to the scrap heap of history. The preferred interim solution has been gasoline-electric hybrid cars, which remain expensive.

But Williams doesn't want you to take just his word for it.

The H2N-Gen recently went through third-party verification -- known as "proof of concept" - at Wardrop Engineering Inc. of Toronto, specialists in product testing and development. The company built its own prototype according to Williams's design and tested it against Williams's claims. It passed with flying colours.

In fact, Wardrop liked the invention so much the company wants to become an equity partner in Williams's company, Innovative Hydrogen Solutions, said Richard Scheps, Wardrop's product development manager and a co-owner of the engineering firm, which employs 600 people.

"At the time we first saw it, it seemed too good to be true," Scheps said. "But for everything we're seeing it seems really good. It does work. So we're moving into phase two. Refinements and further testing."

He cautions that it's "only a go when everything is finished." But if all goes smoothly, he said, it could be out on the market in six to 12 months.

Further tests are now being performed by the Canadian Environmental Technology Verification (ETV), a non-profit Toronto company licensed by the federal government to verify environmental technology. Williams doesn't have to have ETV approval for his unit. But he said that he is not going to market without it.

"I think it has a high potential to do what they say or think it will," said Adele Buckley, vice-president of technology and research.

"On the basis of what we have seen from other situations, it looks likely, but we will wait until we get the data."

Williams never doubted that his H2N-Gen would work. He said his company has "over 80 million miles of real experience of onroad verification of the machine in all four seasons."

His first target would be heavy vehicle fleets such as public transit buses, trucks and trains because they are the biggest fuel users and their engines are the biggest polluters. "We're marketing a 20-pound unit for \$7,500," Williams predicted. "That's the maximum price that it will be. The average truck out there today will get their money back in eight months at the latest. CN (Canadian National) spends \$11 billion a year on fuel and we can save them minimum a guarantee of 10 per cent, \$1.1 billion a year."

And that's where things would get financially interesting. In fact, they become financially astronomically interesting. There are, after all, more than one billion combustion engines on earth. Just a fraction of that business would make him a very rich man. Williams doesn't want to make money just through selling H2N-Gen units. He has his eye on getting a share of the fuel savings.

In other words, he would hope to install the H2N-Gen unit in, say, every Canadian National railway and truck engine for free in return for a percentage of CN's fuel savings. Furthermore, he would hope to get his hands on carbon credits promised by the Kyoto Protocol. The trade in carbon credits is predicted to be a multi-billion-dollar business as countries attempt to meet their 2012 obligations of cutting greenhouse gases to below 1990 levels. Those who fail to make the cuts will be fined or will have to buy credits from companies that have cut well below the agreed levels.

"Credits are a huge bonus," Williams said. He figures his company could make billions trading them.

Williams's entry into the hydrogen field came 11 years ago when he was running his own management consultant firm in Winnipeg.

"It was a friend introducing me to a friend, saying you got to meet this guy," Williams said.

This guy was an environmentalist and inventor named Gene Stowe, from Tempe, Ariz. Stowe had developed a plastic cylinder that produced hydrogen and oxygen through electrolysis on demand only when a fuel engine was running. Stowe's hydrogen-producing cylinder was "very rudimentary." Among its many problems was a nasty habit of blowing up.

"They had a lot of UFO sightings around the area because whenever his cylinder blew it sent a disc flying 200 to 300 feet into the air," Williams said, chuckling. Stowe died six months after their meeting. Williams was intrigued enough by that time to try to take the idea to the next level.

Unlike large companies such as Ballard Power Systems of Vancouver, which has spent billions in public and private money trying to develop fuel-saving and emissions-reducing technologies with modest success - including trying to build a low-cost and safe hydrogen-powered electric engine - Williams said that so far he has spent slightly more than \$7.5 million. He raised money from a private investment fund in western Canada and from the Wealth Masters International, a private fund in Toronto. No government money has gone into his company.

He's not the only one trying to save the world, and to make a bundle doing it. Other companies have been working on the same theory of hydrogen generation and they are already suing each other over patent infringements.

A Toronto company called Hy-Drive Technologies Ltd., for instance, is suing a Winnipeg competitor called Canadian Hydrogen Energy Corporation over alleged patent infringements and a non-disclosure agreement. Williams is named in the lawsuit since he was a part-owner of CHEC until disagreements led him to leave and form Innovative Hydrogen Solutions.

Hy-Drive last year started marketing a hydrogen generator for trucks. Company president Tom Brown claims to be well ahead of Williams, who he said is little more than a "snake oil salesman."

Williams, for his part, said he has never even met Brown.

It must be noted that when Brown's company hit the Toronto venture exchange last year and began selling its units, it was soon discovered that the product was not reliable. After selling only 55 units at \$11,500 a piece, Brown had to take the product off the market. The company's stock is trading at around 78 cents.

Brown said an updated version of his hydrogen generator has rectified reliability problems, but it's not yet on the market. Hy-Drive's unit still weighs about 70 pounds, and at more than 4,000 cubic inches, is much too big to fit into an engine compartment. Truckers have to secure it to the side of their cabs.

But Brown said his company has teamed with Martinrea, a Canadian auto parts manufacturer started three years ago by former executives of the giant Magna Corp., to work on a smaller unit.

Still, it seems that Williams's company is ahead in the game - though, as he notes, the market potential of this technology would be so huge "even 12 competitors could not serve it."

The Gazette drove a 2000 six-cylinder Jeep Grand Cherokee equipped with an H2N-Gen prototype from Montreal to Cornwall and back. We set the cruise control at 102 kilometres per hour. The trip computer indicated that on the highway the car averaged about nine litres per 100 kilometres, which is more than 10 per cent below the

manufacturer's mileage rating of 10.5. The combined city/highway mileage was slightly more than 11; the car is rated at 12.9.

We also tested the Jeep SUV at one of Ontario's Drive Clean emissions inspection centres. The car's emissions were well below the manufacturer's ratings. For instance, on carbon monoxide, Daimler/Chrysler gives a rating of 5.5 grams per mile for this model of car. The Drive Clean rating for the Jeep was zero.

Ontario's Drive Clean testing has been disparaged by the Automobile Protection Association as inaccurate. So neither of our tests - the mileage and the emissions - can be considered scientific. But anecdotally, the H2N-Gen passed.

What's more, even after the hour-long drive from Montreal, the tailpipe was not hot. In fact, we could wrap our hand around it without getting burned. Williams claims this proves that hot polluting emissions are not coming out of the tailpipe.

Confident that the ETV will approve the H2N-Gen, Wardrop's engineers are designing a streamlined module for the marketplace. "We're working on a prototype that will be one eighth the size (of his present unit) to be used in cars," he said. "That should be ready by next year."

When everything falls in place, he's confident his tiny patented machine will have a huge world-wide impact. Then he'll be well on his way to meeting Bill Gates at the top of the Fortune 500.

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