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Chemistry Seems Right for Alexandria Firm

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Barney Rush, chief executive of H2Gen Innovations Inc., pictures the day when his company's machines are installed alongside gas pumps at service stations nationwide, dispensing fuel for vehicles powered by hydrogen fuel cells.

Rush's Alexandria-based start-up designs and manufactures small-scale generators that convert natural gas to hydrogen.

"We feel we're on a pathway to producing hydrogen that is lower-cost than any concurrent way of producing and distributing hydrogen and will be competitive with the price of gas when hydrogen-powered transportation becomes a reality," Rush said.

His company may run into competition from big players in the oil and gas industries. Praxair Inc., one of the largest industrial gas companies, and oil giant ChevronTexaco Corp. are working on hydrogen production technology, as are a handful of smaller companies, including HyRadix Inc. and Harvest Energy Technology Inc., which are developing their own on-site hydrogen generators.

H2Gen's generators use a technology called steam methane reforming. "We're liberating hydrogen from being trapped inside of water molecules and methane molecules," Rush said. The generator works by taking in both water and natural gas, which is mostly methane, and manipulating them with heat and catalysts to split the hydrogen from the carbon and oxygen. The end result: hydrogen in its pure gaseous form and carbon dioxide.

The generators, measuring 7 feet wide by 7 feet tall by 10 feet deep, will cost about $300,000 each. One generator is capable of powering a fleet of 140 to 150 cars that come in for occasional refueling -- or about 20 cars a day, 10 percent of the 200 to 250 cars a typical gas station might service each day. "This is a starter kit," said C.E. "Sandy" Thomas, the company's president. "The next system we've designed has five times higher capacity and would supply 100 cars a day," or about half the load of a regular gas station.

The carbon dioxide created by H2Gen's generators is a greenhouse gas that may contribute to global warming. But Rush said "a car running on hydrogen produced in our machines produces 40 percent of the amount of carbon dioxide that a gas-powered car produces. We want to avoid the best being the enemy of the good. The sooner you have a commercial fuel cell-powered car in the future, the sooner the industry will invest in a better way of making hydrogen."

Rush said that future has been held back in a classic chicken-and-egg scenario: Investors are leery of fuel cells because there's no readily available source of hydrogen to power them, yet no one wants to build a billion-dollar system of hydrogen generators when the future of fuel cells is uncertain.

He argues that H2Gen's generators provide a solution to this dilemma because they are small and scalable and don't require a massive infrastructure for production and transportation. "You don't need long, elaborate

pipelines carrying pure hydrogen, fleets of trucks or enormous facilities producing and liquefying hydrogen," he said. H2Gen's generators produce the hydrogen on-site where it's needed by "piggybacking" off of existing infrastructure that provides water and natural gas, the two main ingredients used by the generators.

While waiting for fuel cells and hydrogen-powered cars to enter the mainstream, H2Gen is seeking homes for its generators in other industries. Rush said he is seeing "keen interest" in the company's generators from the industrial gas industry, as well as from annealing furnace companies that make specialty steel, stainless steel manufacturers, glass companies, food processing plants that make hydrogenated margarine and mayonnaise, and other companies that use small amounts of hydrogen in their manufacturing.

"We have a market today, tomorrow and over the next several years," Rush said. "That will allow us to prove out our machine, demonstrate it works and ready it for the new market emerging in the next decade."