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Ethanol, the ultimate home brew

By Michael Fitzgerald

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What if you could make fuel for your car in your backyard for less than you pay at the pump? Would you?

The first question has driven Floyd Butterfield for more than two decades. Butterfield, 52, is something of a legend for people who make their own ethanol. In 1982, he won a California Department of Food and Agriculture contest for best design of an ethanol still, albeit one that he could not market profitably at the time.

Now he thinks that he can, thanks to his partnership with the Silicon Valley entrepreneur Thomas Quinn. The two have started E-Fuel, which soon will announce its home ethanol system, the E-Fuel 100 MicroFueler. It will be about as large as a stackable washer-dryer, sell for \$9,995 and ship before year-end.

The net cost to consumers could drop by half after government incentives for alternate fuels, like tax credits, are applied.

The MicroFueler will use sugar as its main fuel source, or feedstock, along with a specially packaged time-release yeast the company has developed. Depending on the cost of sugar, plus water and electricity, the company says it could cost as little as a dollar a gallon to make ethanol. In fact, Quinn sometimes collects left-over alcohol from bars and restaurants in Los Gatos, California, where he lives, and turns it into ethanol; the only cost is for the electricity used in processing.

In general, he says, burning a gallon of ethanol made by his system will produce one-eighth the carbon of the same amount of gasoline.

"It's going to cause havoc in the market and cause great financial stress in the oil industry," Quinn boasts.

He may well turn out to be right. But brewing ethanol in the backyard isn't as easy as barbecuing hamburgers. Distilling large quantities of ethanol typically has required a lot of equipment, says Daniel Kammen, director of the Renewable and Appropriate Energy Laboratory at the University of California, Berkeley. In addition, he says that quality control and efficiency of home brew usually pale compared with those of commercial refineries. "There's a lot of hurdles you have to overcome. It's entirely possible that they've done it, but skepticism is a virtue," Kammen says.

Quinn, 53, has been involved with successful innovations before. For instance, he patented the motion sensor technology used in Nintendo's wildly popular Wii gaming system.

More to the point, he was the product marketing manager for Alan Shugart's pioneering hard disk drive when the personal computer was shifting from a hobbyists' niche to a major industry. "I remember people laughing at us and saying what a stupid idea it was to do that disk drive," Quinn says.

Butterfield thinks that the MicroFueler is as much a game changer as the personal computer. He says that working with Quinn's microelectronics experts E-Fuel now employs 15 people has led to breakthroughs that have cut the energy requirements of making ethanol in half. One such advance is a membrane distiller, which, Quinn says, uses extremely fine filters to separate water from alcohol at lower heat and in fewer steps than in conventional ethanol refining. Using sugar as a feedstock means that there is virtually no smell, and its water byproduct will be drinkable.

E-Fuel has bold plans: It intends to operate internationally from the start, with production of the MicroFueler in China and Britain as well as the United States. And Butterfield is already at work on a version for commercial use, as well as systems that will use feedstocks other than sugar.

Ethanol has long had home brewers, and permits are available through the Alcohol and Tobacco Tax and Trade Bureau. (You must be a property owner and agree to make your ethanol outdoors.) But there are plenty of reasons to question whether personal fueling systems will become the fuel industry's version of the personal computer.

For starters, sugar-based ethanol doesn't look much cheaper than gas. It takes up to 14 pounds, or 6.5 kilograms, of sugar to make a gallon of ethanol, and raw sugar sells in the United States for about 20 cents a pound, says Michael Salassi, a professor in the department of agricultural economics at Louisiana State University. But Quinn says that as of January this year, under the North American Free Trade Agreement, he can buy inedible sugar from Mexico for as little as 2.5 cents a pound, which puts the math in his favor. While this type of sugar has not been sold to consumers, E-Fuel says it is developing a distribution network for it.

In addition, it's illegal in the United States to operate a car on 100 percent ethanol, with exceptions for off-road vehicles like Indy cars and farm equipment. Quinn has a U.S. permit to make his own fuel, and believes that if MicroFuelers start popping up like swimming pools, regulators will adapt by certifying pure ethanol for cars.

Despite all the hurdles, Quinn and Butterfield may be on to something. There are plenty of consumers who want to reduce their carbon footprint and are willing to make an upfront investment to do it consider the success of the Prius.

And if oil prices continue to rise, the economics of buying a MicroFueller will become only better and better.

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