

**EXCLUSIVE ►► CAN WILBUR ROSS SAVE DETROIT?**

# dbusiness

DETROIT'S PREMIER BUSINESS JOURNAL

## **THE ETHANOL EQUATION**

America's frenzied race for an eco-friendly gas alternative

## **STAYING THE COURSE**

J. Peter Ministrelli's new northern Michigan resort

## **THE TRUTH BEHIND GREEN MARKETING**

Your company's image may depend on it

# The Second Coming of Tom Monaghan

The ex pizza baron and former owner of the Detroit Tigers is spending his billion-dollar fortune on a mission from God.

**GROWTH REPORT**  
**Retail Roundup**  
**NEW STORES IN METRO DETROIT**  
**PAGE 36**

May/June 2008

IS

0.6



www.dbusinessmag.com



# Fuel to Burn, Roads to Drive

THANKS TO TIGHTER FEDERALLY MANDATED FUEL-ECONOMY STANDARDS FOR MODEL YEAR 2020, THE RACE TO DEVELOP GASOLINE ALTERNATIVES IS NOW MORE FRENZIED THAN EVER BY GARY WITZENBURG

With gasoline prices topping \$3 a gallon in the United States, and nearly double that in Europe and elsewhere, the automotive industry has long sought a cleaner, less-expensive fuel to power a growing array of trucks, SUVs, crossovers, and sedans. Initially, corn-based ethanol was thought to be a viable alternative to gasoline, especially since it could be produced in the United States and because it generates fewer harmful emissions.

But because of some very basic economic factors, corn-based ethanol has failed to catch on with consumers. Consider that corn-based ethanol is more expensive than gasoline, is less energy-efficient, and can't be transported through conventional gasoline pipes because of its corrosive high water content. What's more, service-station owners must install special underground tanks to store corn-based ethanol, which can set them back \$60,000 or more. While there are millions of late-model cars and trucks that can run on E85 — 85 percent ethanol, 15 percent gasoline — few consumers are buying corn-based fuel at the pump, despite a massive marketing campaign and loads of government subsidies. What's more, added demand for corn has resulted in price hikes, which affects the cost of food in poor and developing countries.

Hybrid vehicles have also failed to catch on in great numbers, as many Americans aren't yet willing to sacrifice fuel efficiency for comfort and performance — although recent and upcoming hybrid trucks and SUVs are attracting more buyers. There are also considerable hurdles to overcome, as General Motors Corp. and other automakers strive to introduce vehicles powered, in part, by lithium-ion batteries. Other promising research, such as using waste heat from vehicle exhaust to improve fuel efficiency, may be years away from commercial introduction. And while Brazil and other countries have found success selling ethanol made from sugar cane, colder climate conditions and the corn lobby have made it difficult to produce similar results in the United States.

Finding a viable alternative to oil, it seems, has been fleeting and unrealistic.

While GM Chairman Rick Wagoner acknowledges the challenge of displacing gasoline, he says the solution will likely come from multiple sources, including research into cellulosic ethanol. In January, GM formed a partnership with Illinois-based Coskata Inc. to convert a wide variety of waste materials into ethanol alcohol — for \$1 a gallon, or less. A pilot plant is

expected to be up and running later this year. Coskata also recently announced it would build a commercial ethanol plant by 2011, using a biological fermentation process that would produce 50 million to 100 million gallons of fuel a year. Following a successful launch, similar plants would be operating around the globe using local waste materials.

"Coscata's process is expected to use less than one gallon of water per gallon of ethanol produced, compared to three to four gallons to make a gallon of grain-based ethanol," Wagoner says. "And, very importantly, based on analysis by Argonne National Laboratory, for every unit of energy that the Coskata process uses, it creates up to 7.7 times that amount of energy ... a ratio well above current ethanol production. Argonne's analysis also shows that in a 'well-to-wheels' comparison,



JIM PARKIN / SHUTTERSTOCK



the Coskata process reduces greenhouse gas emissions by up to 84 percent compared to gasoline."

If all works as planned, increasing amounts of petroleum fuel will be displaced by inexpensive ethanol made from municipal waste and nearly anything else (nonmetallic) that would otherwise be buried in landfills, including cellulosic waste from plant materials. It won't have to come from corn or other human or animal food sources, it'll be much cheaper than petroleum fuel, and most of it will be locally produced and sold.

Wagoner points out that if all E85-capable vehicles in the United States today — and all that GM plans to build in the next 12 years — were to run on E85, they would displace 29 billion gallons of gasoline a year by 2020. "And if all manufacturers in the U.S. made the same commitment," he says, "we could save 53 billion gallons of gasoline annually, or 32 percent of our petroleum usage. Nothing else we can do gets close to that kind of impact, that soon. *Nothing*. Ethanol offers a cleaner alternative to petroleum, it's adaptable to our current refueling infrastructure, it doesn't have to be imported, and it requires little change in consumer behavior."

In addition to ramping up U.S. Corporate Average Fuel Economy

(CAFE) requirements to a 35-mpg fleet average by model year 2020, the Energy Independence and Security

---

**"The root cause of our energy problem is importing and burning carbon. The solution to this problem is not in trying to use this poison more efficiently, as CAFE laws would have us do. At best, that approach merely slows down the rate of increase. The solution is to stop importing and burning oil."**

---

**—John McElroy, Autoline Detroit**

---

Act, which President Bush signed last December, calls for a dramatic increase in biofuels, from 7.5 billion gallons in 2012 to 36 billion in 2022. Of that, corn-based and grain-based ethanol should account for up to 15 billion gallons, with the other 21 billion coming from cellulosic and biomass sources.

"Ethanol has a role to play," says Beth Lowery, GM's vice president for environment, energy, and safety policy, "but it's not going to be the

single answer. We believe there will be corn-based and sugar-based, as well as biomass ethanol, available in the market. It won't displace petroleum totally, but it will turn down the curve with respect to CO<sub>2</sub> production and our 96-percent dependence on petroleum for transportation. We certainly want to do our part to reduce dependence on petroleum, so we'll produce products that can run on ethanol, as well as future generations that run on electricity."

Coskata President and CEO Bill Roe says high-volume bio-refineries using the company's process will likely take two to three years to build, and could be located almost anywhere in the world where there's a waste-producing, carbon-based feedstock. "The idea is to get this technology into the marketplace rapidly," he says. "We're going to go through a partnering model where we'll work with people who have feedstock materials [and waste] and [who] want to get into the production of liquid fuels."

While industry analysts applaud GM for taking a leadership role in developing cellulosic ethanol, they offer differing opinions on its viability. "GM is right to focus on alternative fuels," says John McElroy, an automotive journalist and host of Detroit Public Television's *Autoline Detroit*. "The root cause of our energy problem is importing and burning carbon. The solution to this problem is not in trying to use this poison more efficiently, as CAFE laws would have us do. At best, that approach merely slows down the rate of increase. The solution is to stop importing and burning oil. Only an alternative to oil will accomplish this. And if GM and Coskata can succeed in turning garbage into fuel,

**ON THE HORIZON** Corn-based ethanol plants will soon be joined by cellulosic ethanol plants that can produce fuel from a wide variety of materials, including plant waste, wood products, garbage, and old tires.



America will truly become the global leader in energy production again.”

George Peterson, founder and president of AutoPacific, an automotive marketing and consulting firm in Tustin, Calif., says GM and Coskata could change the playing field. “If GM and Coskata can pull this off, it’ll knock the pins out of the corn lobby, help conserve water, and enable the use of other refuse for generating energy,” he says. “If Coskata can generate this for less than a dollar a gallon, that’s great. Of course, other distribution and tax costs will dramatically increase the costs of the basic fuel.”

But again, cellulosic ethanol is only one solution in a multifaceted campaign to reduce the nation’s dependence on foreign oil. Another model for how the United States could phase in more alcohol fuel can be found in Brazil, which in 1975 began a forced march toward energy independence by beginning to displace gasoline with ethanol made from vast supplies of homegrown sugar cane.

Brazilian buyers could choose vehicles that ran either on ethanol or gasoline — and, as long as alcohol was cheaper, it was the better deal. But when the price of sugar cane, and therefore cane-based ethanol, went up because of increased demand for sugar, it wasn’t so good. That led to flex-fuel vehicles designed to run on either — or on any blend of both — so consumers could use whatever was available, and cheapest. GM has sold more than a million flex-fuel vehicles in Brazil, and more than 90 percent of what it sells there today will burn pure alcohol, or E100. (GM says E100 wouldn’t work well in the colder climate of North America because of cold-starting issues.)

“Brazilians use sugar cane because that’s the most competitive technology, and they can make it for about 22 cents per liter,” says Jaime Ardila, president of GM do Brasil. “With this partnership, we’re talking about a production cost of \$1 per gallon, which comes very close. One thing Brazil did very well was that the government intervened

with a mandate that every fuel station had to have at least one 100-percent alcohol pump.”

But Coskata’s process should produce ethanol so inexpensive that there won’t be any need for a mandate. “If you get to a dollar a gallon cost, it’ll facilitate itself,” says Mary Beth Stanek, GM’s director of energy and environmental policy and commercialization. “Gasoline today costs about \$2 per gallon to produce. Distribution needs to get better, but if the ethanol doesn’t travel far, it’ll be very affordably priced. In Brazil, most people use ethanol because of the price difference. A liter of ethanol there is [around] \$1.09 a gallon, while gasoline-blended fuel is [around] \$2.49. That’s what we can look forward to here. It’ll exceed expectations.”

Jim Hall, managing director of 2953 Analytics, an automotive consulting firm in Birmingham, says sugar cane shows tremendous promise in the United States. “I was getting so tired of everyone touting corn as the fuel of the future,” he says. “The truth is that [corn] is only one — and really kind of a stupid one. GM will have to change its commercials with the popcorn coming out of the tank. Sugar cane in Brazil makes tremendous sense, and they manipulated the crop to enhance it as a fuel crop, which is a brilliant idea. We have a lot of states here where you can grow sugar cane, but if you really want to talk about a viable fuel, you would use switchgrass,” which is abundant throughout much of North America.

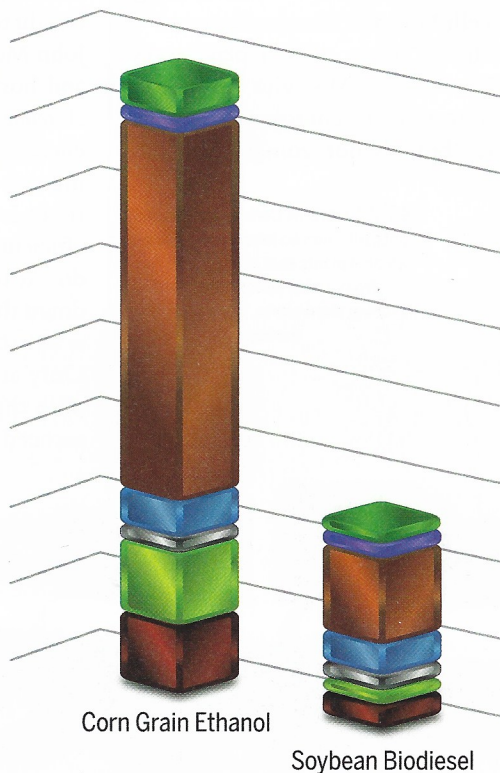
The Coskata partnership includes an undisclosed equity stake for GM, joint research and development into emissions technology, and a commitment to make ethanol from waste and non-recyclable vehicle parts. “Most people don’t know that vehicles are the most recycled products out there,” Stanek says. “Eighty-five percent of a modern vehicle is recycled, and what’s left over is perfect for their process, including the foams and plastics.”

Stanek says the partnership’s research opportunities are promising, too. “We’re part owner of the company and have [a] science exchange going on between our

## Energy Efficiency: Corn-Grain Ethanol vs. Soybean Biodiesel

Biodiesel is more energy-efficient than corn-grain ethanol, as it has a significantly lower ratio of energy input to output.

Source: The University of Michigan, the University of Minnesota, and St. Olaf College.







**GREEN TEAM** Bill Roe, president and CEO of Coskata, right, joins GM Chairman Rick Wagoner, center, during the partnership announcement at the North American International Auto Show in January.

## General Motors and Coskata: The process and the partnership

NEW GM PARTNER COSKATA HAS DEVELOPED A PROPRIETARY PROCESS THAT USES PATENTED MICROORGANISMS AND BIOREACTOR DESIGNS TO MAKE ETHANOL FOR \$1 A GALLON — ABOUT HALF THE PRICE OF PRODUCING GASOLINE

### **Coskata President and CEO Bill Roe explains the process:**

We call it 'next generation.' The first step is what I call the great equalizer, or gasification, meaning a thermal breakdown of the material. Whether it's tires, grass clippings, or kitchen waste, as long as it's organic material, it breaks down into carbon monoxide (CO), hydrogen, and carbon dioxide (CO<sub>2</sub>).

Typically, any gasification process requires very high heat, usually [upward] of 2,000 degrees Fahrenheit, under very controlled oxidation conditions. You don't want to burn the stuff; you just want to heat it and break it down. Gasification gives us the flexibility to use all these different things as feedstocks, because from then on, the process is fairly uniform. The gas goes into a bioreactor, where it has contact with microorganisms. They essentially breathe carbon monoxide and hydrogen, and exhale ethanol. They do it very, very efficiently and, uniquely,

[they] produce only ethanol.

We've taken these strains of microorganisms from Oklahoma State University — through an exclusive relationship we have with them — and we're commercializing them. We've been strengthening the strains, improving their productivity and, at the same time, designing very, very efficient bioreactors to house this process. They allow good gas contact with the microbes, which gives rise to the water savings we're talking about, because we can recycle virtually all of the water. Very little water escapes this process, [and very little water] is consumed.

The bugs (microbes) extract energy from the gases — that's how they live — and the CO<sub>2</sub> is consumed in the process. Because we're gasifying in the front end, there will be ash or slag materials left over. About 1 percent of wood comes out as ash. If you're dealing with municipal waste, as much as 7 to 9 percent comes out as ash. Then we burn

the remaining gas for energy.

The microbes don't care what you put in the front end. All they see is the syngas (synthetic gas). And we have this flexibility, and economics, because some of these feedstocks are very similar to corn, from a cost point of view.

Plastics are a wonderful product for gasification. If you start tossing in tires, you're going to have some sulfur compounds and some other things. If there is sulfur, we scrub it out as hydrogen sulfide. Most materials get combusted or converted to syngas, but whatever isn't carbon or hydrogen is either going to be slag or it's going to be gaseous.

Roe adds that there will be a lot of other technologies coming along that offer similar promises of large quantities of ethanol from feedstocks other than corn — and with different economics. "That's what it has to be if it's going to go," he says. **db**

—Gary Witzenburg

scientists and theirs," she says. "We're going to take some of the fuel from that pilot plant and use it at our Milford Proving Grounds, and we'll work together on their larger-scale facilities, including potentially providing input stocks."

As the world's population and emerging economies continue to grow, so will demand for energy. Wagoner says global oil consumption today is roughly 1,000 barrels per second, and predicts that the world will need about 70 percent more energy in 2030 than it did in 2004. He emphasizes that new automotive technologies such as plug-in hybrids and fuel cells will eventually help to ease that demand, but at the current sales rate, he says it will take more than 12 years to replace most vehicles now on the road with more energy-efficient ones.

"So, are electrically driven vehicles the answer for the mid- and long-term?" Wagoner asks. "Yes, for sure. But do we need something else to significantly reduce our reliance on petroleum in the interim? Absolutely. And it's increasingly clear that the 'something' is ethanol."

Wagoner says that GM will continue to push the development of electrically driven vehicles, simply because they have the potential to remove the automobile from the environmental equation. "But it's clear," Wagoner says, "that we must simultaneously commit ourselves to the rapid development of ethanol, by far the best option we have to reduce the growth of oil consumption and oil imports in the near- and medium-term."

Lowery maintains that GM has no intention of getting into the fuel business in a major way, but concedes that it wouldn't hurt if the partnership contributes to GM's bottom line, along with Coskata's. "We believe [that] ethanol, used as a fuel — not just as a gasoline additive — is the best near-term alternative to the surging global demand for oil because ethanol is renewable, and it significantly reduces CO<sub>2</sub> emissions compared to gasoline," she says. "And, yes, we'll be happy to make money on cars and trucks and other investments, as well." **db**