

**GREEN
ALSO MEANS GO!**



LITTLE GREEN RACING MACHINES

WILL SWITCH GRASS HAVE A BENEFIT IN THE SWITCHBACKS?

BY MARK GILLIES
PHOTOGRAPHY BY DAVID LEONG

» Racing doesn't immediately come to mind as an environmentally friendly activity. Indeed, if one wants to look for a gratuitous waste of fossil fuels, racing is beaten only by an oil tanker running into an iceberg. Yet there are lots of noises about more ecofriendly racing, from Formula 1 down. We were intrigued when Stephen Zadig, a Silicon Valley executive and club-racing driver, contacted us to say he was running a car on cellulosic E85 in the 25 Hours of Thunderhill in northern California.

Despite what you might have heard from Midwestern politicians of all stripes (and the Indy Racing League, whose cars use the stuff), corn-based E85 isn't the panacea for the environment or the solution to our dependence on foreign oil. Depending on

who does the math, producing a gallon of corn ethanol requires substantially less fossil-fuel energy than making a gallon of gasoline, although the gain is offset because ethanol has only about 66 percent the energy content of gasoline. According to the Department of Energy's Argonne National Laboratory, all other things being equal, corn-based ethanol ends up being 18 to 29 percent better in terms of greenhouse-gas emissions than gasoline.

Cellulosic ethanol could be a better alternative, because it takes less energy to turn switch grass or wheat straw into fuel than it does corn. Switch grass is a summer perennial plant native to North America—it's the tall grass of the Great Plains, where the buffalo roamed. Most estimates say that cellulosic ethanol uses

about 80 percent less fossil fuel in its production than does gasoline; the Argonne National Laboratory says it is 85 percent better in greenhouse-gas emissions.

Of course, there are all sorts of question marks over cellulosic ethanol. No one is currently refining it in large quantities as it is difficult and expensive to make. Existing oil pipelines aren't suitable because all ethanol absorbs water. And even if vast swaths of the country were converted to switch grass, we still couldn't produce enough to replace all the foreign oil. A study by Michael McElroy of Harvard University predicts that if we devoted 75 percent of *all* U.S. cropland (or 49 percent of grassland and range) to cellulosic-ethanol production, it would only replace 50 percent of the gasoline we consume.



AL GORE MIGHT APPROVE

These two Norma sports-racing cars ran like trains in the 25 Hours of Thunderhill using cellulosic ethanol, which is regarded as ecofriendlier than corn-based E85.

But say cellulosic ethanol is *a* fuel of the future: Will it make cars more or less enjoyable to drive? That was Zadig's rationale: "I have always been something of an environmentalist, and after racing at Thunderhill in 2006, my conscience started bothering me. Philosophically, I wanted to show that there are alternative fuels that don't diminish the driving experience.

"Initially, we looked at building a car to run biodiesel—an Audi R10 light. But making a transaxle to cope with the torque of our proposed BMW engine was going to be very expensive, so my friend Richard Hatfield suggested using cellulosic ethanol." Zadig contacted Iogen, a company based in Ottawa, Ontario, and it supplied the fuel.

Zadig decided to field a pair of French-built Norma sports-racing cars in the ESR class, running under the Green Alternative Motorsports banner. These tube-frame chassis are simple but effective, with pushrod, control-arm suspensions and lightweight fiberglass bodywork. The cars

were fitted with 2.0-liter four-cylinder Honda Civic Type R engines, mated to Sadev six-speed sequential transmissions. To run E85, GAM fitted larger fuel cells; anodized or removed aluminum components in the fuel system; added a pressure regulator; increased injector volume by 40 percent; and remapped the electronic control unit. That was it. A side benefit that car enthusiasts of all stripes will appreciate is that simply retuning the ECU for E85's higher octane was by itself responsible for about five percent of the engine's power bump from 220 horsepower to 263.

The ethanol part of the equation worked fine in the race. Michael Kantor, Dennis Pavlina, fellow Brit Nik Johnson, and I finished second overall—to a Crawford Daytona Prototype that was running lots of gasoline through its 4942cc Ford V-8 engine. The Norma didn't miss a beat mechanically, which is more than can be said for the flimsy bodywork, which fell victim to off-track excursions and the pounding from Thunderhill's bumps. Fuel consumption ran 8.2 mpg over 1914 miles.

Lots of time behind the wheel showed that Zadig's goal of running alternative fuels doesn't compromise the fun factor. The Norma was fantastic to drive and went wherever it was pointed, producing tenacious peak lateral grip of up to 1.80 g. The engine pulled like a champ all day long, and it was gratifying that our 263-hp, 1190-pound racer driven by amateurs lapped the 3.0-mile track nearly a second faster than the professionally driven, 500-hp Crawford.

The cynic says sure, that's all great, but who are Zadig and his friends trying to kid? Even if racing cars consume green fuels, you still have to get the machinery to the events, along with the people to drive them, look after them, and watch them. (At Thunderhill, it was pretty carbon neutral on the spectator front.) What's the benefit, then, of running the cars on cellulosic ethanol? Kantor simply shrugs his shoulders and says: "This program was about starting somewhere and promoting alternatives." What the race proved: If anyone thinks a move to alternative fuels spells the end of fun with internal-combustion engines, he or she is mistaken. ●