



# SEAWORTHY

The BoatU.S. Marine Insurance and Damage Avoidance Report\*

## Cars, Boats and Ethanol And a Look at What May Be In Store for Diesels



Photo: Danna Sewell

**E**thanol has made a lot of boat owners miserable, if only for awhile. As a solvent that cleans gunk off the inside of gas tanks, it clogs filters and stops engines. It also has the potential to attract water through the tank's vent and separate itself from the gasoline. Should this ever happen, straight ethanol would then sink to the bottom of the tank and could damage the engine, especially a two-cycle engine. And it quickly destroys most fiberglass tanks: Of

the hundreds of different resins made by Interplastic Corp., only three are approved by UL for use with ethanol-enhanced gasoline. One more fact about ethanol: It isn't likely to go away anytime soon.

Ethanol first trickled into the nation's fuel


supply in the 1970s when lead, which had been used for decades in gasoline to boost octane, was first outlawed. Although ethanol was a relatively inexpensive way to raise octane, it remained mostly a novelty ("gasohol") until a decade later when the Environmental Protection Agency began requiring the use of oxygenated gasoline in certain urban areas. Ethanol was one of two oxygenates that were added to gasoline to meet the EPA emission requirements. The other was MTBE, which is an ether made from methanol.

When it was first used in the 1980s, the EPA required that 30% of oxygenates be made from ethanol, but backed off after the major oil companies complained that ethanol was difficult to store and ship long distances. (It should be noted that the oil companies made less money with ethanol.) As a result, ethanol was only used in the Midwest; MTBE was used everywhere else.

A few years later, MTBE began showing up in drink-  
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ing water after it leaked from storage tanks and two-cycle outboards. In 2005 it was outlawed in several states, including California, Connecticut, and New York. Later that year, the federal government denied a request from oil companies that would have protected them from lawsuits arising from the use of MTBE. Within months, all of the areas of the country that had been using MTBE suddenly found themselves using a gasoline blended with 10% ethanol (E-10). It didn't take long—only a few weeks—before boat owners began reporting problems with clogged filters and leaking fiberglass tanks.

As of now, about half of the states have E-10; the rest (mostly rural states) have straight gasoline that must be refined to boost octane. (It is also worth noting that the oil companies, which had resisted the use of ethanol, dropped their opposition when the federal government began offering a subsidy for E-10.)

One more daunting fact: Gasoline used for maritime purposes represents far, far less than one percent of the nation's consumption of gasoline in trucks and automobiles—.005%. That minuscule percentage includes commercial as well as recreational boats.

The average automobile tends to be used much more frequently than the average boat, which means gasoline doesn't sit around long enough to form gunk on tank walls. Auto tanks have closed systems that aren't vented to the outside air. No air = no moisture = no chance of phase separation problems. And, of course, cars don't have fiberglass tanks.

All of this means that there has been no outcry from automobile owners over the introduction of ethanol. QUESTION: If 99.995% of the country is relatively happy about something, what are the chances that the remaining .005% can make enough noise to change things? ANSWER: Not much.

*Seaworthy* called Steve Garrett of Volta Oil, a gasoline distributor in Massachusetts. Could Volta distribute gasoline without ethanol to its marina customers? Steve didn't think so. He noted that it isn't legal in Massachusetts to sell gasoline without an oxygenate—ethanol. He also said that gasoline shipped to Volta's distributor doesn't have sufficient octane to use in a car or boat; it has to be blended (at the local refinery) with ethanol to boost octane.

Next, *Seaworthy* called the American Petroleum Institute (API), a trade association and mouthpiece for the gasoline industry. If a state-by-state lobbying effort made it legal for boats to use gasoline without ethanol, is there some way the big oil companies could ship straight gasoline to their distributors for use at marinas?

**"The biggest difference, however—and it is a HUGE difference for marine purposes—is that E diesel, like gasoline, is a Class I flammable liquid."**

The gist of the API answer is that establishing some sort of system to distribute gasoline to boat owners, even if it could be done legally, would be expensive. Like buying anything in bulk, shipping gasoline in massive quantities for automobiles helps to keep the price down for boats. A good example of what happens to gasoline prices when dealing in "small" quantities is the light plane industry, which uses "avgas." The latter doesn't contain ethanol, has slightly higher octane than automobile gasoline, and costs a whopping \$1 to \$2 more per gallon. Since most of the problems with ethanol-enhanced gasoline are likely to fade—the gunk clogging filters disappear after the tanks have been filled a time or two, and the chances of phase separation occurring can be reduced significantly by keeping tanks topped off—would boat owners be willing to pay the extra price for straight gasoline? Not likely. Even the considerable cost of replacing a fiberglass tank seems less onerous than the prospect of having to pay up to 50% more for gasoline without ethanol.

### **Could Ethanol Find Its Way into Diesel Fuel?**

As of now, the government has not announced plans to require the use of either biodiesel (also called soy diesel) or E diesel (also called oxy-diesel or diesohol). There are no front-page legislative votes pending and no speeches demanding that diesel fuel be replaced by a more eco-friendly fuel that will reduce the nation's dependence on foreign oil. So, why even talk about it?

The answer is that while much of the nation continues to adjust to ethanol-enhanced gasoline, at least two groups—the E diesel Consortium and the National Biodiesel Board—are quietly promoting "renewable alternatives" to petroleum diesel fuel. The National Biodiesel Board, coordinates research and development for biodiesel, an oil derived most often from soybeans. The other group, the E diesel Consortium, is made up of a group of "stakeholder companies and organizations that are committed to bringing E diesel to the marketplace." E diesel is made with ethanol. Both groups are betting that their respective fuels could eventually help engine manufacturers meet tougher emissions regulations for diesel engines—an 80% reduction in emissions from all diesel engines by 2014.

The two fuels are very different. Biodiesel has been around for over a decade; as far back as January 1997, *Seaworthy* noted that a 20/80 blend of biodiesel reduces particulates by 31%, carbon monoxide 21% and hydrocarbons 47%. It also lubricates a diesel's fuel system, gets rid of gunk in the tank, and is almost impossible to ignite. Using a 20/80 blend doesn't require any modifications to an engine's hoses and seals. There were, and still are, a lot of reasons to like biodiesel.

In some respects, E diesel is similar to biodiesel: Both are made from renewable resources and burn cleaner than petroleum diesel. Both will clean gunk that builds up in tanks. (Note that for both E diesel and biodiesel, clogged filters would be a problem, at least initially.) And the use of either fuel blended with petroleum diesel (15/85 for E diesel and 20/80 for biodiesel) does not require engines to be modified. But it's their differences that are most likely to grab your attention. One positive for E diesel is that it would be much easier to start in cold weather. On the other hand, it doesn't provide as much lubricity, which is one of biodiesel's biggest positives, especially in this era of low-sulfur diesel. The biggest difference, however—and it is a HUGE difference for marine purposes—is that E diesel, like gasoline, is a Class I flammable liquid. E diesel, as one engine manufacturer noted, would change a diesel engine from a safe product to one that is potentially dangerous. Even the proponents of E diesel acknowledge that there would need to be many changes in the way diesel fuel is stored, delivered, and consumed before it could be used safely.

There is no reason to believe that the use of E diesel is likely to become wide-

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spread, at least in the near future. An ASTM (American Society for Testing and Materials) rating must first be obtained before a fuel can be sold to the public. E diesel is only about two years into the rating process, which takes six or seven years. (Biodiesel has had an ASTM rating for over a decade and is currently available at about 400 filling stations nationwide, out of 187,000). E diesel is still considered "experimental."

Diesel engines, because they are more efficient and get much better mileage than comparable gasoline engines, are now used in almost half of the automobiles sold in Europe. In this country, pollution concerns have meant that diesels are used primarily on larger commercial vehicles. According to the Department of Energy, if 30% of the passenger cars and light-duty trucks in U.S. had diesel engines, net crude oil imports would be reduced by 350,000 barrels *per day*.


In the quest to reduce the nation's dependence on foreign oil, it's likely that diesels

## BoatU.S. Is Conducting a Test with Biodiesel and E Diesel in Fiberglass Fuel Tanks

If the use of either E diesel or biodiesel were to become widespread, what would the effect be in fiberglass fuel tanks? Is ethanol mixed with diesel fuel as corrosive in a fiberglass tank as it is when it's blended with gasoline? Is biodiesel corrosive?

Rick Strand of Impact Matrix Systems was asked by BoatU.S. to conduct a

series of tests using both fuels to at least get a preliminary idea of what the effects of the new fuels might be. Strand is using newly laminated samples immersed in E diesel and biodiesel for several months. He will test samples before and after immersion, to gauge the loss of strength and stiffness, if any. Results will be published in the July *Seaworthy*.

will be getting more and more attention, from Capitol Hill to the automakers. Improvements in technology—catalytic converters—will help diesels run cleaner. But the key to cleaner burning diesels is the fuel itself. Leland Tong, a consultant to the National Biodiesel Board, thinks that the use of one or the other fuel will ultimately be driven by economics, "If one makes more money than the other, that's what will be in the system." A lot could happen in the next few years. Stay tuned. 

***To read more about ethanol and gasoline, including how best to store ethanol over the winter, go to: BoatUS.com/Seaworthy***