Pros and cons of biodiesel fuels
What you need to know before filling the tank

Increasing the use of biodiesel in the United States makes sense for two reasons. According to the U.S. Department of Energy, biodiesel produced from soybeans reduces life cycle CO2 emissions significantly. A 5 percent blend (B5) of soybean oil in diesel fuel reduces life cycle CO2 emissions approximately 4 percent. Secondly, the use of biodiesel can reduce our dependence on foreign crude. It’s not a huge factor currently, but if the entire country switched to B5 biodiesel, we could reduce our diesel fuel requirement by 5 percent.

This becomes even more important with the rising cost of refined products due to increasing crude oil costs. I think we will see larger penetrations of passenger-car diesel engines because of their inherently better fuel mileage over gasoline burners.

Let’s define biodiesel fuels. Biodiesel fuels can be produced from the oils of many types of plants. Some examples are coconuts, corn, cottonseed, olives, palms, peanuts, rapeseed, soybeans, and sunflowers. Additionally, biodiesel can be produced from animal fats, such as beef tallow and lard. Biodiesel can even be produced from cellulose fibers.

Pure biodiesel, or B100, is unsuitable for use as diesel fuel because it lacks the necessary oxidative stability. Usually a 2 percent (B2) or 5 percent (B5) blend of biodiesel in regular diesel fuel makes a suitable fuel to burn without problems.

This could change. Toyota and Nippon Oil are currently experimenting with a hydrocracking technique designed to produce biodiesel fuels with oxidative stabilities more like those of current diesel fuels. If successful, this technology will allow the use of significantly higher bio-content diesel fuels.

The United States has an advantage in the introduction of biodiesel fuels. Europe has been using biodiesel fuels for years, and its extensive R&D efforts will help us avoid many costly mistakes. European biodiesel usage tripled between 2004 and 2005, and it is predicted to increase tenfold in the next two to three years. Almost 2 percent of Europe’s diesel fuel is currently biodiesel.

The various types of biodiesel all have less oxidative stability than typical diesel fuels. This means if we try to use large concentrations of biodiesel, we will have issues with:

• injector deposits;
• lacquer formation; and
• fuel system corrosion.

Higher concentrations of biodiesel blends also inhibit cold-flow performance. It takes approximately twice as much cold-flow improver to make B10 behave as well as B5 biodiesel at -35°C temperatures. High bio-content fuels won’t offer sufficient cold-flow performance, no matter how much additive is utilized. In fact, most fuel suppliers and engine builders recommend cutting biodiesel usage in half in the winter (from 5 percent to 2 percent) to be safe.

One of the nice things about biodiesel is that the various sources of biodiesel components give significantly different properties to the fuel. For example, rapeseed-, safflower- and sunflower-based biodiesel have the best low-temperature properties. Biodiesel fuels based on beef tallow, butterfat, lard or palm oil have higher cetane numbers and better oxidative stability. This means fuel formulators have some freedom in tailoring biodiesel fuels to the application and the ambient environment. Peanut- and soybean-based biodiesel fuels are more middle of the road.

Some time ago, Minnesota encountered problems with its B2 biodiesel fuel mandate, but these problems weren’t attributable to using biodiesel fuels; instead, they were caused by faulty B100 production. Early production materials suffered due to incomplete reactions and poor purification. Once the faulty materials were removed from the market, things proceeded as planned.

When trying new fuels, be sensitive to fuel supply system cleanliness and expect shorter-than-normal filter life for the first few months. Carry extra fuel filters on your trucks. Remember to do your testing homework. Don’t listen to testimonials. Insist on test results using TMC/SAE procedures, and evaluate everything in your fleet using up-to-date methodology. You’ll be glad you did. FE