BIODIESEL: NO LONGER A FRINGE FUEL

The availability of biodiesel-based fuels is growing, and industry-accepted standards have begun to ensure its quality from reputable suppliers. However, fleet managers should research the alternative fuel before use in their vehicles. By Sean Lyden

In December 2007, waste collection and recycling company Allied Waste, Inc. of San Mateo County, Calif., converted its entire 225-vehicle diesel fleet to B-20 (a blend of 20-percent biodiesel with 80-percent ultra low sulfur diesel).

"From an environmental perspective, it was the right thing to do," recalls Evan Boyd, Allied Waste general manager. "From a cost perspective, it was kind of a cost-neutral situation. And from a maintenance and performance perspective, it was going to have a limited or no impact. So our overarching conclusion was yes, it's the right thing to do."

Allied's fleet maintenance staff,

FIVE FACTORS DRIVE BIODIESEL MARKET GROWTH

What's driving biodiesel's rapid expansion? Here are five prominent growth drivers:

1. EPAct Amendment.

The Energy Policy Act (EPAct) was amended by the Energy Conservation Reauthorization Act of 1998 to include biodiesel fuel use as a way for federal, state, and public utility fleets to meet alternative-fuel requirements. Covered fleets can earn one EPAct credit for every 450 gallons of B-100 purchased for use in blends of 20 percent or higher in vehicles in excess of 8,500 lbs. gross vehicle weight rating (GVWR). Since most existing diesel equipment and distribution systems are compatible with biodiesel blends, biodiesel is a cost-effective means to earning EPAct credits.

2. Federal Tax Incentives.

A federal tax credit for biodiesel was included as part of the American Jobs Creation Act of 2004. This credit equates to a one-penny per percent of biodiesel in a fuel blend made from agricultural products (such as vegetable oils) and a half-penny per percent of recycled oils (such as restaurant cooking oils). This incentive is taken by the petroleum distributors and usually passed on to end users. The impact: rapid growth in distributors and retailers, making biodiesel more accessible and cost competitive with standard diesel.

Last May, Congress extended the biodiesel tax incentive beyond its original 2008 limit through December 31, 2009.

3. Government Mandates.

In September 2005, Minnesota became the first state to mandate the state's entire diesel fuel supply contain 2-percent biodiesel (B-2). In May 2008, the state increased that mandate to 20-percent biodiesel (B-20) by 2015. According to the legislation, the current 2-percent biodiesel mandate will increase to 5-percent (B-5) May 1 this year; to 10-percent (B-10) May 1, 2012; and to 20-percent May 1, 2015.

"[The Minnesota mandate] was kind of the start of the big government mandates that have stimulated biodiesel growth," explains Mixon. "The City of Portland in Oregon instituted a mandatory B-5 program within the city limits. In Illinois, if you use a B-10 or higher biodiesel blend, you are exempt from the sales tax. That created a big push for people to at least give biodiesel a try in that state."

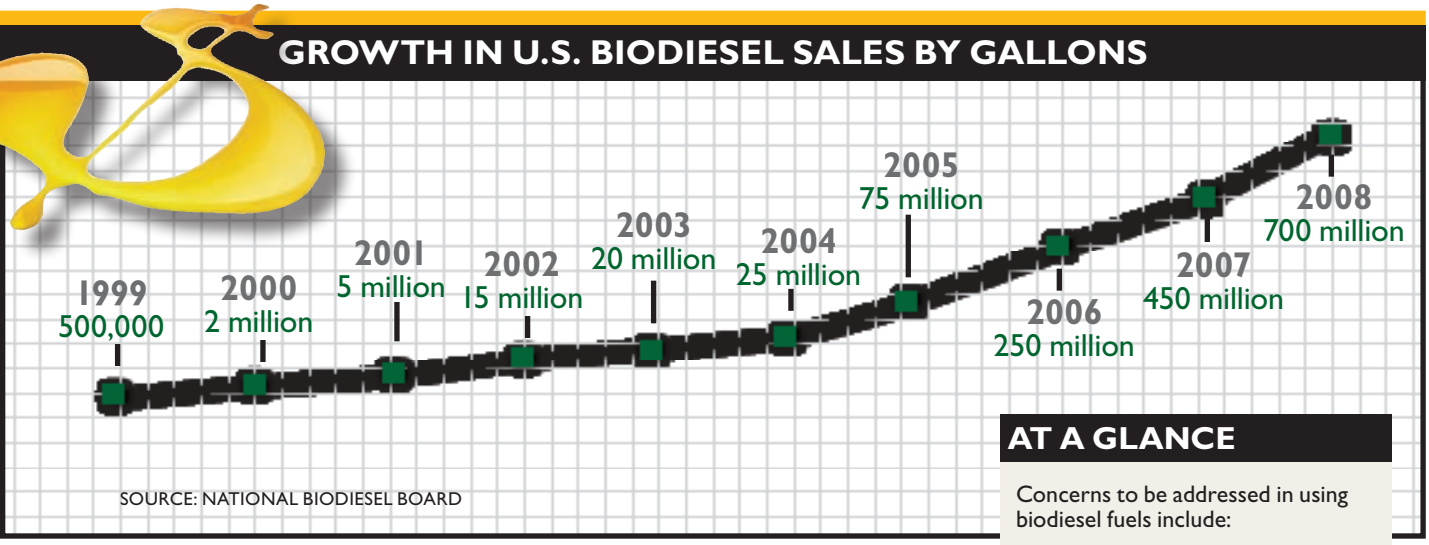
Pennsylvania is the latest state to make the move. Governor Ed Rendell announced in January that Pennsylvania will require B-2 in all diesel fuel sold in the state starting January 2010.

More states are likely to follow. According to NBB, biodiesel-related bills nationwide have grown from 100 in 2003 to 653 in 2008.

4. Fuel Quality Standards.

Biodiesel that does not meet strict quality standards can diminish engine performance, clog filters and injectors, and cause numerous other costly repairs.

To mitigate this risk, Mixon strongly urges fleet manag-



however, posed some initial concerns. "They heard horror stories of fuel filters clogging more often, with concerns the quality of the fuel would be lower standard than you would see with ultra low sulfur diesel," says Boyd.

Allied Waste had already successfully implemented biodiesel programs at some of its other facilities, so Boyd referred to real-world performance data to alleviate maintenance concerns.

"Our approach was essentially, 'Hey,

AT A GLANCE

Concerns to be addressed in using biodiesel fuels include:

- Engine performance.
- Fuel availability.
- Cold weather performance.
- NOx emissions.
- Fuel tank maintenance.

ers to ensure their biodiesel supplier adheres strictly to the guidelines of ASTM D6751.

ASTM refers to the American Society of Testing and Materials International, one of several world standard-setting organizations that has adopted approved specifications for biodiesel. ASTM D6751 is the most common standard referenced in the United States. This standard is designed to protect consumers from poor products, reduce cost of buying and selling biodiesel, and streamline the procurement process.

To further ensure fuel quality, the National Biodiesel Accreditation Commission (NBAC) initiated a voluntary accreditation program for biodiesel fuel producers and marketers called BQ-9000 (www.bq-9000.org). This program combines the ASTM D6751 standard with a quality systems initiative that promotes "best practices" for storage, sampling, testing, blending, shipping, distribution, and fuel management practices.

"When evaluating a biodiesel fuel source, ask yourself, 'What is the quality control of the manufacturer?' " advises Mark Mixon of Mansfield Oil. "You can't just focus on price. It has to be a quality fuel source or you'll have serious performance issues. Does the supplier have good, sound testing procedures? Are they BQ-9000-certified as a manufacturer?"

5. Growing OEM Acceptance.

Until a few years ago, fleet managers' concern that biodiesel use would void vehicle warranties was valid. Today, however, most major engine companies allow biodiesel use at some level without voiding parts and workmanship warranties. Here's a sampling of summarized OEM warranty statements regarding biodiesel use:

General Motors: (8/1/2007) B-20 SEO (special equipment option) available to fleets on the 6.6L Duramax diesel engine in the 2008 Chevy Silverado Heavy Duty and GMC Sierra Heavy Duty 1-ton pickup, as well as on Chevy Express and GMC Savana commercial cutaway vans with Duramax diesel engines.

Ford: (8/31/2007) Any recent-model Ford truck with a diesel engine can run on a mixture including up to 5-percent biodiesel (B-5), but higher amounts are not recommended at this time. Ford is currently conducting research that may enable future B-20 acceptance.

Chrysler LLC: (1/10/2008) B-5 factory fill in place for 2008 Dodge Ram and 2008 Jeep Grand Cherokee. Biodiesel fuel must meet ASTM D6751 and military spec requirements that fuel must be used within six months of production.

A comprehensive list of engine manufacturers (including Isuzu, Navistar, Caterpillar, etc.) and summary warranty statements is available at www.biodiesel.org/resources/oems/. Fleet managers should consult OEM suppliers directly for the latest guidelines for biodiesel use in their equipment.

what do we have to lose? Let's just get started [using biodiesel], and if there are any issues, there's nothing that says we can't go back,' " says Boyd. "We haven't experienced any issues; it's been a fairly smooth transition."

NO LONGER A FRINGE FUEL

Allied Waste of San Mateo County is just one of a growing number of fleets operating with biodiesel in some form, including all four branches of the U.S. armed forces, the U.S. Postal Service, several public transit systems, municipalities, and private fleets, including Safeway, Universal Studios, and United Parcel Service (UPS).

According to the National Biodiesel Board (NBB), a leading industry trade association, biodiesel production has grown from 500,000 gallons annually in 1999 to 700 million gallons in 2008, a staggering 1,400-fold increase over 10 years.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While 700 million gallons represents a small percentage of the overall 60-billion gallon U.S. diesel market, the steep growth trajectory suggests biodiesel is no longer a fringe fuel, but a rapidly expanding alternative to petroleum-based fuel.

So, what exactly is biodiesel? What motivates diesel fleets to make the conversion? What market factors are driving biodiesel's expansion? What concerns and potential issues with biodiesel should fleet managers be aware of before making the switch? This article provides a guide to the information and resources needed to evaluate biodiesel use in a particular fleet.

BIODIESEL DEFINED

Biodiesel is a clean-burning alternative renewable fuel produced from vegetable oils (such as soybeans), animal fats, and yellow grease (recycled cooking oil from restaurants.) The term "biodiesel" technically refers to the pure fuel (100-percent biodiesel or B-100) before blending with diesel fuel.

ADDRESSING BIODIESEL USE CONCERNS

What potential concerns should be addressed before making a complete switch to biodiesel? Here are five to consider:

1. Engine Performance.

According to the Engine Manufacturers Association (EMA), the net impact of using pure biodiesel is a loss of 5-7 percent in maximum power output. However, that drop in power occurs with B-100. If fuel quality meets ASTM standards, lower biodiesel blend ratios, such as B-2, B-5, or even B-20, appear to have little, if any, impact on perceived performance.

2. Fuel Accessibility.

This one challenge has deterred many fleets from converting to biodiesel. They want to make the switch, but cannot find a biodiesel retailer close enough to their operations.

However, with the number of biodiesel retailers consistently expanding, as National Biodiesel Board (NBB) data indicates, what may not have been available last month could be today. A current list of retailers by location is available at the NBB's "Find a Retailer" link:

www.biodiesel.org/buyingbiodiesel/retailfuelingsites/.

For centrally-fueled fleets (with on-site fuel tanks), a guide to biodiesel distributors can be found at:

www.biodiesel.org/buyingbiodiesel/distributors/.

What to look for in a supplier? "If you're making the switch to biodiesel because you want to do the right thing for the environment, make sure the fuel is not being trucked in from across the country," advises Evan Boyd, general manager for Allied Waste, Inc. of San Mateo County, Calif., which now uses biodiesel exclusively in its fleet. "If you're trucking in palm oil from Texas to your site in California, you've really negated the environmental benefits you hoped to gain by switching to biodiesel in the first place. So ask the supplier where its oils actually come from."

3. Cold Weather Operability.

"The performance of biodiesel in cold conditions is markedly worse than that of petroleum diesel," says Anthony Radich, U.S. Department of Energy analyst, in his analysis paper "Biodiesel Performance, Costs, and Use." He says the temperature at which wax crystals can form and potentially clog fuel lines and filters in a vehicle fuel system using biodiesel is higher than that for petroleum diesel.

What measures can be taken to improve cold weather performance? The NBB offers these tips:

- ▲ Use high-quality biodiesel fuel that meets the national standard, ASTM D6751.
- ▲ Blend biodiesel with kerosene.
- ▲ Blend biodiesel with diesel treated with cold-weather additives.
- ▲ Use block and filter heaters.

"Biodiesel blends" are labeled in terms of percent biodiesel. For example, B-5 is a blend of 5-percent biodiesel and 95-percent diesel, B-20 (20-percent biodiesel and 80-percent diesel), B-40 (40-percent biodiesel, 60-percent diesel), and so forth.

Biodiesel is produced through a chemical process called transesterification, which separates glycerin from the fat or vegetable oil, creating two by-products — methyl esters (the chemical name for biodiesel) and glycerin (usually sold for use in soaps and other products).

Pure biodiesel is biodegradable, nontoxic, and essentially free of sulfur and aromatics.

MOTIVATED TO CONVERT

Proponents place their hope in biodiesel as a means to wean the United States from foreign oil and to promote a cleaner environment. Since biodiesel operates in conventional diesel engines with few, if any, modifications, it requires a relatively low initial investment.

"The beauty of biodiesel is that there is no real need to change infrastructure," says Mark Mixon, commercial and industrial sales manager for Mansfield Oil, a Gainesville, Ga.-based petroleum and biofuels distributor operating in 49 states. "So for the good corporate citizen trying to be 'green,' this is one low-cost option to make it happen." **WT**

BIODIESEL RESOURCES

For more in-depth study into biodiesel, consult these resources:

- National Biodiesel Board, www.biodiesel.org.
- Alternative Fuels Data Center, www.afdc.energy.gov/afdc/.
- Analysis Paper: Biodiesel Performance, Cost, and Use, by Anthony Radich, U.S. Department of Energy, www.eiaa.doe.gov/oiaf/analysispaper/biodiesel/index.html.
- National Renewable Energy Laboratory (NREL), www.nrel.gov/.

▲ Store vehicles indoors.
▲ Use a B-20 blend or below.

For more detailed information on handling cold flow issues, visit: www.biodiesel.org/pdf_files/fuelfactsheets/Cold%20Flow.PDF.

4. Increase in NOx Emissions.

According to the "Clean Alternative Fuels: Biodiesel" document produced by the U.S. Environmental Protection Agency (EPA), while biodiesel reduces particulate matter and hydrocarbon emissions, it increases nitrogen oxide emissions by 2 percent (in B-20) and 9 percent (in B-100).

The increase in nitrogen oxide (NOx) emissions is a concern because NOx is a significant contributor of ozone. To counteract and reduce NOx emissions in biodiesel, fuel suppliers blend appropriate additives with the fuel. For example, research sponsored by the National Renewable Energy Laboratory (NREL), in Golden, Colo., found that adding cetane enhancers, such as di-tert-butyl peroxide at 1 percent or 2-ethylhexl nitrate at 5 percent can reduce NOx emissions. The study also indicates NOx can be reduced by blending biodiesel with kerosene or Fischer-Tropsch diesel.

Fleet managers should research their fuel suppliers' efforts to reduce NOx in their biodiesel blends.

5. Fuel Tank Maintenance.

"Diesel tanks tend to get water in them over time, allowing microbes to grow and contaminate the fuel," says Mixon. "So when you transition to biodiesel, remember that [biodiesel] acts like a solvent. This means, if you have a tank that has not been cleaned in a while (or ever), when you put biodiesel in, it will certainly clean the tank. But then all your filters and pumps are going to clog up. So it's really important to institute consistent tank maintenance procedures when you're starting a biodiesel program."

Mixon's advice: "If you're not going to clean your tanks regularly, don't do biodiesel."

In the Final Analysis

What's been the downside for Allied Waste in the past year since converting its entire fleet to biodiesel?

"No visible downside or issues so far," says Boyd. "The upside is that we've been finding a home for used vegetable oil, reusing it in the community, and reducing our carbon footprint. The next step is to determine what we can do to make that transition up to a higher percentage of biodiesel, like B-40, and then getting the parts and engine manufacturers to continue to honor warranties when you use that high-level biodiesel in your trucks."