

					<b>WEST COAST COLLABORATIVE</b> Public-private partnership to reduce diesel emissions
<b>Bridging the Biodiesel Gap</b>				<b>Procedure #</b>	
<b>Fleet Training Q/A</b>					

## Fleet Training Q/A

### *1) What are the basic steps I should follow when transitioning my fleet to biodiesel?*

**1) Learn:** Many sources of good education exist. Begin by reading the end user portion of this curriculum and the Department of Energy’s “[Biodiesel Handling and Use Guidelines](#)”. Reach out to fleet operators of biodiesel blends with similar fleet sizes and applications.

**2) Ensure total costs/savings:** The transition to a biodiesel blend may include some upfront costs, such as a component compatibility review, that may save you money in the long run. You may need to install or clean out a tank, dedicate employee training time, pay more or less for your blend, and prepare for increased initial maintenance costs. You may save money in the end through reduced maintenance, improved marketing or diesel price fluctuations. Whatever your costs or savings, you should ensure that you dedicate the initial funds and time for a smooth transition.

**3) Clean Your Tanks:** The U.S. Department of Energy states that “B20 is sufficiently diluted so that most (cleaning effect) problems are insignificant.” Field reports indicated this is still a possibility even with the B5 blends, especially if your fuel storage and handling systems are old or have not been carefully maintained. Depending on the condition and age of your fueling infrastructure, you should clean any fuel tanks that will store biodiesel to remove any build up of sediment before transitioning to biodiesel or a biodiesel blend. Develop a tank management quality program for your site to ascertain the ongoing status of your fuel and tanks. Take regular bottom samples to verify lack of moisture content and microbial activity. Depending on how quickly you use the fuel an algacide may be recommended.

**4) Quality is critical:** Require a D-6751 ASTM spec sheet from your distributor. The spec sheet will include cold flow properties and ensure that your fuel has been tested to meet the most recent D-6751 ASTM specifications. Producers are now transitioning to meet the BQ-9000 specifications for fuel quality production. A BQ-9000 certified producer follows quality assurance and quality control protocols to assure that the fuel they produce is of the highest quality.

**5) Pilot with low-level blends:** It is wise to start small. Individual engines may demonstrate different carbon deposit build-ups. Biodiesel in its pure form (B100) has excellent solvency characteristics. To minimize the possibility of disturbance to your fleet systems apply lower blend levels at first to a few vehicles (if feasible) and work up as you and your fleet adjust to the new fuel. Biodiesel is easy to phase in and out, so you can



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maintain flexibility in technology deployment. It can be blended with existing diesel to create various mixtures such as B2, B5 or B20 blends. Biodiesel is an excellent complement to Ultra Low Sulfur Diesel (ULSD), which requires additional lubricity. Biodiesel is a renewable additive with plenty of lubricating properties to fill this role.

**6) Take samples:** If your biodiesel fuel is being delivered pre-blended (recommended) then it may be more difficult to assess quality at the time of delivery. Request that your distributor take and test samples or become a BQ-9000 Certified Marketer. This BQ-9000 Marketer certification, like the BQ-9000 Producer Certification, does not guarantee quality, but does ensure that the best distributing practices are in place. You may also want to develop a relationship with a local fuel testing laboratory.

**7) Be Prepared: with Compatible parts:** Any gasket, hose or O-rings that will come in contact with biodiesel should be manufactured and tested for biodiesel compatibility. Viton, Teflon and many parts manufacturers currently carry biodiesel compatible materials. All blended products, such as B2 and B5, would have a minimal effect on less durable compounds such as nylon, polypropylene, and polyurethane. For a comprehensive list of these materials, visit [www.biodiesel.org](http://www.biodiesel.org) and click, 'Fuel Facts.' Demand that your fuel distributor and mechanics review component viability before modifying any system.

**8) Take Cold Weather and Oxidative Precautions:** Depending on the feedstock, B100 stored in cold temperatures (less than 40 degrees Fahrenheit) may need to be heated prior to distribution. If pumping biodiesel in cold weather through a pump, keep the hose and supply line to the pump equally protected. A simple cold-flow additive may be enough to eliminate any potential cold-flow threats. Remember to start with the highest quality diesel fuel in terms of cold weather performance. If the biodiesel portion of the fuel has been produced and delivered from out-of-state or from long distances, it may have been exposed to extreme temperatures elsewhere therefore changing its oxidative or chemical make-up by the time it reaches your tank. Check the ASTM certification for cold-flow properties and date of production.

**9) Keep records:** Everything from a broken headlight to a faulty alternator has been blamed on biodiesel. Without a strict record keeping regime, there is no means of documenting the maintenance and cost impacts of using biodiesel. This can be especially effective if you have a solid record keeping system already in place and can compare any previous changes to current changes with biodiesel use. Once in place you will have the raw data to adequately review all the positive and negative impacts of a biodiesel transition.



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**10) Go fleet-wide:** Once you have followed steps 1-9, you and your fleet are prepared to go fleet-wide. The first six months may require a few additional maintenance items such as replacing some fuel lines, filters and seals. Once the initial diesel carbon sediment has been cleaned out of the engine system, your fleet will likely see fewer maintenance issues and a cleaner work environment. The literal and figurative diesel headaches of the past should be gone for good as long as you stay on top of ensuring quality fuel and equipment compatibility.

**11) Market Your Success:** By diversifying your fueling sources and stabilizing prices, your company can save money and prepare for the future. Beyond the economic advantages, many companies are finding that by doing the right thing for the environment, our national security, and vehicle performance they are directly benefiting from the marketing advantages of using biodiesel. Stickers on vehicles, press releases about environmental responsibility, participation in industry panels, and leadership in the realm of sustainability all come with biodiesel use. Over 700 fleets currently use biodiesel or a biodiesel blend. Your fleet can be next.

**2) Will I get the same power and fuel economy running B20 biodiesel blends?**

The values below represent energy content of average No. 2 diesel fuel and average biodiesel in the US. While BTU changes of 1-2% can be picked up in lab tests with B20 for horsepower, torque, and fuel economy, in practice it is difficult to detect any differences with a 1-2% change in fuel BTU content outside normal variability experienced from day to day operations, even in closely monitored fleets.

Average Density and Heating Value of Biodiesel and Diesel Fuel

Fuel	Density g/cm <sup>3</sup>	Net Heating Value Avg. Btu/gal.	% Difference vs. No. 2 Diesel Avg.
No. 2 Diesel	0.850	129,500	
Biodiesel (B100)	0.880	118,296	8.65 %
B20 Blend (B20)	0.856*	127,259*	1.73 %*
B2 Blend (B2)	0.851*	129,276*	0.17 %*

\* Calculated Values from those of No. 2 Diesel and Biodiesel (B100)

**3) Is cold weather a problem in high percentage blends?**



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Yes. The B100 will begin to gel around freezing (between 32-36° F) and will clog fuel filters between 22-28° F. Gelled fuel melts when warmed. Fuel rarely gels while the engine is running and circulating fuel through the system. Cold morning startups are generally the only time that gelling becomes an issue. To ensure cold weather operability we recommend taking precautions whenever temperatures are near freezing. There are three important actions you can take to continue using biodiesel in temperatures below freezing: add heat, add petroleum, or add a winterizing additive. The easiest cold weather solutions seem to be a blend or, if you'd rather not add petro, you could use a cold flow additive.

**4) *What is the price and availability of Biodiesel?***

Biodiesel diversifies our energy supply and stabilizes our fuel prices. While biodiesel has historically cost slightly more than petroleum diesel, *biodiesel has more recently maintained price fluctuated much like petroleum diesel prices.* Biodiesel's role in providing enhanced lubricity, decreasing exposure to toxic emissions, and supporting American farmers makes any price difference negligible at best.

Biodiesel is a cost-effective and flexible fuel that can be blended with petroleum diesel at any level and used in most diesel engines with few or no modifications. Growth of the biodiesel industry benefits the economy, while also broadening the nation's renewable energy options. Biodiesel is widely available today and is the fastest growing alternative fuel in the U.S. *Domestic production has increased from 1 million gallons per year in 2001 to over 2.61 billion gallons in 2008.*

Biodiesel produced domestically reduces the nation's reliance on imported oil and encourages investment in the development of a clean energy economy. It also offers a regional approach to energy production and energy security, a contrast to the centralized, choke-point-laden petroleum production system. Trains, ships, trucks, agriculture and construction, all depend on diesel equipment that is likely to remain in service for the next several decades. No other alternative, including compressed natural gas, electric vehicles or hydrogen, can replace diesel equipment easily or cost effectively. Clean burning biodiesel requires no new equipment, no infrastructural changes, and no engine modifications when used in common blends with petroleum. Because of its higher lubricity, biodiesel use also contributes to a longer engine life and lower maintenance costs.

Check with your local distributor for current price and availability.

**5) *Do I need special storage facilities for biodiesel?***



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In general, the standard storage and handling procedures used for petroleum diesel can be used for biodiesel. The fuel should be stored in a clean, dry, dark environment. Acceptable storage tank materials include aluminum, steel, fluorinated polyethylene, fluorinated polypropylene and teflon. Copper, brass, lead, tin, and zinc should be avoided. It is important to verify the condition of any tank that has been used to store other materials, especially petroleum products.

**6) *Can Biodiesel be used as a fuel lubricity additive?***

Testing has confirmed that biodiesel can provide sufficient levels of fuel lubricity, even at blend levels below 1%, in current on-road diesel fuel. Testing is underway to determine specific blend levels that would be required in ultra-low sulfur diesel fuel (15 ppm).

Replenishing the lubricity that is lost in ULSD can be accomplished with conventional lubricity additives on the market today. Economically, these products are the same or less expensive than biodiesel. Petroleum based additives, however, do not have the same conservation, energy security, environmental, and economic benefits. All of these factors should be evaluated when making a decision on what to use for a lubricity additive.

**7) *Has Biodiesel been thoroughly tested?***

Biodiesel has been extensively tested by government agencies, university researchers and private industry in the United States, Canada and Europe. Many transit authorities within the US have conducted tests as well.

*More than 600 fleets, 100 biodiesel demonstrations, including three one-million-mile tests and more than thirty 50,000-mile tests, have logged more than 10 million road miles with biodiesel blends on US roads.*

Tests measuring performance, fuel mileage, and drivability have found that biodiesel blends perform similarly to conventional diesel. Opacity levels, which measure particulate emissions, were reduced and exhaust odor was less offensive. No adverse durability or engine wear problems were noted.

*The biodiesel industry has also commissioned more than 40 independent studies to research benefits ranging from improved lubricity to biodegradability.*

**8) *Who blends biodiesel, and how is it done?***



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Diesel users can have their suppliers obtain biodiesel and blend it before delivery. *Another option is to have pure biodiesel (B100) delivered directly and mix it themselves. It blends easily, stays mixed and requires no special handling.*

**9) Which biodiesel blend is best?**

Depending on the application, climate and season the blend of biodiesel can be from 2% up to 100%. In Europe (especially France), where low sulfur diesel has been in-place for many years, biodiesel is added to provide the lubrication that was lost with the removal of sulfur. In environmentally sensitive areas (marine, alpine) and in mines where the maximum environmental benefit is required, 100% biodiesel is often used. In the US, where biodiesel is in use in many bus fleets, 20% biodiesel is commonly used to address the best current balance of emissions, cost and availability.