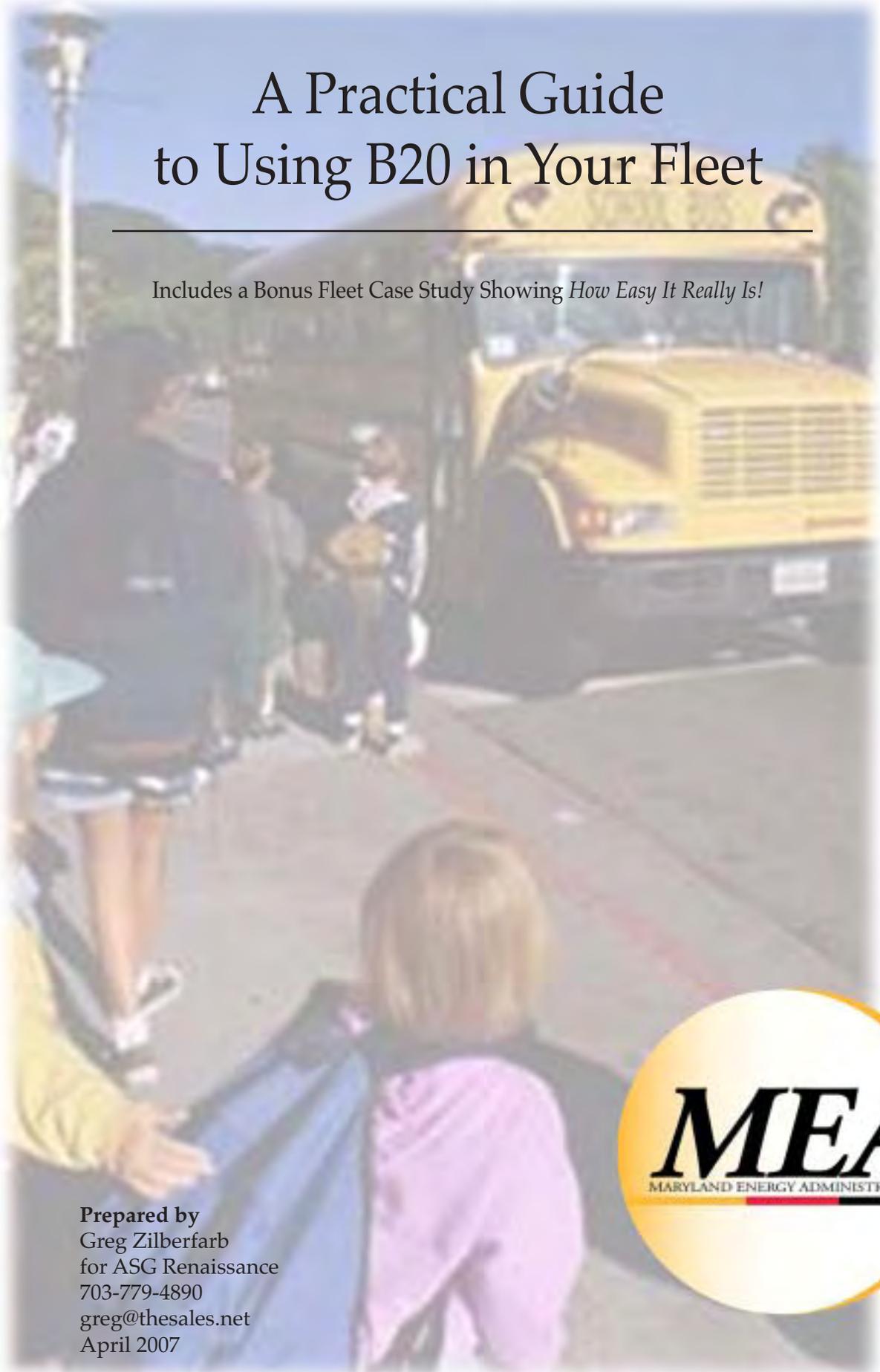


A Practical Guide to Using B20 in Your Fleet

Includes a Bonus Fleet Case Study Showing *How Easy It Really Is!*



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Foreword

Cleaner air, reduced dependence on foreign oil and rising fuel costs provide three compelling reasons to use Biodiesel as a diesel replacement. This guide dispels the myths associated with using Biodiesel, specifically B20, in fleet use by providing enough information to begin using B20 within the first week of reading it!

Additionally, we follow one fleet's initial "switchover" to B20 documenting three months during the winter of 2005-2006. We later check back in with them to ensure B20 is still being used and provide closing comments on their experience.

By documenting what steps they took during the switchover, what costs they incurred and what problems, if any, they incurred, we produced this "Practical Guide to Introducing B20 Into Your Fleet" that will help additional fleets in Maryland switchover to a clean, renewable, domestically produced fuel: Biodiesel.

This guide was funded in whole by the Maryland Energy Administration and may be freely circulated, quoted or used without obtaining written permission from MEA or from ASG Renaissance, the authors of the report. We do ask that you cite MEA and ASG Renaissance if you do.

ASG Renaissance represents that the information contained herein is deemed to be accurate. We suggest you consult your local fuel provider before you engage in an alternative fuel program.

All product and company names mentioned herein may be the trademarks of their respective owners.



School bus fleets are an excellent place for biodiesel: The improvements in emissions are especially helpful to children's health, because children's lungs are still developing and they have faster rates of breathing than adults. This guide has a bonus case study which describes one school bus fleet's success using a B20 biodiesel blend.

A Practical Guide to Using B20 in Your Fleet

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Executive Summary

There are three compelling reasons to begin using Biodiesel:

- Cleaner Air-Biodiesel reduces emissions
- Energy Security-Less dependence on foreign oil
- Economics-We all want to save money

While all of us want to believe we are “green” or “patriotic,” the bottom line is that the economics are important. Today, switching over to B20 is economically feasible, and using B20 will provide cleaner air and reduce our country’s dependence on foreign oil, improving energy security.

There are recommended steps to begin using B20 and we will discuss them in the pages that follow, but there is a practical side to implementing B20 too. We will discuss that and more importantly, show you how one fleet quickly implemented B20 without following the recommended steps and yet didn’t incur any problems.

This guide will provide a detailed plan for implementation based on the biodiesel industry’s best practices and provide “Watch Out For...” sidebars along the way for easy viewing.

Background

Although biodiesel is the fastest growing alternative fuel in the United States, it has been slow to gain acceptance among users in the state of Maryland. Misinformation, lack of information and a general reluctance by fleet operators to change their current operation has contributed to this dilemma.

Before we can convince you to begin using Biodiesel we have to explain what it is, what it does to your vehicles, what affect, if any, it has on engine warranties, how it is stored, and what modifications should be made for a biodiesel fueling station. After you know all of the basics you will understand why so many politicians, celebrities, farmers and fleets are talking about biodiesel.

What is Biodiesel?

The problem with biodiesel is that everyone thinks they know what it is and then every manufacturer of anything containing animal or vegetable fats and oils wants to sell you “biodiesel.” The fact is, there is only one official definition for biodiesel and it comes from the National Biodiesel Board (NBB). They have, in fact, trademarked the name biodiesel and you can only call a product biodiesel if it meets the following definition:

Biodiesel, n—a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100, and meeting the requirements of ASTM D 6751.



These sidebars provide quick, convenient highlights that make this guide a quick read for those of us who have short attention spans! Items marked with the orange caution sign are “watch out” items that require action.



Items marked with the yellow and black bar are informational items not necessarily requiring action.



It isn't biodiesel if it doesn't meet the National Biodiesel board definition. The term "biodiesel" usually refers to pure or "neat" biodiesel, also called "B100."

Biodiesel blends are called BXX, where the XX stands for the percentage of biodiesel in the blended fuel.

Find out more at:
www.biodiesel.org



SVO is not the same as biodiesel!

Glycerin from biodiesel production is used in the manufacture of cosmetics, soap and food. It does not belong in fuel tanks.

The catalyst used in biodiesel production, either methanol or ethanol, is reclaimed and reused. It does not remain in the biodiesel.

Biodiesel Blend, n—a blend of biodiesel fuel meeting ASTM D 6751 with petroleum-based diesel fuel, designated BXX, where XX represents the volume percentage of biodiesel fuel in the blend.

In simple terms, the NBB defines it this way:

Biodiesel is the name of a clean burning alternative fuel, produced from domestic, renewable resources. Biodiesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a biodiesel blend. It can be used in compression-ignition (diesel) engines with little or no modifications. Biodiesel is simple to use, biodegradable, nontoxic, and essentially free of sulfur and aromatics.

Very often, a broad, general description is used to define biodiesel in a way that is easy to understand by the general public. We all have heard of the nature-loving car owner who poured used fryer oil from his local fast food restaurant directly into his diesel car and then went on television claiming anyone can use "biodiesel" just like he did!

The truth is, he wasn't using biodiesel. He was using used fryer oil, often called SVO, or "Straight Vegetable Oil." Now, we are not saying what he did was wrong or bad, it just isn't biodiesel and someone else needs to write about a practical guide to using it! The Engine Manufacturer's Association (EMA) and the United States Department of Energy (USDOE) have both distributed papers on utilizing SVO and they can be found in Appendix A. You can form your own opinion after reading what EMA and USDOE have to say.

Biodiesel is not the same thing as raw vegetable oil. It is produced by a chemical process which removes the glycerin from the oil. This process is called transesterification and is a key step in making biodiesel which meets the ASTM specification.

The transesterification process typically involves a reaction of a vegetable oil or animal fat with an alcohol such as methanol or ethanol in the presence of a catalyst to yield mono-alkyl esters (biodiesel) and glycerin, which is removed.

One other significant difference between biodiesel and SVO is that biodiesel, as defined in D 6751, is registered with the US EPA as a fuel and a fuel additive under Section 211(b) of the Clean Air Act.

We mentioned biodiesel can be used in any concentration with petroleum based diesel fuel in existing diesel engines with little or no modification. The most common blend of biodiesel is B20; meaning twenty percent biodiesel is mixed with eighty percent diesel. Why? Because legislation called the Energy Policy Act of 1992, (updated in 1998 and 2005) mandates the purchase of alternative fuel vehicles by federal, state and utility fleets and fleets can

offset these mandates by getting credit for burning biodiesel in a minimum B20 blend. This guide will give you the steps to implementing B20 into your fleet for this reason.

What Does Biodiesel Do To Your Vehicles?

B20 works in any diesel engine with few or no modifications to the engine or the fuel system. B20 provides similar horsepower, torque and mileage as diesel. Biodiesel has a solvent effect that may release deposits accumulated on tank walls and pipes from previous diesel fuel storage. This affect is much more dramatic with B100 than with biodiesel blends like B20. Always ensure that only fuel meeting the biodiesel specification (D 6751) is used to create the blended fuel.

Practically speaking, Biodiesel is an effective engine and diesel injector cleaner! If you have been using diesel in your vehicle before you make the switch to B20, you should replace your fuel filter after the first thirty days of use. Do you have to? No. In fact, the fleet in our case study didn't and they had no problems. But who wants to find out that they had a dirty engine after the tow truck driver brings the vehicle in on the end of the dreaded hook.

If pure biodiesel comes in contact with brass, bronze, copper, lead, tin, and zinc for a prolonged period of time it will cause degradation of these materials and create sediments. Lead solders and zinc linings should be avoided, as should copper pipes, brass regulators, and copper fittings. Affected equipment should be replaced with steel or aluminum. The effect of B20 on vulnerable materials is significantly reduced compared to higher blends.

Pure biodiesel can soften and degrade certain types of gasket, hose, and seal compounds like natural rubber, Buna-N, and nitrile, which can create fuel system leaks. This affect has NOT been observed with blends of B20 and lower over the last 10 years of B20 experience, so B20 or lower blends can be used without changes. If it is desired to use blends over B20, the engine or vehicle manufacturer should be contacted to determine if the seals, hoses, and gaskets are compatible with the blend being considered before use.

What Affect Does Biodiesel Have on Engine Warranties

As with all fuels, simply using biodiesel does not affect your warranty in any way. This is a common misconception and is made worse, in part, from poor understanding at vehicle service departments around the nation.

The Magnuson-Moss Act of 1975 states that to affect the vehicle warranty, the fuel, in this case biodiesel, must be directly responsible for the failure. If the fuel didn't cause the problem the warranty cannot be voided, regardless of brand or length of time in



*What do we mean by “little or no modifications”? The release of deposits may clog filters upon initial use of B20. This should be closely monitored. **Do yourself a favor** and replace the engine fuel filter after the first thirty days of switching over to B20. Then, cut open the old filter and inspect it. What you find may help you manage your fuel and fuel tank better.*



Since 1994, almost all engine and fuel hoses installed on diesel engines are compatible with B20.

Using biodiesel and biodiesel blends does not void your engine warranty.

use. So to clarify, if you blow an injector and an OEM voids the warranty, they would have to prove it was due to the biodiesel and not to poor design or manufacturing!

Specifically, OEM warranty covers failures that are a result of defects in material or factory workmanship. Engine damage, service issues, and/or performance issues determined by the OEM to be caused by the use of biodiesel are not considered defects in material or workmanship.

Manufacturers have been issuing positive statements on biodiesel, especially B20, for quite some time. All major diesel engine and vehicle manufacturers support B5 and lower blends. Some have even issued support for B20 and higher blends. For example, just prior to publication of this report, Cummins approved the use of B20 in their diesel engines and DaimlerChrysler announced that they would fill the tanks of the 2007 Jeep Cherokee diesels with B5 as they leave the assembly line. (See Appendix A of this report for additional information and visit www.biodiesel.org to view current OEM statements.)

How is Biodiesel Stored?

Biodiesel is stored the same way petroleum diesel is, in an approved fuel storage tank. 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. The three main fuel contaminants for all fuels are air, water, and fuel itself – new deliveries of fuel may bring rust, sediment and sludge with it. Managing your fuel tank to minimize the potential entry of these contaminants into your fuel storage system will go a long way toward eliminating engine problems associated with bad fuel – regardless of whether it is petroleum, biodiesel blends, or pure biodiesel. Water pastes such as SarGel and KolorKut are effective with biodiesel. Stick your tank periodically for water and if you find it, manage against it.

Acceptable storage tank materials for biodiesel include aluminum, steel, fluorinated polyethylene, fluorinated polypropylene and Teflon. Copper, brass, lead, tin, and zinc should be avoided.

One final note on storage: All fuels, including #2 and #1 petrodiesel, have a shelf life. This is also true with biodiesel and biodiesel blends. Industry experts recommend that biodiesel be used within six months of purchase to ensure that the quality of the fuel is maintained. The use of fuel stabilizers, the same fuel stabilizers used for #2 and #1 petrodiesel, are necessary if you need long term storage of biodiesel.

Treat spilled biodiesel as if it were petroleum diesel if it is spilled in significant quantities. Wipe up any small amounts which

may drip on vehicle paint or decals with a soft, soapy rag. Dispose of the rag in a safety can.

How Do I Buy Biodiesel?

Ask your regular local fuel provider to bring you biodiesel blends such as B20. The National Biodiesel Board maintains a list of biodiesel providers, from manufacturers to downstream providers, on its website. You or your fuel provider should be able to figure out how to source the fuel from there. In general, biodiesel blends are available virtually nationwide and often on an “overnight” turnaround basis.

Be sure to spec out that the biodiesel meets ASTM D 6751 when you bid out the fuel, and if necessary, also specify your sulfur level. Pure biodiesel is virtually sulfur free. Also add any cold-weather performance specs you may desire. (See Appendix for a sample spec sheet.)

If at all possible, insist upon preblended B20 or other blends. This will clarify the chain of ownership in the event that there may be any problem with the fuel. It also will help ensure that the fuel is blended completely. When fuels are “splash blended” directly into a tank, it’s possible that the pure biodiesel, being somewhat “heavier” than petrodiesel, could remain at higher concentrations in the bottom of the tank. (If the fuels must be splash blended, be sure to agitate the tank to improve blending.)

The NBB has implemented a cooperative and voluntary program called “BQ-9000” for the accreditation of producers and marketers of biodiesel fuel. The program is a unique combination of the ASTM standard for biodiesel, ASTM D 6751, and a quality systems program that includes best storage, sampling, testing, blending, shipping, distribution, and fuel management practices.

BQ-9000 is open to any biodiesel manufacturer, marketer or distributor of biodiesel and biodiesel blends in the United States and Canada. For additional information about BQ-9000 go to www.bq9000.org

What Modifications Should I take with My Biodiesel Fueling Station?

We discussed any modifications you may need to take with your vehicles, but how about your station? Same thing applies here and bears repeating. Remember the fact about biodiesel being an excellent solvent? If you pour biodiesel into an existing petrodiesel storage tank, it will clean that tank. But where does all of the sediment go? You guessed it - right into your diesel vehicle. But first, it clogs up your dispenser filter and any other small orifice it comes across along the way.



INSIST that your fuel provider brings you biodiesel blends produced with pure biodiesel which meets the ASTM D 6751 specification.



Choosing a BQ-9000 certified producer and marketer means that your biodiesel and blends have been handled properly and should result in the highest quality, most reliable fuel deliveries possible.



For current information about the UL status of dispensers, visit: www.ul.com/gasandoil/development.html



Replace your dispenser's fuel filter after your first load of B20 and before the second one is delivered. It may not be necessary, but for the money spent, it can help prevent any problems.

There are no differences between biodiesel and petrodiesel dispensers. If you have an older dispenser, remember that if pure biodiesel comes in contact with brass, bronze, copper, lead, tin, and zinc for a prolonged period of time, it will cause degradation of these materials and create sediments. In addition, these substances may accelerate the oxidation of the fuel. Lead solders and zinc linings should be avoided, as should copper pipes, brass regulators, and copper fittings. Affected equipment should be replaced with steel or aluminum. The effect of B20 on vulnerable materials is significantly reduced compared to higher blends.

On October 23, 2006, Underwriter's Laboratory, Inc. (UL) distributed a communication to Authorities Having Jurisdiction (AHJ) explaining that it had suspended authorization of E85 dispenser components and that it would be updating its requirements. The primary concern addressed in UL's communication with the AHJ community was any potential material compatibility issues, specifically corrosive effects that E85 may have on dispenser components. To date, UL has not certified any motor fuel dispensers for use with E85. This has never been an issue with biodiesel, although some dispenser manufacturers are now certifying their dispensers for alternative fuel use.

For example, Gilbarco, one of the nation's leading dispenser manufacturers has just announced an alternative fuels dispenser for ethanol or biodiesel that has the following internal components:

- cast iron fuel meters with nickel-plated measuring chambers
- internal piping made with black iron or stainless steel
- nickel-plated inlet filter adapters
- un-plated steel compression fittings
- stainless steel control valves with compatible seals
- ethanol compatible sealants

After you begin your B20 program, keep an eye on your dispenser, just in case. Visually inspect hoses for signs of weeping. Inspect fuel and fuel filters periodically, and make a note of flow rates.

The actual fueling of your diesel vehicle with biodiesel, in any blend, is exactly the same as it is with petrodiesel. There is no reduction in flow or difference in color. There are no additional safety concerns.

Finally, you will need to label your biodiesel dispenser with the blend you are using. For example, if you decide to use B20, and we hope you do, please label your dispenser with B20 and have some sort of explanation of B20 on the dispenser.

Let's Get Started

Selecting the Vehicles for B20 Use

First things first. You must select diesel vehicles. Yes, there are some people who have used biodiesel in gasoline engines - without success of course!

One of the great things about biodiesel is that it allows you to keep the same diesel vehicles and equipment to which you, your drivers and your mechanics are accustomed.

We recommend you select new or recently purchased diesel vehicles. We mentioned earlier that biodiesel has a cleansing affect, even as B20, and you would be surprised how dirty the insides of a diesel engine can get in a short time. After you have selected the diesel vehicles review their repair record. If a vehicle has a lousy repair record before using B20 you can be pretty sure that will continue! B20 is not a miracle cure for poorly performing engines, although there are some performance and drivability benefits we will discuss later.

Check with MEA for Any Incentives

There are many incentives for using biodiesel. The Maryland Soybean Board (www.mdsoy.org) works closely with the Maryland Energy Administration (MEA) to promote the use of biodiesel. Occasionally there are additional incentives, over and above the government incentives.

There are some key federal incentives available too. Here is a rundown of available incentives:

Federal Excise Tax Credit

- Signed into law on 10/22/04 as part of H.R. 4520, the American JOBS Creation Act of 2004

- Tax incentive effective as of 1/1/05 and has been extended through 2008. Congress is considering several bills which may extend it even longer.

- Tax incentive for biodiesel blenders of 1¢ per percentage of biodiesel blended for virgin oils, (vegetable oils and animal fats)

- B20 = 20 ¢; B2 = 2 ¢

- Tax incentive for biodiesel blenders of 1/2¢ per percentage of biodiesel blended for recycled oils

- Must meet ASTM D 6751

- Lowers cost of biodiesel to consumers in taxable and tax exempt markets

Energy Policy Act of 2005

Under EPACK 2005 you can receive a 30 percent tax credit up



Biodiesel blends can be used in any diesel engine.



The Maryland School Bus Contractor's Association used biodiesel blends in its annual safety competition during 2005, 2006 and 2007. The effort was supported by MEA and the Maryland Soybean Board.

www.energy.state.md.us
www.mdsoy.org



Your drivers are important to your success. If they refuel vehicles or equipment, be sure they know to choose biodiesel blends. Nothing is worse than publicly declaring that your fleet is using biodiesel blends, then getting caught at a regular station! Drivers can also be great ambassadors of your fleet.



*For a complete guide to storage and handling, download the “Biodiesel Handling and Use Guide” from the National Biodiesel Board website at:
www.biodiesel.org*

to \$30,000 for the installation of a biodiesel fueling facility. For example, if you install a biodiesel facility for \$100,000 you would receive a 30 percent, or \$30,000 tax credit.

Your MEA is the best place to start identifying biodiesel incentives. Their knowledgeable staff will help you identify and apply for federal and of course, the state of Maryland incentives.

To find out more, please call (800) 72-ENERGY.

Select a BQ-9000 Certified Fuel Provider

We discussed buying fuel from a certified BQ-9000 provider earlier in this guide. Purchasing from a BQ-9000 provider means your fuel has been stored and handled in a way that will ensure you receive the best quality biodiesel on the market.

When interviewing your prospective biodiesel fuel provider ask to see their BQ-9000 certification or inquire as to the status of their application.

Let Your Company Know What You Are Doing

Every employee should be part of the biodiesel implementation plan. With awareness of alternative fuels at an all time high most employees will be happy to participate in a biodiesel program.

If you are only implementing B20 into some of your fleet vehicles it is always best to ask for volunteers to drive the biodiesel fueled vehicles.

If you make the technicians, administrative staff, and most of all, drivers part of the solution they will become ambassadors for your fleet’s public image!

Inform Your Customers You Are Using Biodiesel

In our case study, a school bus fleet switched to B20. This was a very positive thing to do for the school district they were serving and they deserve recognition for taking the initiative on their own. We recommend notifying parents of the switch to let them know the school bus they are riding in is better for the environment and better for their children’s health. A sample PowerPoint presentation and Parent handout appears in Appendix A.

Preparing Your Fueling Facility Storage Tank

Once you have identified your diesel vehicles you have to decide how you are going to fuel them. You have a few choices here. You can convert an existing diesel tank to B20, like our case study fleet did, or you can take the opportunity to upgrade to a

new tank.

Using existing tanks is fine, although we recommend a few simple precautionary measures to ease the transition. Here is where that B20 cleansing effect comes back into play: If you simply add B20 to an existing tank you run the risk of dislodging all of the crud your tanks have accumulated since your last tank cleaning. We recommend implementing your B20 program at your next scheduled tank cleaning. This way, you start off with a nice clean tank and lessen the chance of sending debris into your diesel engines!

You will want to check and possibly change the filter(s) on your fueling station dispenser after thirty days too, just to play it safe.

In Colder Weather be Aware of B20's Cold Weather Properties

A 20 percent blend of biodiesel with petrodiesel usually raises the cold weather properties by about 2 to 10 degree F (pour point, cloud point, cold filter plugging point). In most cases, this has not been an issue. Twenty percent biodiesel blends have been used in the upper Wisconsin area and in Iowa during -25 degree F weather without issues. Solutions to biodiesel winter operability problems are the same solutions used with conventional #2 petrodiesel (use a pour point depressant, blend with #1diesel, use engine block or fuel filter heaters on the engine, store the vehicles near or in a building, etc.).

Take Advantage of the Positive "Green" Press

Now that you have done your research, read this guide and implemented your program, it is time to take some credit for your efforts. With rising oil costs bio-fuels are gaining increased attention, especially from Congress. Your company should issue a press release to let others know that you taken our environment and energy security seriously. See Appendix A for a sample press release from the City of Denver that can be a great guide for writing your press release.



Do yourself a favor and start your biodiesel program with a clean storage tank! Diesels are tough, durable engines, but gunked-up fuel — petroleum or biodiesel blends — can stop them cold. Maintaining your fuel storage tank is a good practice.



"Old Brownie" — a 1992 Ford F-250 owned by the Missouri Soybean Merchandising Council, had 360,000 biodiesel miles on it when this photo was taken.



Koch Transportation's fleet consists of:

- six 42-passenger school buses;
- fourteen 66-passenger school buses;
- one GMC pickup truck.

The diesel engines utilized in these vehicles:

- eight International 466;
- four International 444;
- eight Mercedes 210;
- one GMC 6.6.

Bonus Fleet Case Study

Koch Transportation Implements a B20 Program

Let's see how easy it can be to implement B20 into your fleet. In the fall of 2005 Dick Koch decided he wanted to do something to clean up diesel emissions on his fleet of school buses. Mr. Koch, (pronounced "coke") owns Koch Transportation and he provides school bus transportation for Charles County Maryland public schools. We followed their ninety days of B20 use and documented what they did, and what they didn't do.

Koch Transportation had one existing diesel tank and switched the entire fleet over to B20.

Koch has nineteen buses that are identified in Appendix E. The entire fleet of buses, and Mr. Koch's personal vehicle, began using B20 on September 13, 2005 when BQ-9000 certified marketer Tri-Gas & Oil Company delivered 5760 gallons of number 2 diesel and 1440 gallons of B100 that was preblended to a total of 7200 gallons of B20. (1440/7200=.20)

The mixed fuel was dropped into an existing tank that was not prepped in any way. This technique is supported by marketers claims of start today stop tomorrow technology, and rarely poses any problems, although, as we mentioned earlier in this guide, we recommend changing your vehicle fuel filters after thirty days and your fueling station filters after the first tank of biodiesel runs through the station.

During our three months of monitoring Koch received a total of 2,508 gallons of blended B20. During the colder months of October and December the deliveries included four gallons of a cold weather fuel additive, Artic Flow.

Results

Koch Transportation Operations Manager, Brenda Jones, had the following observations:

"On the older buses we still have, we have not noticed a lot of smoke from exhaust when starting engine in cold weather, like we did last year!"

"Also, no diesel smell like we used to have."

During the three months we monitored their B20 implementation they had four clogged filters on four different school buses, both during a cold snap the week of December 16, 2005. (Remember, they simply began using B20 without any tank preparation.) As a precaution, it was agreed to add 1000 gallons of petrodiesel #1

(clear kerosene) to the existing B20 blend to increase cold flow. There were no other problems reported during the study.

We checked back in with Brenda in March, 2006 after they had six months of use and at this time they had experienced just one more case of filter clogging and that was on Mr. Koch's personal diesel pickup. The filter was replaced and he resumed driving his truck.

Brenda said the week of February 6 was also a very cold week, although none of the school buses experienced any issues during that time.

Seth Powell, of Tri-Gas and Oil said that fleets need to take the same cold weather precautions with B20 as they do with #2 petrodiesel. He delivered #1 (clear kerosene) to many of his #2 petrodiesel customers during the two cold snaps that Koch Transportation reported filter clogging.

Seth went on to say, "Cold weather fuel management of B20 is very manageable and Koch Transportation now has a plan in place for colder weather."

"Tri-Gas and Oil will work new customers implementing a B20 program to ensure the B20 keeps flowing in all kinds of weather."

Successes

As mentioned earlier, Brenda noticed a visible improvement in the amount of smoke coming from the tail pipes and less of a diesel smell. Drivers also reported better power and easier starts when using B20.

Additionally, they implemented a B20 program without incurring any startup costs-no tank cleaning, no vehicle modifications, no additional purchases at all. The cost of the fuel averaged twenty cents higher per gallon of B20, a penny a point, and that was before tax credits were in place to receive that same penny a point back under the federal excise tax credit mentioned earlier. Koch Transportation is now running B20 and with the federal excise tax credit, the cost of the fuel is the same as #2 petrodiesel.

In an interview May 2, 2007, Dick Koch said he has purchased two additional Mercedes 210 school buses and they, too, are running on B20. He has had no additional problems and continues to use B20.

The Future of ULSD and Biodiesel

The new clean diesel technology and Ultra Low Sulfur Diesel (ULSD) are signs of progress in our transportation industry. Model year 2007 diesel engines will be equipped with advanced emissions control devices that require the use of ULSD. They drastically cut



Koch fuel deliveries during the project included:

9/13/05: 7,200 gal. B20

10/20/05: 7,040 gal. B20 containing 4 gal of Arctic Flow

12/01/05: 7,199 gal. B20 containing 4 gal of Arctic Flow

12/21/05: 1,000 gal of clear kerosene to further improve cold flow

1/27/06: 7,200 gal. B20 containing 4 gal. Arctic Flow



The information gathered so far on biodiesel and ULSD indicates that use of B20 with PM traps actually allows them to be more effective. The National Biodiesel Board continues to work with OEMs on new ULSD technology and with OEMs and the American Society of Testing and Materials (ASTM) on final B20 blended fuel specifications.

pollution, which is better for the environment, better for the health of drivers and the public in general.

Fleet managers are now tackling the challenge of implementing ULSD and the new diesel technology, and have many questions. These include questions about using biodiesel with ULSD and the new technology.

Lubricity of ULSD, reliability of the new Particulate Matter (PM) traps, and impact on fuel economy have all been raised as issues and concerns. You can expect some bumps in the road these first few years as the U.S. implements ULSD and the after-treatment technologies that will make S15 diesel fuels the clean, high-efficiency transportation fuels of choice. Biodiesel is expected to be an important part of all future diesel fuel, and the use of biodiesel blends may actually help eliminate many of the lubricity and maintenance needs with ULSD and the new particulate traps.

The National Biodiesel Board (NBB) continues to work with the OEMs to secure the final B20 blended fuel specifications and other data that some say they need before fully supporting B20. This includes specific work on B20's impact on ULSD and on the new PM traps being implemented this year, as well as NOx technology to be implemented in 2010. The information gathered so far indicates that use of B20 in PM traps actually allows them to be more effective in reducing particulate matter than S15 petrodiesel. In addition, B20 lowers the regeneration temperature needed for soot burn-off, which may reduce the amount of unburned fuel needed for PM trap regeneration. This could result in a possible fuel economy increase with B20 compared to petrodiesel. More research is needed with B20 in these new technologies, but data so far are encouraging.

The NBB will continue to work with all OEMs on ensuring existing and future diesel technology compatibility. That testing is funded partly by America's soybean farmers, through a program called the soybean check off. Not only do farmers put food on our table, they put fuel in our tank. And they do this in a way that sustains both the need for food and fuel, which are totally compatible.



Appendix A-Information You Will Want to Read

Sample Press Release

Mayor's Office - Press Release



4/22/2004

FOR IMMEDIATE RELEASE:

Thursday, April 22, 2004

CONTACT:

Lindy Eichenbaum Lent

720 865-9016

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Nancy Kuhn

720 865-3911

Denver to Begin Using Biodiesel Fuels

Mayor John Hickenlooper announced at the city's Earth Fair on Thursday that the City and County of Denver is going to begin using B20 biodiesel fuel in a pilot program that will begin next week and run through December 2004. The purpose of the pilot program is to evaluate biodiesel and its effects on vehicle performance, fuel economy and emissions.

"This is a giant step forward in terms of the city's commitment to conservation, energy efficiency and environmental health," said Mayor Hickenlooper, whose official car is a gas-electric hybrid vehicle from the city's fleet. "I commend our Public Works and Fleet Management Departments for their innovation and look forward to the results of this pilot project. Biodiesel represents a tremendous opportunity – both environmentally and economically – for the region."

The city's pilot program will involve approximately 60 vehicles at the Wastewater Management Building. For the next eight months, these vehicles will fuel with B20 biodiesel. Information will be gathered on vehicle fuel mileage, maintenance, repairs, performance and emissions.

Studies have shown that biodiesel can substantially benefit human health and the environment. Biodiesel has been shown to emit lower levels of carbon monoxide, unburned hydrocarbons, and particulate matter than regular petroleum diesel. Tests also show that biodiesel produces lower emissions of PAH (Polycyclic Aromatic Hydrocarbons) and nitrated PAH compounds, which have been identified as potential cancer-causing compounds.

Biodiesel is a clean-burning, alternative fuel produced from domestic renewable resources, such as soybeans and mustard seed. Biodiesel can be used in its pure form or blended at any level with petroleum diesel. The City and County of Denver will use B20 biodiesel, which is a blend of

20% biodiesel and 80% petroleum diesel.

An estimated 50,000 gallons of B20 biodiesel fuel will be utilized in the pilot program. The total cost of the pilot program is estimated at \$15,000. [More details on the parameters and benefits of the biodiesel pilot project are attached.]

Also at Thursday's Earth Fair, the U.S. Environmental Protection Agency awarded the Webb Municipal Office Building with a prestigious ENERGY STAR designation for its environmentally conscious design and technologies.

City and County of Denver Biodiesel Pilot Program Project Parameters

Approximately 60 diesel engine vehicles are identified for use in the pilot program, which will run from April through December of 2004. The vehicles will fuel with biodiesel instead of regular petroleum diesel. Fueling will occur at the Wastewater Management facility.

The following data will be gathered and analyzed during the pilot program:

Fleet Maintenance will test the fuel's effects on particulate emissions by performing opacity tests on a sampling of vehicles before and after biodiesel use.

Fleet Maintenance will gather fuel mileage data on all vehicles and determine if mileage increases or decreases in new and older vehicles.

Fleet Maintenance will survey vehicle operators on vehicle performance.

Fleet Maintenance will monitor vehicle repair and maintenance histories and perform specialized vehicle inspections and oil analysis.

Fleet will collaborate with Gray Oil and Blue Sun Biodiesel to obtain any data they are currently gathering on fuel additives that reduce NOx emissions.

What the City Hopes to Gain

Information: City and County of Denver will increase its working knowledge of biodiesel and the effects it has on vehicle mileage and performance.

Valuable data: Denver hopes to identify potential costs savings associated with biodiesel that could help offset its higher price.

A cleaner environment: Based on emissions reductions substantiated by the National Renewable Energy Laboratory (NREL) and the Environmental Protection Agency (EPA), the City of Denver expects that using B-20 biodiesel in a 50,000 gallon pilot program will result in the following smog, ozone, and greenhouse gas emissions savings:

- A. CO reduced - 711 lbs
- B. HC reduced - 84 lbs
- C. PM reduced - 64 lbs
- D. SO2 reduced - 44 lbs

- E. CO2 reduced -161,210 lbs

F. NOx 0 to 3% decrease is possible with combustion fuel additive

The Benefits of Biodiesel

Fleet Maintenance recommends the use of biodiesel based on its environmental benefits and ease of implementation.

Biodiesel is a domestically-produced, renewable fuel, typically made from seed oil (soybean, rapeseed, brown mustard seed, etc.) or used fryer fat.

Biodiesel could be utilized in all of the City's existing diesel vehicles with no modifications required to the vehicles, to the City's maintenance facilities, or to the City's fueling infrastructure.

Biodiesel is readily available in Denver.

Biodiesel reduces serious air pollutants such as soot, particulates, carbon monoxide, hydrocarbons and air toxics.

Use of biodiesel could end up providing a boost to the local agricultural community/economy and create new jobs.

Use of biodiesel would reduce City's dependency on foreign oil and shift spending to domestically produced energy sources.

Biodiesel is simple to phase in and out of use.

Four local municipalities (Lakewood, Aurora, Arvada, and Littleton Public Schools) are already using biodiesel with no problems reported.

Biodiesel mixes with popular diesel fuels.

Cetane rating is approximately 50, which equates to better/faster combustion, less knocking and improved acceleration.

Reduces Carbon Monoxide (CO) emissions by 12%, reduces Carbon Dioxides (CO₂) by 16%, reduces Hydrocarbons (HC) emissions by 11%, and particulates (PM-10) by 18% compared to conventional diesel fuel.

Biodiesel's higher lubricity can reduce engine/injector/pump wear.

Studies show biodiesel performs similarly to petroleum diesel while benefiting the environment and human health compared to petroleum diesel.

Use of biodiesel won't void parts and materials workmanship warranties of any major U.S. engine manufacturer, according to the National Biodiesel Board.

###



Communication Resources: Sample Biodiesel Hand out for Parents

Note: You should customize this parent handout by adding in the name of your school district, your biodiesel start date and number of buses, and the dates of your informational session and biodiesel kickoff celebration.

Making Our Buses Safer and Cleaner with Biodiesel Fuel

Starting on DATE the Your School District will be implementing a biodiesel blend in XX of our school buses. We have decided to use biodiesel because it is cleaner for the environment, and it supports America's energy independence and our state's farming economy.

We will be using B20, a blend of 20 percent biodiesel and 80 percent regular petroleum diesel. Biodiesel is a cleaner burning fuel made from renewable and domestic resources such as soybeans and other vegetable oils.

We know you will be interested in learning more about this important step we are taking to increase the safety of our children, our environment, and our national economy. Please join us at an **information session on Day Time Place**. And please join us to celebrate the launch of our first biodiesel buses at a **Biodiesel Celebration on Day Time Place**.

Here are the answers to some **frequently asked questions** about biodiesel.

Is biodiesel safe?

Yes! Biodiesel reduce harmful emissions, is safe to handle and store, and works with our current proven school bus technology.

Less Harmful Emissions

B20 has over 15-20% less health harmful emissions than regular diesel. Recent studies have shown that children are exposed to high levels of diesel exhaust while riding on the bus. By using B20, we will be significantly reducing the particulate matter, carbon monoxide, and hydrocarbon emissions of our buses—and making our children safer.

Lower flash point—less risk of fire

Biodiesel has a higher flash point than regular diesel. That means it is less likely to burn, and therefore, safer to transport, store, and handle.

Proven technology—no greater risk of breakdowns or malfunctions

Biodiesel will be used in our existing school bus fleet and refueling system. Unlike many alternative fuels, biodiesel will not require any new or unproven technology.

How is biodiesel better for the Environment?

Biodiesel reduces emissions, is energy efficient, and is biodegradable and non-toxic.

Significant Reductions in Smog and Green House Gas Emissions

B20 produces 20% less green house gas—a contributor to global climate change--and 15% less smog forming emissions. So, it is not only better for the health of our children, it's also better for our environment.

High Energy Balance

Biodiesel has the highest energy balance, or return in energy on investment in energy to produce it, of any alternative fuel. For every unit of petroleum used to produce biodiesel, 3.2 units of energy are created.

Biodegradable and Non-Toxic

Unlike traditional diesel, biodiesel is less toxic than table salt and biodegrades faster than sugar. In other words, it is much safer for the environment than petroleum diesel.

How does biodiesel support energy independence and fuel security?

Biodiesel is made from domestic, renewable resources and is safer from fuel supply disruptions.

100% Made in the USA

Biodiesel is made from USA grown and produced vegetable oils, such as soybeans. Every gallon of biodiesel we use is one less gallon of oil we need to import.

Distributed Production Means More Secure Fuel Supply

In the wake of Hurricane Katrina, it is clear that our petroleum fuel supply is vulnerable to disruptions and shortages because most of it is processed in one geographic location. Biodiesel is made in over 100 facilities across the United States from vegetable resources that are also distributed across the nation.

How does biodiesel support rural and farming economies?

Biodiesel is produced from vegetable oil made from American crops like soybeans.

Biodiesel provides an important new market for our nation's farm products. By using biodiesel, our school district is supporting the rural and farming economy of our state. (If possible add: Our biodiesel comes from soybeans grown right here in Your State and it processed at an in-state facility. This means jobs and security for our states economy.)

Is biodiesel cost effective?

Biodiesel is the cheapest and easiest alternative fuel to implement.

No new vehicles or fueling equipment

Biodiesel is the cheapest and easiest alternative fuel to implement. We are using our existing buses and existing fueling equipment. Our change to biodiesel has had virtually no start-up costs.

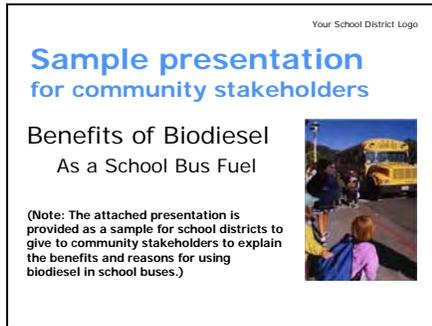
Biodiesel costs the same or less than regular diesel

The recently passed Federal Energy Bill extended a biodiesel tax credit that makes the price of biodiesel equal to or even less than traditional diesel. (If possible: add in any additional funding sources and grants your school district received).



Sample PowerPoint Presentation for Community Stakeholders

Slide 1



Tips on giving this presentation:

1. This presentation should be customized for your school district before giving it to parents

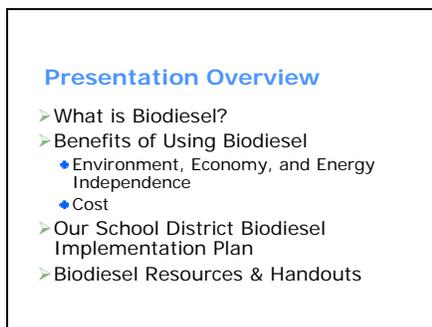
2. A sample script is provided in the notes field for all informational slides. It's a good idea to print out a copy using the "notes mode" in your printer dialogue box to use as you give the presentation.

3. It is also a good idea to read all the bullets on the slide as a part of the script you use for giving the presentation.

Sample script:

The goal of this presentation is to introduce you to biodiesel, answer some of the frequently asked questions about biodiesel, and explain the benefits of using biodiesel for our school district.

Slide 2



Sample script:

The outline for this presentation will cover the following information:

What is biodiesel, or some basics on biodiesel and how it works

Benefits of biodiesel including environmental benefits, benefits to the local and national economies, and benefits for energy independence and fuel supply security. And the low costs associated with switching to

biodiesel, which is the cheapest alternative fuel to implement.

Next, we'll discuss our plan implementing biodiesel in our district.

Finally, we'll cover some resources for getting more information about biodiesel.

Slide 3

Your School District Logo

Biodiesel is...

- A clean burning alternative fuel, produced from domestic, renewable resources such as soybean oil
- Not made from petroleum, but can be blended at any level with petroleum diesel to create a biodiesel blend
- Can be used in existing compression-ignition (diesel) engines with little or no modifications
- Simple to use, cost competitive, biodegradable, nontoxic, free of sulfur and aromatics

Sample script:

We will get into more detail on all of these issues throughout the presentation, but the basics you should know on biodiesel include (read slide)

More info on what biodiesel is made from:

Biodiesel can be made from any fat. In the US it is primarily made from soybean oil. In Europe it is primarily made from rapeseed oil. It can be made from waste vegetable oil, such as used restaurant deep fryer oil. However, biodiesel is not the same thing as using unprocessed vegetable oil, often referred to as straight vegetable oil (SVO). SVO can not be used in regular diesel engines without significant modifications to the vehicle.

Slide 4

Biodiesel Defined

- **Biodiesel, n.** -- a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100, and meeting the requirements of ASTM D 6751.
- **Biodiesel blend, n.** -- a blend of biodiesel fuel meeting ASTM D 6751 with petroleum-based diesel fuel designated BXX, where XX is the volume percent of biodiesel (e.g. B20)

Sample script:

There are two important definitions we need to cover. First, pure biodiesel, which contains no petroleum and is made from vegetable oils and/or fats. This is called B100. B100 meets the same requirements for fuel quality and safety that regular diesel must meet.

Second, biodiesel blends, which are the most common way to use biodiesel and the way we will be using it. Biodiesel blends are mixtures of biodiesel and regular petroleum diesel. We will be using B20, which is a blend of 20% biodiesel and 80% petroleum diesel.

Slide 5

Your School District Logo

Biodiesel Credentials

- **Guaranteed quality**
 - B100 has a full ASTM standard (D 6751) in place
 - ASTM standard setting is currently in process for B20
 - The biodiesel industry has implemented a voluntary quality control program – BQ000 – for biodiesel producers and marketers
- **Official alternative fuel**
 - Department of Energy (DOE) & US Department of Transportation (DOT) designated alternative fuel
 - Least cost option for gaining Energy Policy Act (EPACT) compliance credits
- **Safe**
 - Only alternative fuel to have fully completed the health effects testing requirements of the 1990 Clean Air Act Amendments
 - Registered as a fuel & fuel additive with the Environmental Protection Agency (EPA)

Sample script:

Biodiesel is a high quality fuel. It meets ASTM standards. And, biodiesel has a quality control program for production and handling. It is the lowest cost option of the alternative fuels that are recognized by the Depts. of Energy and Transportation. And, biodiesel is safe. It meets all of the EPA Clean Air Act requirements.

Slide 6

Your School District Logo

Benefits of Using Biodiesel

➤ **Better For The Environment**

- ◆ Made from renewable, domestic resources
- ◆ 78% reduction in lifecycle CO2 emission, a contributor to global climate change
- ◆ Reduces emissions of unburned hydrocarbons, carbon monoxide and particulate matter, which form smog and are linked to human health problems
- ◆ Biodegradable, nontoxic, free of sulfur and aromatics
- ◆ Highest energy balance of any fuel; every unit of fossil fuel it takes to make biodiesel results in 3.2 units of energy gain

By using biodiesel, we will be making a big step towards minimizing our impact on the environment. Biodiesel has many environmental benefits over petroleum diesel including (read slide)

Slide 7

Your School District Logo

Benefits of Using Biodiesel

➤ **Promotes Energy Independence and Fuel Supply Security**

- ◆ Made from domestically produced resources such as soybeans and waste oil
- ◆ Every gallon of biodiesel we use is one less gallon of imported petroleum we need
- ◆ Produced at locations throughout the USA; not subject to localized production disturbances

As fuel prices rise and in the wake of fuel supply disruptions caused by Hurricane Katrina, it is becoming more and more clear that we need to find alternative fuels that support America's energy independence and improve the security of our fuel supply. Biodiesel does both of these things. (Read bullets)

Slide 8

Your School District Logo

Benefits of Using Biodiesel

➤ **Supports Farm and Rural Economies**

- ◆ Provides an important new market for America's farmers and jobs in rural communities
- ◆ For every 1.4 gallons of biodiesel we use, we will be providing a market for 1 bushel of soybeans

Sample Script:

(If your school district is in a rural community or in a state with high grain production, this is a particularly important slide to highlight).

Biodiesel also helps support farmers and rural economies. (read bullets)

Slide 9

Your School District Logo

Benefits of Using Biodiesel

- **Cheapest and Easiest Alternative Fuel to Implement**
 - ◆ Runs in existing buses, no new equipment; minimal changes for maintenance and drivers
 - ◆ Federal tax credit makes cost of biodiesel the same or less than regular diesel
 - ◆ Widely available for sale from reputable dealers and distributors
 - ◆ It is the lowest cost EPACT alternative fuel to implement and use

Biodiesel is the cheapest and easiest alternative fuel to implement. (read bullets) In addition, we can easily switch back and forth between biodiesel and regular diesel if we need to because we will not be changing our buses or our fueling system.

Slide 10

Your School District Logo

Benefits of Using Biodiesel

- **Biodiesel Can Cost Less Than Regular Diesel Fuel**
 - ◆ The combination of
 - Rising petroleum fuel prices
 - National petroleum fuel supply disruptions (i.e. Hurricane Katrina)
 - Low cost of biodiesel raw materials
 - ◆ Can make biodiesel even less expensive than petroleum diesel in some instances

Read slide

Slide 11

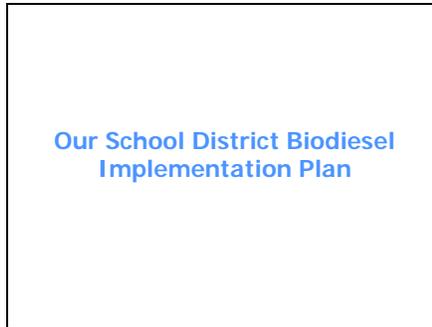
Your School District Logo

Who Else Is Using Biodiesel?

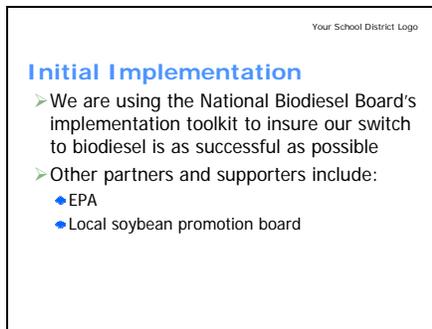
- Over 100 school districts are currently running over 1000 buses on biodiesel
- Other school districts in our area include:
 - ◆ See <http://www.eesi.org/programs/cleanbus/cleanbuslisting.htm> and www.biodiesel.org for lists of districts

Biodiesel is not an experimental fuel. It is safe, tested, and widely used. (Read slide—go to <http://www.eesi.org/programs/cleanbus/cleanbuslisting.htm> to find school districts in your area that are using biodiesel. Also check the National Biodiesel Board website at <http://www.biodiesel.org/markets/sc h/>)

Slide 12

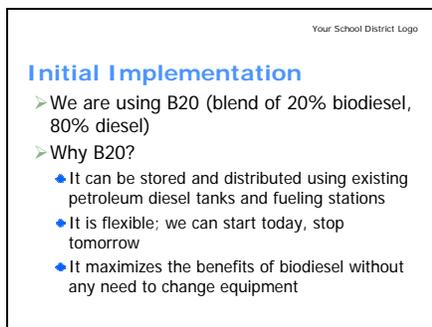


Slide 13



In order to insure we implement our biodiesel program as efficiently and effectively as possible, we are acting with the support of some experts on biodiesel: The National Biodiesel Board (Note: you should customize this slide to include all the partners that assisted you with this implementation such as any trade associations that helped supply this toolkit to you, and other organizations that assisted you in your implementation).

Slide 14



We will be using B20. We chose to use B20 because it provides the greatest benefits of using biodiesel with the minimum requirement to change equipment or maintenance procedures. (read slide)

Slide 15

Your School District Logo

Initial Implementation

- We are will begin by running X number of buses on biodiesel starting DATE
 - ◆ If all goes well, we will transition the entire bus fleet in the next year
- We will be getting our fuel pre-blended from XX distributor

Note: you should customize this slide to represent how you will be implementing biodiesel.

Slide 16

Your School District Logo

Initial Implementation

- Changes for maintenance staff and drivers are minimal, but we are training them all on using biodiesel
- All teachers have biodiesel curriculum materials to incorporate biodiesel learning opportunities into student coursework

We will be using biodiesel as a learning opportunity for our employees and students. Drivers and maintenance folks will be trained on what biodiesel is, why we are using it, and the proper storage and maintenance procedures. And, all teachers will have access to curriculum materials, provided by the National Biodiesel Board to use our new school bus fuel as an opportunity to teach students about environmental and scientific topics.

Slide 17

Your School District Logo

Educational Resources from NBB



The National Biodiesel Board has lots of information about biodiesel available if you would like more information. Also, if you did not get a copy of the handout we sent home last week, we have those available here tonight.

Slide 18

NBB Technical Library

National Biodiesel Board
www.biodiesel.org
1-800-841-5849



- Educational Videos Available
- Informational Resources
- Technical Resources
- On-line Database & Spec Sheets

If you want more information, here is the contact information for the National Biodiesel Board and the kinds of information they have available.



Cummins Announces Approval of B20 Biodiesel Blends

For Immediate Release
March 21, 2007

LOUISVILLE, Ky. (March 20, 2007) - Cummins Inc. (NYSE: CMI) today announced the approval of biodiesel B20 blends for use in its 2002 and later emissions-compliant ISX, ISM, ISL, ISC and ISB engines. This includes the recently released 2007 products.

Cummins is able to upgrade its previous position on the use of biodiesel fuel, which limited the use to B5 blends only, up to B20 for three key reasons. First, the American Society of Testing Materials specification ASTM D6751 now includes an important stability specification for B100 biodiesel. Second, the availability of quality fuels from BQ-9000 Certified Marketers and Accredited Producers is growing rapidly; and third, Cummins has completed the necessary testing and evaluations to ensure that customers can reliably operate their equipment with confidence using B20 fuel.

'We have completed exhaustive analysis and test evaluations which enable Cummins to provide the necessary guidance and information to our customers for the proper and successful use of this fuel in our engine,' said Edward Lyford-Pike, Chief Engineer - Advanced Alternative Fuel Programs. 'This will enable our customers to have a choice that includes renewable fuel.'

The popularity and use of biodiesel fuel continues to climb. Recent studies predict that, by 2008, 1.2 billion gallons of B100 biodiesel will be produced in the United States. Cummins will continue its efforts to ensure that future products will be compatible with biodiesel fuels, and will continue to participate in industry efforts aimed at the development of consistent quality throughout the biodiesel industry.

Further information about the use of biodiesel for both on-highway and off-highway Cummins products can be found on the Web at everytime.cummins.com.

Cummins Inc., a global power leader, is a corporation of complementary business units that design, manufacture, distribute and service engines and related technologies, including fuel systems, controls, air handling, filtration, emission solutions and electrical power generation systems. Headquartered in Columbus, Indiana (USA), Cummins serves customers in more than 160 countries through its network of 550 company-owned and independent distributor facilities and more than 5,000 dealer locations. Cummins reported net income of \$715 million on sales of \$11.4 billion in 2006. Press releases can be found on the Web at cummins.com or everytime.cummins.com.

Expiry Date :: February 25, 2106, Publish Date :: March 21, 2007, Author :: cb154, Approver :: cb154

Jeep® to Fuel Grand Cherokee CRD with B5 Biodiesel Blend at the Factory

Progress Continues on a National B20 Specification with Latest ASTM Vote

Jefferson City, MO. – Chrysler Group announced today that its first diesel-powered, full-size sport utility vehicle (SUV) offered in the United States will be shipped from the factory with B5, a blend containing 5 percent biodiesel. The Jeep® Grand Cherokee CRD's B5 factory fueling builds on a similar program implemented with the company's Jeep Liberty CRD.

"We are pleased that Chrysler will continue to lead the industry in using B5 for the Jeep Grand Cherokee CRD factory fill," said Joe Jobe, CEO of the National Biodiesel Board (NBB).

The 2007 Jeep Grand Cherokee features a 3.0 liter common rail turbo diesel (CRD) engine built by Mercedes-Benz. Clean diesel technology improves fuel economy by an average of 30 percent and reduces carbon dioxide (CO₂) emissions by up to 20 percent. The Grand Cherokee CRD will be manufactured at the Jefferson North Assembly Plant in Detroit and will arrive at Jeep dealerships in the first quarter of 2007. Peter Cremer North America of Cincinnati, OH – certified through the industry's BQ-9000 quality control program – will supply the biodiesel fuel.

"Biodiesel represents a huge opportunity to address some of our nation's toughest energy, environmental and economic challenges," said Deborah Morrisett, DaimlerChrysler's VP of Regulatory Affairs. "We know this is the right thing to do. The goal now is to develop a national B20 standard that can be universally applied to all diesel vehicles, both on road and in production, to confidently support higher blends of biodiesel such as B20."

The factory fill is another event demonstrating that engine and auto manufacturers are embracing biodiesel. All major OEMs support B5 and lower blends, provided they are made with biodiesel meeting ASTM D 6751, the existing ASTM International standard for pure biodiesel (B100), although the use of blends higher than B5 will not necessarily void existing warranties.

NBB's goal is to have strong position statements affirming acceptance of the use of B20. Engine and auto manufacturers maintain that an approved ASTM specification for blended B20 is critical to achieve universal acceptance. Progress toward a national B20 specification continued to move forward within the ASTM technical committee responsible for specifications that ensure the quality of the nation's fuel supply. The committee recently approved nine ballot items for improvements and changes to the existing B100 specification. The changes were necessary to move forward on approval of a blended fuel specification for B20.

The changes, which included a first-ever agreement on a stability parameter, were approved an ASTM petroleum products and lubricants subcommittee meeting on June 29 in Toronto, Ontario. Previously, failure to pass a stability parameter was the biggest hurdle to the passage of blended (B20) fuel specifications. The biodiesel industry received more good news on June 29, when the Senate Appropriations Committee approved its version of the Energy and Water Appropriations legislation that includes \$1.5 million for critical testing of biodiesel in future advanced diesel engines.

If the Energy and Water Appropriations bill passes Congress with the funding recommendations intact, it will increase the likelihood of major U.S. automakers approving the use of biodiesel blends in 2007 engines and beyond.

The Engine Manufacturers Association's (EMA) recent approval of test specifications for biodiesel blends up to 20 percent by volume helps clear the way for engine testing and evaluation. Roger Gault, Technical Director for the EMA, said his members were pleased with the changes made to the ASTM specification, although he stressed the need for continued progress on an ASTM specification for B20. "We need an approved ASTM specification for blends up to B20, and we hope to work with the National Biodiesel Board to achieve this result," said Gault. "People are using biodiesel blends in the market, and they are not waiting for ASTM to approve a B20 specification."

A subcommittee vote on an ASTM B20 specification is likely to happen in December. Final approval for the specification could come at the full petroleum and lubricants committee meeting in June 2007. At a Biodiesel Summit held in Detroit in May, engine and vehicle manufacturer representatives said they share the goal of approving an international ASTM B20 specification.

According to Rod Lawrence, Quality Control Manager for Magellan Midstream Partners, the blended fuel specifications are a very small piece to the biodiesel quality puzzle. "By far the most important piece is meeting the biodiesel specification D 6751 prior to blending, and the use of BQ-9000 certified companies helps ensure that only good biodiesel is getting into the market," said Lawrence.

Biodiesel is a renewable diesel fuel that is made from domestic resources such as soybean oil or other domestic fats and vegetable oils. Biodiesel significantly cuts harmful environmental emissions, promotes greater energy independence and boosts our economy. Today, more than 600 major fleets use biodiesel commercially, and more than 800 retail filling stations make it available to the public.

###

Straight Vegetable Oil as a Diesel Fuel?

Concerns about U.S. reliance on imported petroleum and fluctuating fuel prices have led to growing interest in using biodiesel, an alternative fuel made from vegetable oils. However, there is also interest in the direct use of vegetable oils as straight or raw vegetable oil (SVO or RVO), or of waste oils from cooking and other processes. These options are appealing because SVO and RVO can be obtained from U.S. agricultural or industrial sources without intermediate processing. However, SVO is not the same as biodiesel, and is generally not considered to be an acceptable vehicle fuel for large-scale or long-term use.

While straight vegetable oil or mixtures of SVO and diesel fuel have been used by some over the years, research has shown that SVO has technical issues that pose barriers to widespread acceptance.

Performance of SVO

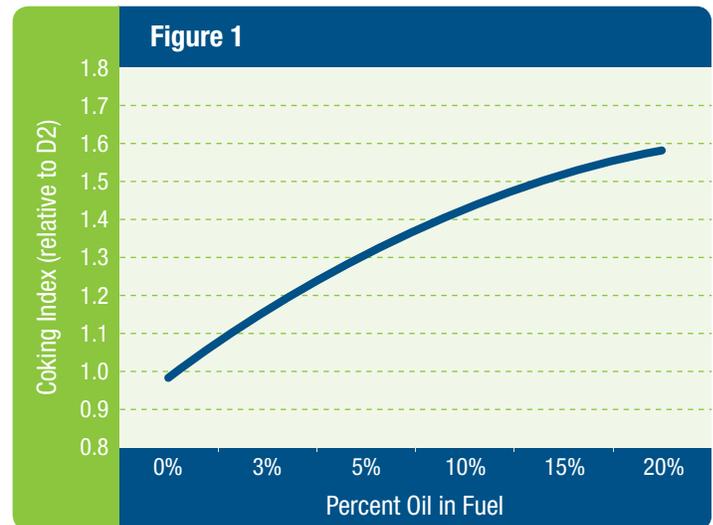
The published engineering literature strongly indicates that the use of SVO will lead to reduced engine life. This reduced engine life is caused by the build up of carbon deposits inside the engine, as well as negative impacts of SVO on the engine lubricant. Both carbon deposits and excessive buildup of SVO in the lubricant are caused by the very high boiling point and viscosity of SVO relative to the required boiling range for diesel fuel. The carbon buildup doesn't necessarily happen quickly, but instead over a longer period. These conclusions are consistent across a significant body of technical information in multiple articles and reports.

A recent technical paper¹ reviews published data on the use of SVO in engines. Quoting from this paper:

Compared to No. 2 diesel fuel, all of the vegetable oils are much more viscous, are much more reactive to oxygen, and have higher cloud point and pour point temperatures.

Diesel engines with vegetable oils offer acceptable engine performance and emissions for short-term operation. Long-term operation results in operational and durability problems.

Some investigators have explored modifying the vehicle to preheat the SVO prior to injection into the engine. Others



have examined blends of vegetable oil with conventional diesel. These techniques may mitigate the problems to some degree, but do not eliminate them entirely. Studies show that carbon build up continues over time, resulting in higher engine maintenance costs and/or shorter engine life. Figure 1 shows how the tendency to form carbon deposits increases with blending of a vegetable oil into a diesel fuel.²

Another issue that is particularly critical for use of neat (100%) SVO is fuel viscosity. As Figure 2 (next page) indicates, the viscosity of SVO is much higher than that of diesel fuel at normal operating temperatures.³ This can cause premature wear of fuel pumps and injectors, and also can dramatically alter the structure of the fuel spray coming out of the injectors to increase droplet size, decrease spray angle, and increase spray penetration. All of these changes

¹ Babu, A.K.; Devaradjane, G. "Vegetable Oils And Their Derivatives As Fuels For CI Engines: An Overview." SAE Technical Paper No. 2003-01-0767.

² Jones, Samuel T.; Peterson, Charles L.; Thompson, Joseph C. Biological and Agricultural Engineering Department, University of Idaho, Moscow, Idaho, USA. "Used Vegetable Oil Fuel Blend Comparisons Using Injector Coking in a DI Diesel Engine." Presented at 2001 ASAE Annual International Meeting, Sacramento, California, USA, July 30–August 1, 2001. ASAE Paper No. 01-6051.

³ Bruwer, J.J., et al. "Use of Sunflower Seed Oil in Diesel Engined Tractors." Proceedings of the IV International Symposium on Alcohol Fuels Technology; October 5, 1980, Guarujá, SP, Brazil.



to the fuel spray will tend to increase wetting of engine internal surfaces with the fuel leading to increased tendency to form carbon deposits and dilute the lubricant.

The long-term effect of using SVO in modern diesel engines that are equipped with catalytic converters or filter traps is also a matter of concern. In general, these systems were not originally designed with SVO in mind, and can be seriously damaged or poisoned by out-of-spec or contaminated fuel.

Biodiesel: Fuel made from SVO

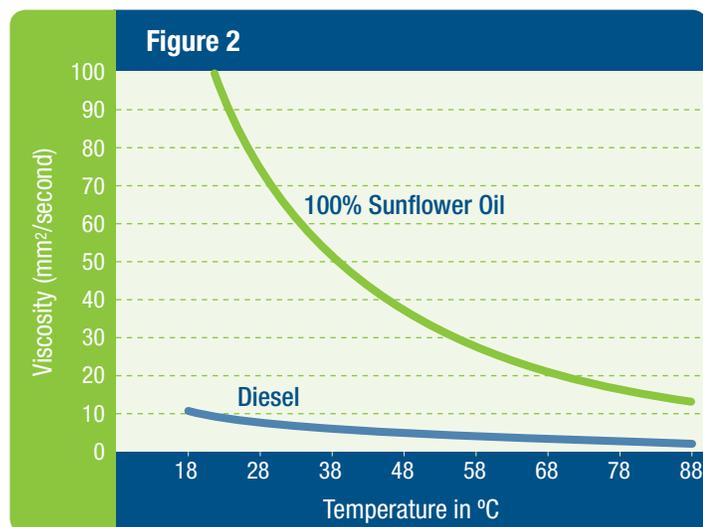
Biodiesel is an alternative fuel that can be made from SVO in a chemical process called transesterification that involves reaction with methanol using caustic soda (sodium hydroxide) as catalyst. Biodiesel has substantially different properties than SVO, and results in better engine performance. In particular, biodiesel has a lower boiling point and viscosity than does SVO. Because of its improved qualities, vehicle and engine manufacturers are more willing to support use of biodiesel blends in their products, which will ease some of the barriers to introducing a new fuel.

The quality of biodiesel is governed by specifications developed by the American Society for Testing and

Materials (ASTM). The specifications are for pure biodiesel (B100), which can be used in blends up to a maximum of 20% by volume biodiesel. ASTM specification D6751-03a is intended to ensure the quality of biodiesel used in the United States, and any biodiesel used for blending should meet this specification. Biodiesel that meets ASTM D6751-03a is also legally registered as a fuel and fuel additive with the U.S. Environmental Protection Agency. For a complete list of ASTM biodiesel requirements, see the 2004 Biodiesel Handling and Use Guidelines at www.nrel.gov/docs/fy05osti/36182.pdf. In addition, the National Biodiesel Board is instituting a quality assurance program for biodiesel producers and marketers. To learn more about the BQ-9000 program, visit the National Biodiesel Board at www.biodiesel.org.

Where can I get more information?

- The Clean Cities activity has produced a fact sheet on biodiesel blends. It is available at www.eere.energy.gov/cleancities/blends/pdfs/37136.pdf.
- The U.S. DOE's Alternative Fuels Data Center at www.eere.energy.gov/afdc is a vast collection of information on alternative fuels and alternative fuel vehicles.
- The U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy website at www.eere.energy.gov/biomass contains information on biodiesel and ethanol production and policy.
- The National Biodiesel Board is the national trade association representing the biodiesel industry. Its website, www.biodiesel.org, serves as a clearinghouse of biodiesel related information.
- The National Renewable Energy Laboratory's Non-petroleum Based Fuels website, located at www.nrel.gov/vehiclesandfuels/npdf, provides links to a variety of biofuels documents.
- The Environmental Protection Agency's Biodiesel Emissions Analysis Program at www.epa.gov/otaq/models/biodsl.htm contains a biodiesel emissions database.



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Use of Raw Vegetable Oil or Animal Fats in Diesel Engines

Recently, raw vegetable oils and animal fats have increasingly been substituted for “processed” biodiesel meeting established specifications.¹ The U.S. Department of Energy has stated that, “Raw or refined vegetable oil, or recycled greases that have not been processed into biodiesel, are not biodiesel and should be avoided.”² The use of raw, unprocessed vegetable oils or animal fats in diesel engines – regardless of blend level – can have significant adverse effects and should not be used as fuel in diesel engines.

Raw or refined vegetable oil, or recycled greases have significantly different and widely varying properties that are not acceptable for use in modern diesel engines. For example, the higher viscosity and chemical composition of unprocessed oils and fats have been shown to cause problems in a number of areas: (i) piston ring sticking; (ii) injector and combustion chamber deposits; (iii) fuel system deposits; (iv) reduced power; (v) reduced fuel economy and (vi) increased exhaust emissions. Use of unprocessed oils or fats as neat fuels or blending stock will lead to excessive fuel condensation and corresponding dilution of the engine’s lubricating oil that may result in sludge formation. Any or all of these conditions may result in reduced engine life, increased maintenance costs, or catastrophic engine failure. More over, the problems associated with the use of raw vegetable oil or animal fat may not become evident until a significant amount of damage has occurred over an extended period.

The significantly higher viscosity of raw vegetable oils (27 - 54 mm²/s) compared to petroleum diesel fuel (2.6 mm²/s) alters fuel injector spray patterns and spray duration, adds stress on fuel injection systems, and results in incomplete combustion and high dilution of the engine lubricating oil. In turn, fuel injector spray pattern, duration, etc. affect the combustion process and the resulting engine performance and emissions levels. This incomplete combustion increases fuel dilution of engine lubricating oil and leads to sludge development. In addition, the polymerization of glycerides in raw vegetable oils and animal fats during the combustion process results in undesirable deposits on pistons, piston rings, fuel injectors, valves, etc. It is important to note that such effects may not be immediate, but occur over a period of weeks or months depending on engine use and fuel system design.

Finally, raw or refined vegetable oils and animal fats experience significant degradation due to oxidation compared with petroleum diesel fuels. Such oxidation leads to sludge formation in the storage or vehicle fuel tank, which, in turn, can plug fuel filters and prevent fuel delivery to the engine’s combustion chamber. This oxidation reaction is accelerated by exposure to heat which can be due to solar effects or fuel recirculation in the engine’s fuel delivery system.

¹ Biodiesel, or B100, is a term defined by the United States Department of Energy (DOE) as, “A biodegradable transportation fuel for use in diesel engines that is produced through the transesterification of organically-derived oils or fats.” ASTM International, a recognized standard-setting organization, has adopted “Standard Specification for Biodiesel Fuel (B100) Blend Stock for Distillate Fuels” (D6751), which defines the minimum performance parameters required for biodiesel to be considered acceptable as a blending stock for distillate fuels. Similarly, European Committee for Standards (CEN) has adopted “Automotive Fuels. Fatty Acid Methyl Esters (FAME). Requirements and Test Methods,” EN 14214 which defines minimum performance parameters for biodiesel to be utilized as either a neat fuel or as a blending stock for distillate fuels.

² U.S. Department of Energy; Biodiesel Handling and Use Guidelines, revised November 2004



SAMPLE MATERIAL SAFETY DATA SHEET



1. CHEMICAL PRODUCT

General Product Name: **Biodiesel (B100)**
Synonyms: Methyl Soyate, Rapeseed Methyl Ester (RME)
Product Description: Methyl esters from lipid sources
CAS Number: Methyl Soyate: 67784-80-9; RME: 73891-99-3;

2. COMPOSITION/INFORMATION ON INGREDIENTS

This product contains no hazardous materials.

3. HAZARDS IDENTIFICATION

Potential Health Effects:

INHALATION:

Negligible unless heated to produce vapors. Vapors or finely misted materials may irritate the mucous membranes and cause irritation, dizziness, and nausea. Remove to fresh air.

EYE CONTACT:

May cause irritation. Irrigate eye with water for at least 15 to 20 minutes. Seek medical attention if symptoms persist.

SKIN CONTACT:

Prolonged or repeated contact is not likely to cause significant skin irritation. Material is sometimes encountered at elevated temperatures. Thermal burns are possible.

INGESTION:

No hazards anticipated from ingestion incidental to industrial exposure.

4. FIRST AID MEASURES

EYES:

Irrigate eyes with a heavy stream of water for at least 15 to 20 minutes.

SKIN:

Wash exposed areas of the body with soap and water.

INHALATION:

Remove from area of exposure; seek medical attention if symptoms persist.

INGESTION:

Give one or two glasses of water to drink. If gastro-intestinal symptoms develop, consult medical personnel. (Never give anything by mouth to an unconscious person.)

5. FIRE FIGHTING MEASURES

Flash Point (Method Used): 130.0 C or 266.0 F min (ASTM 93)

Flammability Limits: None known

EXTINGUISHING MEDIA:

Dry chemical, foam, halon (may not be permissible in some countries), CO₂, water spray (fog). Water stream may splash the burning liquid and spread fire.

SPECIAL FIRE FIGHTING PROCEDURES:

Use water spray to cool drums exposed to fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Biodiesel soaked rags or spill absorbents (i.e. oil dry, polypropylene socks, sand, etc.) can cause spontaneous combustion if stored near combustibles and not handled properly. Store biodiesel soaked rags or spill absorbents in approved safety containers and dispose of properly. Oil soaked rags may be washed with soap and water and allowed to dry in

well ventilated area. Firefighters should use self-contained breathing apparatus to avoid exposure to smoke and vapor.

6. ACCIDENTAL RELEASE MEASURES SPILL CLEAN-UP PROCEDURES

Remove sources of ignition, contain spill to smallest area possible. Stop leak if possible. Pick up small spills with absorbent materials and dispose of properly to avoid spontaneous combustion (see unusual fire and explosion hazards above).

Recover large spills for salvage or disposal. Wash hard surfaces with safety solvent or detergent to remove remaining oil film. Greasy nature will result in a slippery surface.

7. HANDLING AND STORAGE

Store in closed containers between 50°F and 120°F.

Keep away from oxidizing agents, excessive heat, and ignition sources.

Store and use in well ventilated areas.

Do not store or use near heat, spark, or flame, store out of sun.

Do not puncture, drag, or slide this container.

Drum is not a pressure vessel; never use pressure to empty.

8. EXPOSURE CONTROL /PERSONAL PROTECTION

RESPIRATORY PROTECTION:

If vapors or mists are generated, wear a NIOSH approved organic vapor/mist respirator.

PROTECTIVE CLOTHING:

Safety glasses, goggles, or face shield recommended to protect eyes from mists or splashing. PVC coated gloves recommended to prevent skin contact.

OTHER PROTECTIVE MEASURES:

Employees must practice good personal hygiene, washing exposed areas of skin several times daily and laundering contaminated clothing before re-use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point, 760 mm Hg:>200°C

Volatiles, % by Volume: <2

Specific Gravity (H₂O=1): 0.88

Solubility in H₂O, % by Volume: insoluble

Vapor Pressure, mm Hg: <2

Evaporation Rate, Butyl Acetate=1: <1

Vapor Density, Air=1:>1

Appearance and Odor: pale yellow liquid, mild odor

10. STABILITY AND REACTIVITY

GENERAL:

This product is stable and hazardous polymerization will not occur.

INCOMPATIBLE MATERIALS AND CONDITIONS TO AVOID:

Strong oxidizing agents

HAZARDOUS DECOMPOSITION PRODUCTS:

Combustion produces carbon monoxide, carbon dioxide along with thick smoke.

11. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL:

Waste may be disposed of by a licensed waste disposal company. Contaminated absorbent material may be disposed of in an approved landfill. Follow local, state and federal disposal regulations.

12. TRANSPORT INFORMATION

UN HAZARD CLASS: N/A

NMFC (National Motor Freight Classification):

PROPER SHIPPING NAME: Fatty acid ester

IDENTIFICATION NUMBER: 144920

SHIPPING CLASSIFICATION: 65

13. REGULATORY INFORMATION:

OSHA STATUS:

This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, thermal processing and decomposition fumes from this product may be hazardous as noted in Sections 2 and 3.

TSCA STATUS:

This product is listed on TSCA.

CERCLA (Comprehensive Response Compensation and Liability Act):

NOT reportable.

SARA TITLE III (Superfund Amendments and Reauthorization Act):

Section 312 Extremely Hazardous Substances:

None

Section 311/312 Hazard Categories:

Non-hazardous under Section 311/312

Section 313 Toxic Chemicals:

None

RCRA STATUS:

If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste, (40 CFR 261.20-24)

CALIFORNIA PROPOSITION 65:

The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986. This product contains no chemicals known to the state of California to cause cancer.

14. OTHER INFORMATION:

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process. Such information is to the best of the company's knowledge and believed accurate and reliable as of the date indicated. However, no representation, warranty or guarantee of any kind, express or implied, is made as to its accuracy, reliability or completeness and we assume no responsibility for any loss, damage or expense, direct or consequential, arising out of use. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use.



STAFF PHOTO BY IAN BLYTH

Richard Koch, owner of Koch Trucking in La Plata, started using bio-diesel fuel in his 17 school buses this year.

Cleaning the air for school bus passengers

Contractor switches to bio-diesel fuel

BY IAN BLYTH
STAFF WRITER

Richard Koch, owner of Koch Trucking in La Plata, knew he wasn't going to save the world this year when he started using bio-diesel fuel in his school buses.

But with all the articles he had seen about the fuel alternative in trade magazines touting the clean-air benefits of bio-diesel as well as the concern about America's dependence on foreign oil, he decided to be a "guinea pig" for the fuel.

"I've been reading about the amount of oil we've been purchasing from foreign countries," Koch said. "I've hoped for a long time that we could find an alternative. Basically if I can do something to help the farmers and help the United States, that's fine with me."

Koch started using the fuel alternative this year in his 17 buses contracted with Charles County Public Schools and has already seen the results both on his lot and at the schools.

The most noticeable difference between bio-diesel and standard diesel is the amount and quality of the emissions, Koch said.

See Bio-diesel, Page B-14

Bio-diesel

Continued from Page B-10

"The first thing I liked was how clean it was," Koch said. "It used to be in the colder months, we'd start up the buses 20 or 25 minutes before we started in the morning. With all the smoke we had, I half expected someone to call the fire department."

That's not the case anymore, Koch said.

"Basically, now when we start them up, there's no smoke at all," Koch said. "I bet you could run up the road and hardly tell the buses are running."

And then there's the smell.

The gas pump Koch's drivers use is located directly beside the building where he bases his operations. When a driver finished a run, he or she would pull the bus up directly beside the building and let the engine idle for three minutes before fueling. During the winter months in the past, Koch and his employees dealt with staying warm inside the building while dealing with the fumes from the emissions that would seep into the building.

"The smell would be horrible," Brenda Jones, Koch's office manager, said. "We'd almost suffocate in here from the fumes."

Koch's drivers still follow the same format but with the new fuel mix, there's hardly any smell at all.

"Besides the sound of the bus running beside the building," Jones said, "you hardly notice it."

Koch said the students who ride the buses on his route are benefiting from the cleaner air as well.

"It's a lot nicer, especially when the kids are around it," he said. "When you get down to a school on a cold day and there are 20 or 30 buses running outside, it makes a big difference. Kids don't have to be around all that smoke."

Bio-diesel is a "domestic, renewable fuel for diesel engines derived from natural oils like soybean oil," according to the National Biodiesel Board.

Though it can be used as is or mixed with petroleum diesel, the most cost-effective use is a 20 percent bio-diesel, 80 percent petroleum mixture, which Koch uses.

While it can be made from many types of oil, including recycled french-fry oil, bio-diesel made from soybeans is the best, the board and many other

"The first thing I liked was how clean it was."

**Richard Koch,
school bus contractor,
on his switch to bio-diesel**

bio-diesel organizations like the Maryland Soybean Board believe.

Koch purchases his bio-diesel from Tri Gas & Oil in Grassonville, an oil company with offices across the state.

Seth Powell, alternative fuels representative from Tri Gas & Oil, said Koch should be praised for purchasing bio-diesel — especially since he's paying between 5 to 10 cents more per gallon for the alternative, compared to standard diesel fuel.

"He's pretty unique and should be commended for the fact that he's taken the approach to improving the air quality around the school buses," Powell said. "One of the worst things for children is when these buses are sitting outside of the school idling on a warm spring day with the windows wide open. It's astonishing how bad the air quality is with standard diesel."

Powell said bio-diesel is gaining popularity around the area. Locally, buses at the University of Maryland and in Arlington and Queen Anne counties in Virginia use the alternative.

While bio-diesel is more expensive than standard diesel, one big positive — aside from the improved air quality — is that owners don't have to modify their diesel vehicles to use the fuel alternative.

"It's a fuel to go," Powell said. "You can transition between both fuels — standard and bio-diesel. But he should be commended for doing it. He's obviously taking his payload into consideration and the air quality he's improving. He's a businessman and he has a cheaper way to go, and he's not."

Koch said that during the coldest months of the year he's noticed a little bit of lag in performance with bio-diesel, but it's nothing that is going to make him stop using the fuel alternative.

"In exceptionally cold weather, you're going to have problems with all types of fuel," Powell said.

*E-mail Ian Blyth at
iblyth@somdnews.com.*

FIRST PERSON

How I Grew to Love Biodiesel

By Mike Clark

In the fall of 2003, I was approached by Bloomington Transit and Indiana University to participate in a pilot program using B20 (20 percent soy biodiesel, 80 percent petroleum diesel).

I knew this was the right thing to do politically, but I was still hesitant because of all the negative information I had heard regarding soy biodiesel. Reluctantly, I agreed to participate in the pilot program. But I told the Indiana Soybean Board that if I experienced one problem, they were pumping my tanks and I would never use it again.

I chose four of my oldest buses — with engines such as International's DT 360 and CAT's 3116 and 3208 — as I was sure that I would lose a motor during the pilot program, and I could just send the bus to the auction pile.

We began the program in December 2003, just in time for winter. One morning, the temperature was below zero. On my way to coffee, I called the morning supervisor and told her to get some buses running so that when the biodiesel buses quit, we would have spares ready to go. I was sure they would gel up, but I was proven wrong.

There were no problems whatsoever.

Another morning, the temperature was -23 degrees, and we had a bus leaving on a field trip. The driver



Mike Clark is director of transportation at Monroe County Community School Corp. in Bloomington, Ind.

wanted to know if she should take a biodiesel bus or a regular-diesel spare bus. Since the trip was in town, I advised her to take the biodiesel bus. If she were to have problems, we'd be able to get to her fast.

Again, no problems.

In summer 2004, we began running our summer-school buses on B20. We didn't experience filter problems on any of these buses. But we had some filter problems at our fuel pumps.

My advice to others who implement B20 is to have external filters on your pumps and keep them clean. After all, soy methyl ester is a natural solvent, and it will clean your tanks out if you have old tanks.

In fall 2005, we switched our entire fleet to B20. We are monitoring our fuel closely. When ordering, we specify what we want the CFPP to be and leave the mixing up to the supplier.

We also specify a minimum of 50 cetane on our low sulfur diesel and require our supplier, Countrymark Co-op, to pull samples and run lab tests on our CFPP. To date, we have not experienced any problems due to cold weather.

We have seen several benefits from using soy biodiesel. The most obvious one is the noticeable reduction in diesel fumes in our bus lot. We no longer have the blue haze that used to linger when we started our buses on cold mornings at 5.

Allen Jackson, our garage supervisor, notices a difference in the garage as well. While we may have been a little premature in changing our fuel filters, with the clean-burning biodiesel we have been able to double our mileage and increase our oil change intervals.

Gary Koontz, our mechanic who takes care of our preventive maintenance, says that he can tell by the feel of the fuel how clean it is. It doesn't have the gritty feeling that No. 2 diesel has. I have even had a few drivers mention that their buses seem to be running more smoothly on biodiesel.

Now, we can't imagine going back to straight diesel. **SBF**

Fast Facts

Buses	110
Students transported daily	9,000
Total students in district	10,776
Schools served	19
Daily mileage	6,000
Area of service	352 square miles
Average driver wages	\$12.14/hour



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