

BIODIESEL POISED TO BE A SIGNIFICANT CONTRIBUTOR TO THE U.S. ALTERNATIVE FUELS MARKET

Biodiesel is a clean burning fuel for diesel engines and is produced from renewable resources such as soybean oil. It can be used as a pure product or blended at any percentage with petroleum diesel. Biodiesel is typically produced through the reaction of a vegetable oil or animal fat with an alcohol in the presence of a catalyst to yield glycerin and biodiesel (chemically called alkyl esters). Biodiesel is simple to use, renewable, domestically produced and readily available.

Biodiesel approved by the EPA. In March 1998, biodiesel became the only alternative fuel in the country to have successfully completed the \$1 million EPA-required Tier I Health Effects testing under 211(b) of the Clean Air Act. The testing, which was conducted by Southwest Research Institute, conclusively demonstrated biodiesel's significant reductions in virtually all regulated emissions. The National Biodiesel Board (NBB), on behalf of the biodiesel industry, currently is on track for submission of the \$1.2 million Tier II subchronic inhalation testing report to EPA by May 2000.

Biodiesel EPAct provisions passed by Congress. Effective November 1998, B20, a blend of 20% biodiesel and 80% petroleum diesel, was approved by Congress as an EPAct (Energy Policy Act of 1992) compliance strategy. The legislation allowed EPAct fleets to meet their alternative fuel vehicle purchase requirements simply by buying 450 gallons of pure biodiesel and burning it in new or existing diesel vehicles in at least a 20% blend with diesel fuel. Because the incremental cost of the fuel is the only cost associated with using biodiesel, B20 is usually the lowest cost option to comply with EPAct. In March 1999, three major fleets were known to be using B20 for EPAct compliance. By December 1999, that list increased to 25 and includes such fleets as the Ohio Department of Transportation, U.S. Postal Service, General Services Administration, Alabama Power and the U.S. Department of Agriculture. That is more than a 700% increase in biodiesel users in less than a year's time.

Provisional Specification passed by ASTM. In December 1998, the American Society of Testing and Materials (ASTM) issued a provisional specification (PS 121) for biodiesel fuel. ASTM is the premier standard-setting organization for fuels and additives in the U.S. The EPA has adopted the ASTM standard and state divisions of weights and measures currently are considering its adoption. This development has gone a long way to help standardize fuel quality for biodiesel in the U.S. market.

President favors bio-based products. On August 12, 1999, President Clinton signed Executive Order 13134, Developing and Promoting Biobased Products and Bioenergy, which calls for the expanded use of bio-based fuels such as biodiesel. Furthermore, on September 14, 1998, the President signed Executive Order 13101, Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition, which gives preference to bio-based products for federal government procurement.

Biodiesel premium diesel programs announced. Since 1997, seven companies have released proprietary biodiesel additive packages and have been marketing them as lubricity additives. In the summer of 1999, two major petroleum companies released their own premium diesel packages targeted to the agriculture market and began offering the products in bulk in more than six mid-western states at more than 18 terminal locations. These petroleum companies are further evaluating the prospects of increasing their biodiesel involvement by expanding their product lines to include B20 and market the alternative fuel to their network of customers through their terminal and distributor systems.

Major automobile manufacturers begin biodiesel research. Ford and Chrysler have begun major biodiesel research initiatives, with Ford's efforts being the most advanced. Ford is conducting independent compatibility and emissions testing in anticipation of obtaining additional certifications for diesel engines operating on biodiesel. Such research could lead to advanced technology features such as blend sensors which could detect biodiesel blend levels and automatically adjust engine timing levels for optimized performance and further emission reduction.

Biodiesel research agreement reached with the U.S. Army. The National Biodiesel Board just entered into a Cooperative Research and Development Agreement (CRADA) with the Tank, Automotive and Armament Command (TACOM) of the U.S. Army. The agreement provides that the NBB will provide guidance and information to the Army in their effort to incorporate biodiesel into the procurement provisions for the military. NBB is further working with the Department of Defense, Defense Logistics Agency (DLA), to streamline the biodiesel procurement process for both the military and individual federal agencies.

Significant Investment by Private Industry. Presently there are 13 biodiesel fuel suppliers/marketers in the U.S. This is up from only one supplier in 1994 and three in 1996. Furthermore, major petroleum companies such as Williams Pipeline, Gulf Oil, and Valero Energy are working partners with the biodiesel industry.

Biodiesel offers positive economic development benefits to state and local economies. A 1994 economic study conducted by the Food and Agricultural Policy Research Institute predicted that a sustained national market for 70 million gallons of biodiesel annually could return up to \$225 million to soybean farmers in the form of higher or sustained prices for soybeans. In addition, a 1996 study conducted by the University of Missouri looked at the possible economic benefits to the State of Missouri from the construction and operation of a biodiesel facility in Missouri. The UM study concluded that the total additional incremental cost of operating Missouri state fleet vehicles (diesel portion) on B20 could be offset by the predicted increase in tax revenues realized by the construction and operation of a 5 million gallon a year biodiesel facility within the state of Iowa that utilized locally grown soybeans as a feedstock.

Support of the biodiesel industry offers the opportunity for a "win-win" situation for urban and rural interests. In urban areas, the public will enjoy additional jobs and cleaner air. Production agriculture will benefit from the "derived demand" for their products. State economies can flourish through the creation of additional jobs and the positive impacts on balance of trade.

Biodiesel helps to keep air clean and protect the environment. The use of biodiesel in a conventional diesel engine results in substantial reduction of unburned hydrocarbons, carbon monoxide, and particulate matter. Emissions of nitrogen oxides are either slightly reduced or

slightly increased depending on the duty cycle of the engine and testing methods used. Biodiesel use results in the following emission reductions.

Particulate Matter – Breathing particulates has been shown to be a human health hazard. Biodiesel significantly cut particulate matter emissions.

Carbon Monoxide – Everyone knows the dangers of this pollutant. Biodiesel greatly reduces the amount of carbon monoxide produced by diesel engines.

Ozone Forming Potential – Research documents the fact that the ozone forming potential of the hydrocarbon emissions of biodiesel is nearly 50% less than that of petroleum fuel.

Sulfur Dioxide – This pollutant causes acid rain. Biodiesel does not contain sulfur and therefore reduces sulfur dioxide exhaust from diesel engines to virtually zero.

Biodiesel is safer for people to breathe. Research conducted in the U.S. showed biodiesel emissions have decreased levels of all target polycyclic aromatic hydrocarbons (PAH) and nitrated PAH compounds, as compared to petroleum diesel exhaust. PAH and nPAH compounds have been identified as potential cancer causing compounds. Targeted PAH compounds were reduced by 75 to 85 percent, with the exception of benzo(a) anthracene, which was reduced by roughly 50 percent. Target NPAH compounds were also reduced dramatically with biodiesel fuel, with 2-nitrofluorene and 1-nitropyrene reduced by 90 percent, and the rest of the nPAH compounds reduced to only trace levels. All of these reductions are due to the fact the biodiesel fuel contains no aromatic compounds. As discussed at the International Liquid Biofuels Congress in Curitiba (July '98), reduced health care costs are a definite economic consideration.

Biodiesel helps to preserve and protect natural resources:

Energy Balance – For every one unit of energy needed to produce biodiesel, 3.24 units of energy are gained. (This is compared to .83 for petroleum diesel).

Biodegradable and Non-Toxic – Tests sponsored by the U.S. Department of Agriculture confirm that biodiesel is less toxic than table salt and biodegrades as fast as dextrose (a test sugar).

Global Warming – A U.S. study has found that biodiesel production and use, in comparison to petroleum diesel, produces 78.5% less CO₂ emissions. Carbon dioxide is "taken up" by the annual production of crops such as soybeans and then released when vegetable oil based biodiesel is combusted.

Biodiesel offers fleets a cost-effective and simple solution to clean the air. Environmental concerns and energy security issues have prompted legislation and regulatory actions spurring demand for alternative fuels such as biodiesel. One of the largest roadblocks to the use of alternative fuels is the change of performance noticed by users. Biodiesel has many positive attributes associated with its use, but by far the most noted attribute highlighted by fleet managers is the similar operating performance to conventional diesel fuel and the lack of changes required in facilities and maintenance procedures. Biodiesel functions in the engine the same way as petroleum diesel, but is a fuel that fulfills all the environmental and energy security needs previously mentioned without sacrificing operating performance.

Biodiesel also is an economically viable solution to meet future emissions regulations. When reviewing the high costs associated with other alternative fuel systems, many fleet managers believe biodiesel is their least-cost-per-compliance mile option for cleaner air. Biodiesel doesn't require expensive modifications to engines or refueling facilities and mechanics do not have to be retrained to work on your vehicle or vessel. The only thing that changes is air quality.

Biodiesel has High Fuel Lubricity -- Biodiesel provides improved lubricity compared to conventional diesel fuel resulting in longer engine and component life.

Biodiesel exhibits similar performance as petroleum diesel fuel and superior performance compared to other alternative fuels. Based on more than 20 million successful U.S. road miles using biodiesel, data shows that biodiesel has a higher cetane rating and BTU content, which results in similar fuel consumption, horsepower, and torque, as petroleum diesel fuel.

Biodiesel is safe. A flash point of over 300 degrees Fahrenheit makes biodiesel safer to store and handle than petroleum diesel fuel.

For more information, please visit the National Biodiesel Board web site at www.biodiesel.org or call the biodiesel hotline at 1-800-841-5849

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