Biodiesel Done Right: Strategies for Municipal Fleets

Daniel Birkett
US EPA Region 2
birkett.daniel@epa.gov
2/4/10

Why Biodiesel?

- Reduce air pollution from vehicle exhaust
  - Particle pollution linked to asthma, lung cancer and premature death
- Decrease greenhouse gas emissions
  - Particularly when using recycled feedstock
- Recycle waste
  - Keep waste oil out of landfills
- Prevent sewer blockages
  - Avoid repair costs and fines

What can municipalities do?

- Municipalities can purchase biodiesel from distributor
- Municipalities can collect waste vegetable oil and convert to biodiesel themselves
- Public-Private partnership to collect WVO and convert

- All can help meet sustainability goals
- Cost savings are possible

What biodiesel is – and isn't

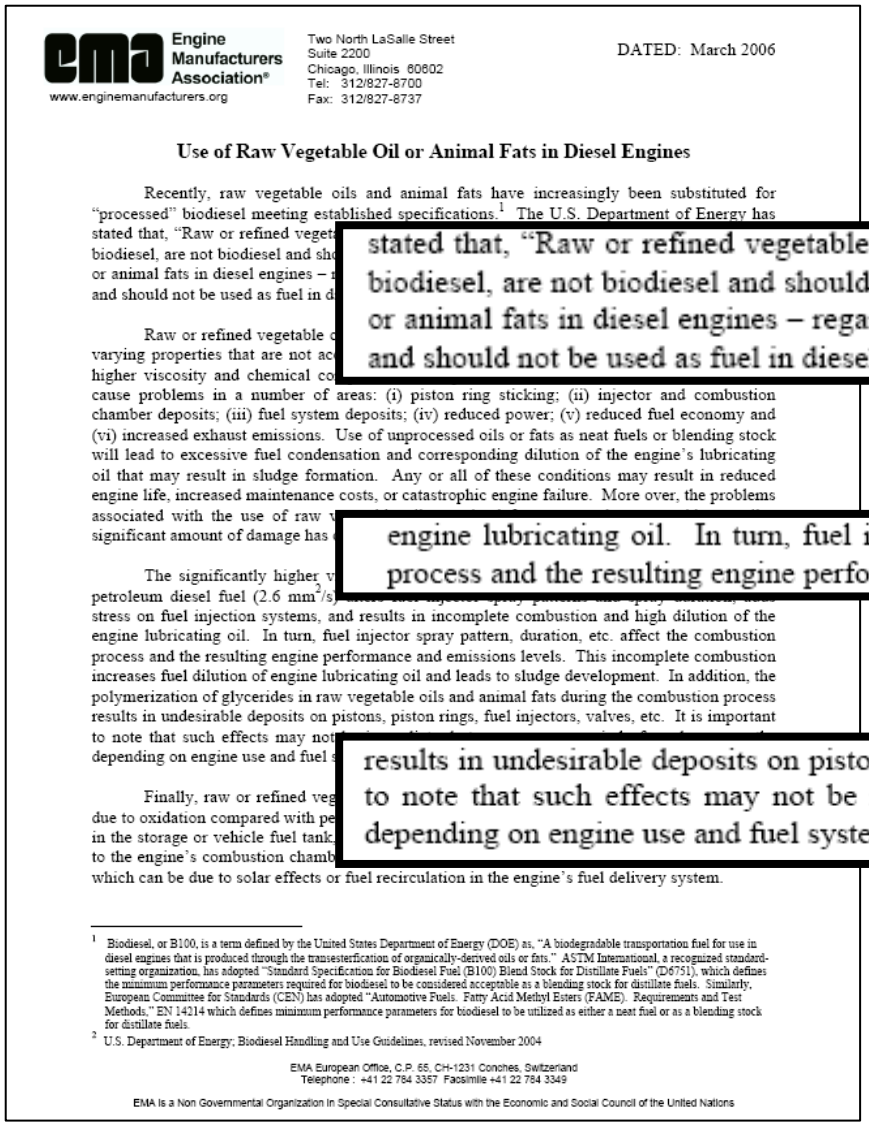
Biodiesel is:

- Converted from renewable feedstock to FAME
- Biodiesel must meet ASTM standards
  - ASTM D6751-09 for pure biodiesel
- Blends in any amount can be used in diesel vehicles
  - Typically B5 or B20 is used

Biodiesel is <u>not</u>:

- Vegetable oil, whether virgin or recycled, that has not undergone a chemical conversion process

Unprocessed Vegetable Oil



Engine Manufacturers Association®
www.enginemanufacturers.org

Two North LaSalle Street
Suite 2200
Chicago, Illinois 60602
Tel: 312/827-8700
Fax: 312/827-8737

DATED: March 2006

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 vegeta… biodiesel, are not biodiesel and sh… or animal fats in diesel engines – r… and should not be used as fuel in d…

Raw or refined vegetable … varying properties that are not ac… higher viscosity and chemical co… 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 v… significant amount of damage has …

The significantly higher v… petroleum diesel fuel (2.6 mm^2/s) … 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… depending on engine use and fuel …

Finally, raw or refined veg… due to oxidation compared with pe… in the storage or vehicle fuel tank… to the engine's combustion chamb… 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 transesterfication 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

EMA European Office, C.P. 65, CH-1231 Conches, Switzerland
Telephone : +41 22 784 3357 Facsimile +41 22 784 3349

EMA is a Non Governmental Organization In Special Consultative Status with the Economic and Social Council of the United Nations

> 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.

> 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

> 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.

Statement of Engine Manufacturers Association:

http://www.enginemanufacturers.org/file.asp?A=Y&F=2006+03+03+Raw+Vegetable+Oil+Technical+Statement%2Epdf&N=2006+03+03+Raw+Vegetable+Oil+Technical+Statement%2Epdf&C=documents

Biodiesel Done Right: Strategies for Municipal Fleets

Daniel Birkett
US EPA Region 2
birkett.daniel@epa.gov
2/4/10

Funding Availability

- EPA's Pollution Prevention Program administers Pollution Prevention grants and Source Reduction Assistance Grants
- Information about these two grant programs may be found at: http://www.epa.gov/region02/p2/grants.htm
- If you have questions about either program, contact Joe Bergstein at: Bergstein.Joseph@EPA.gov

Clean Cities Coalitions

- **Coalitions**
  - Build bridges in the local community to mutually address barriers
- **Technical Information and Resources**
  - Alternative Fuels & Advanced Vehicle Data Center (AFDC) internationally recognized as reliable sources of unbiased information
- **Local Strategy to Advance a National Goal**
  - National leadership adds legitimacy to local activities and assists with information transfer among coalitions.
- **NY/NJ Coordinators**

– New Jersey:
Chuck Feinberg, 973-886-1655
– Albany Area:
Deborah Stacey, 518-458-2161
– Syracuse Area:
Barry Carr, 315-498-2548
– Buffalo Area:
Steve Carr, 315-278-6928
– Rochester Area:
David Keefe, 585-301-2433
– Long Island:
Rita D. Ebert, 631-969-3700
– NYC & Lower Hudson Valley:
Christina Ficicchia, 212-839-7728
– Elsewhere:
http://www1.eere.energy.gov/cleancities/

Resources

- US EPA, Guidance for Biodiesel Producers and Biodiesel Blenders/Users, 2007: http://www.epa.gov/oms/renewablefuels/420b07019.pdf
- National Renewable Energy Laboratory, Biodiesel Handling and Use Guide, 2009: http://www.nrel.gov/vehiclesandfuels/pdfs/43672.pdf
- US EPA Region 7, Environmental Laws Applicable to Construction and Operation of Biodiesel Production Facilities, 2008: http://www.epa.gov/region07/priorities/agriculture/biodiesel_manual.pdf
- US EPA Region 4, Biodiesel Production in Municipalities and High Schools: A Primer, 2009: http://www.epa.gov/Region4/clean_energy/Biodiesel%20Primer%20Final.pdf
- US EPA Region 4, So You Want to Produce Biodiesel, 2007: http://www.southeastdiesel.org/Photos/So%20you%20want%20to%20make%20biodiesel11.15.07.pdf
- Hall et al. (Auburn Univ.), Producing Biodiesel for Municipal Vehicle Fleets from Recycled Cooking Oil: http://www.nrmdi.auburn.edu/bio/documents/AUMuncipalBiodieselGuideFINAL.pdf
- US DOE Energy Efficiency and Renewable Energy, Biodiesel Incentives and Laws: http://www.afdc.energy.gov/afdc/fuels/biodiesel_laws.html
- Clean Cities Biodiesel Blends Fact Sheet, 2008: http://www.afdc.energy.gov/afdc/pdfs/42562.pdf

Thank you for joining us!

For more information on Region 2's Clean Diesel Webinars please visit:
www.epa.gov/region2/sustainability/greencommunities/cleandiesel.html

Still have unanswered questions?

Technical assistance is available at:

Clean Diesel Helpline

1-877-NCDC-FACTS

(1-877-623-2322)

cleandiesel@epa.gov