

Farm Energy

Biodiesel: growing an industry in CT

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What is *biodiesel*?

Biodiesel is a cleaner burning, domestic and renewable fuel that can be produced from virgin or recycled vegetable oil and animal fat.

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.

Key attributes of biodiesel

- Biodegradable
 - Straight biodiesel (B100) biodegrades as fast as sugar, and even accelerates the biodegradability of petrodiesel, thus minimizing the environmental impact of fuel spills. Classified as a non-hazardous material.
- Non-toxic
 - Straight biodiesel (B100) is less toxic than table salt and irritates skin less than ordinary hand soap.

Key attributes, cont'd

- **Cleaner burning**

Biodiesel is currently the only fuel which meets the EPA Tier 1 & Tier 2 Clean Air targets.

B100 Biodiesel emissions vs. Petrodiesel:

No Sulfur Dioxide emissions (ACID RAIN)

78% reduction in CO₂ emissions (GLOBAL WARMING)

48% reduction in CO emissions (SMOG)

67% reduction in unburned hydrocarbons (SMOG)

47% reduction in particulate matter (SMOG)

80% reduction in PAH (polycyclic aromatic hydrocarbons)
(CANCER)

+/- NO_x (nitrogen oxides)*

Key attributes, cont'd

- Renewable
 - A liquid fuel that, in essence, extracts solar energy in the form of carbon stores from plants through a simple process of refining the plants' oil. The plant oil (feedstock) is harvested from crops that are grown year after year.

Positive energy balance

- Energy balance is the ratio:
$$\frac{\text{Units of alternate fuel energy created}}{\text{Unit of fossil energy used to produce}}$$
- Soy Biodiesel: 3.5
- Corn Ethanol: 1.2
- petrodiesel: .8
- Used Vegetable Oil Biodiesel: 7.8
- Biodiesel has the highest energy balance of any transportation fuel today

Energy Security

- Surging national, regional and local interest in energy independence
 - 1.6 billion gallons of CT's 3.1 billion gallon annual petroleum demand is imported
 - 1 billion gallons of these imports originate outside the Western hemisphere
 - 320 million gallons originate from the Persian Gulf region (\$838M)

How is biodiesel made?

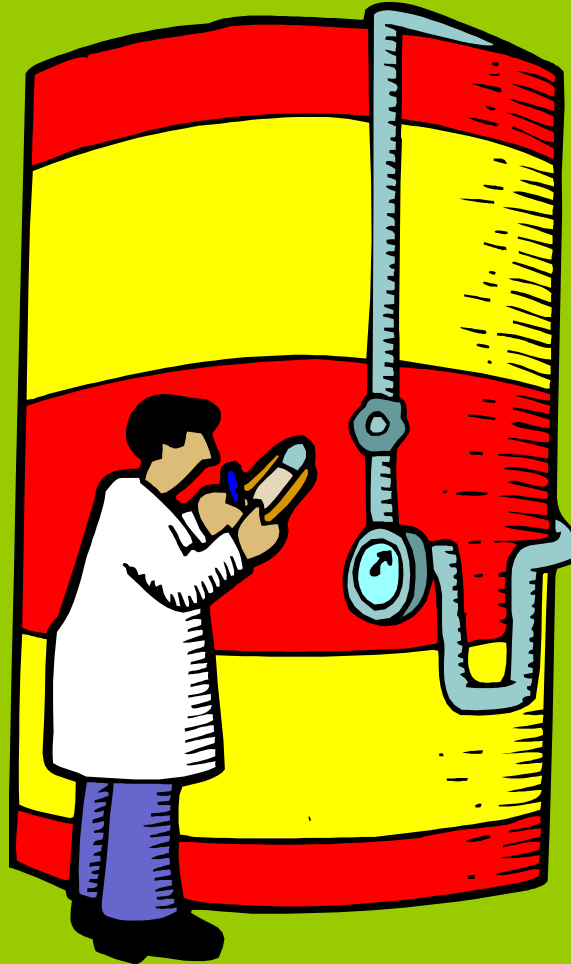
Biodiesel is refined from vegetable oils through a fairly simple chemical reaction called *transesterification*.

How is biodiesel made?

In the presence of a catalyst

Combining

**Vegetable Oil
or
Animal Fat
(100 lbs.)
+
Methanol or
Ethanol
(10 lbs.)**



Yields

**Biodiesel
(100 lbs.)
+
Glycerine
(10 lbs.)**

How is biodiesel used?

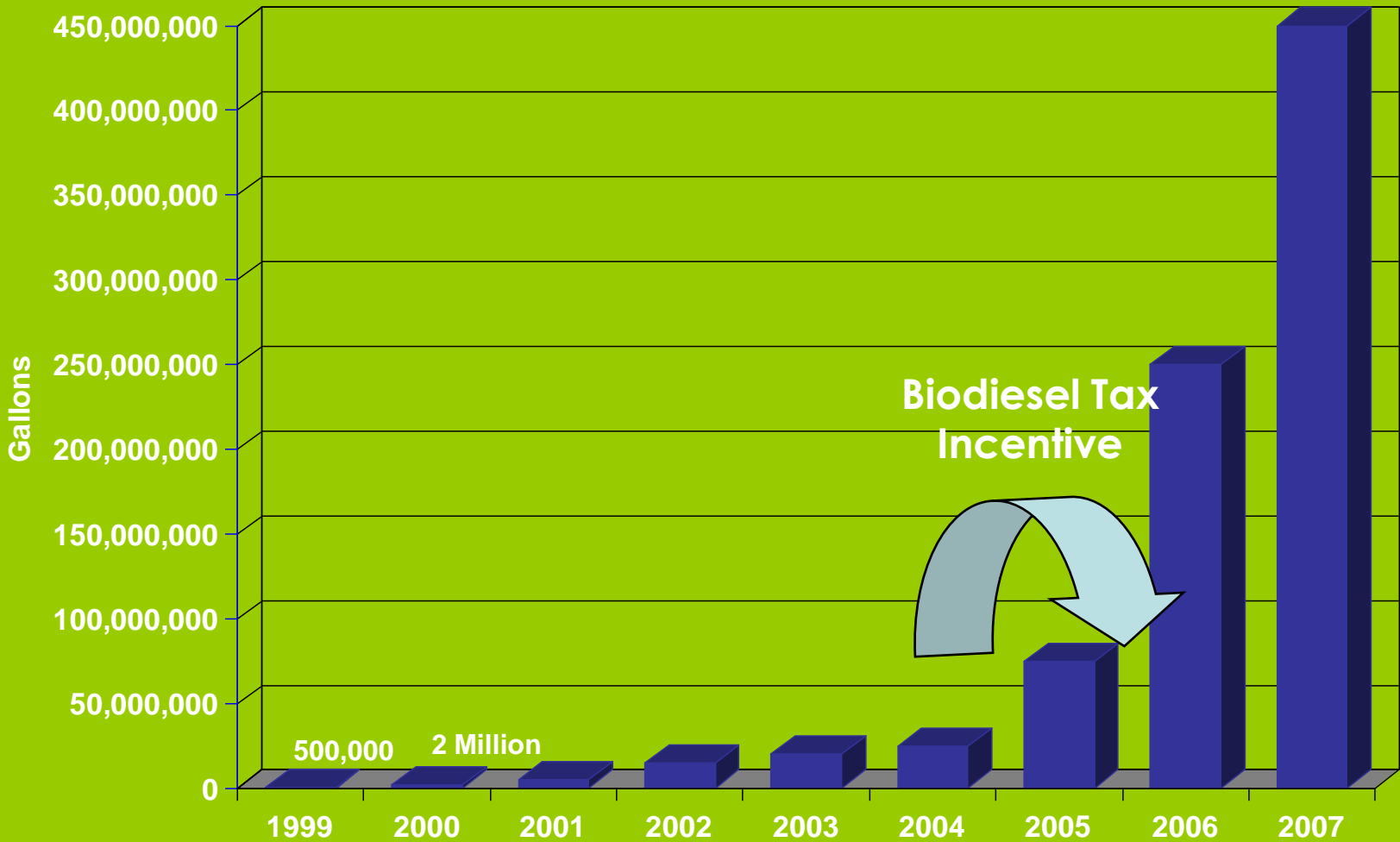
- Diesel engines
 - On-highway
 - Off-highway
 - Marine
- Oil-burning furnaces
- Easily blends with petroleum products



Who is using biodiesel today?

- Military - U.S. Coast Guard Academy
- State Fleets - Connecticut DOT: over 1 million gallons of B20 used since 2001
- Municipal fleets - including New Haven, Cheshire, Glastonbury, Sharon and Salisbury
- Bus fleets - including Glastonbury Public Schools; University of Connecticut; Yale University

U.S. Biodiesel Production



CT Biodiesel/Bioheat Association

- Representing producers, marketers and affiliates
- Primary objectives
 - Establishing state incentives for the production and use of biodiesel in CT
 - Ensuring product quality
 - Outreach and education

Connecticut Incentives

■ Biodiesel Production Grant

- One-time grants for the initial purchase of or retrofit of production facilities and equipment not to exceed either \$3 million dollars or 25% of the equipment or construction cost.
- A qualified biodiesel producer will be eligible for up to 60 monthly grants up to a total grant per fiscal year equal to:
 - 1) \$0.30 per gallon for the first five million gallons of biodiesel
 - 2) \$0.20 per gallon for the second five million gallons of biodiesel
 - 3) \$0.10 per gallon for the third five million gallons of biodiesel

Connecticut Incentives

- **Distribution Grant**
 - Up to \$50,000 per distributor/site will be available for the actual costs of creating storage and distribution capacity for biodiesel.
- **Biofuels Research Support**
 - DECD is to provide funding to Connecticut institutions of higher education or research for agricultural research to promote biofuel production from agricultural products, algae and waste grease, as well as biofuel quality testing.

Proposed Incentives

- 2008: income tax credit for bioheat; \$2M additional for R&D; \$6M for grants; quality assurance program
- Beyond: tax break for transportation diesel; mandates?

Thank You!

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More information on biodiesel:

- www.biodiesel.org