

California Environmental Protection Agency



Air Resources Board

Update to the Board on Biodiesel Use in California

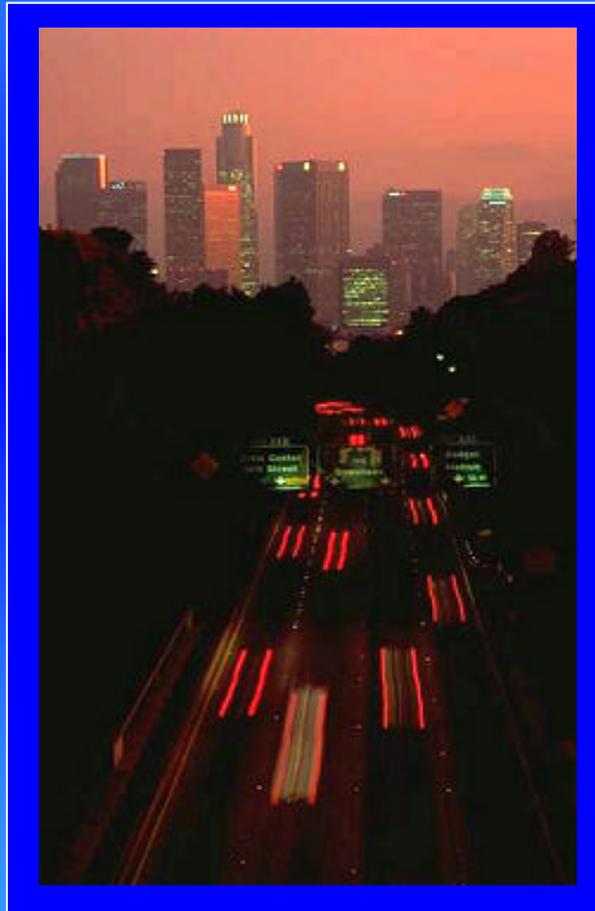
June 2005



Overview

- Background
- Production and Distribution
- Emissions
- Costs and Incentives
- Fuel Issues
- Recent Activities
- Goals
- Next Steps

Background



Diesel and Gasoline in CA

- Fuel consumption in 2004
 - Diesel: 2.9 billion gallons
 - Gasoline: 15.9 billion gallons
- Growth rate of diesel higher than gasoline from 1990-2004
 - Diesel 60%
 - Gasoline 20%

Governor's Executive Order Establishes Aggressive Greenhouse Gas Emission (GHG) Targets

- By 2010: reduce GHG emissions to 2000 levels

Biodiesel Greenhouse Gas Benefits

- Based on lifecycle analysis
 - 1 gallon of diesel produces 28 lbs of CO₂
 - 1 gallon of B100 produces 6 lbs of CO₂ emissions
- Reduces greenhouse gas emissions
 - Biodiesel could displace about 1% of diesel fuel and reduce CO₂ emissions by 300,000 tons

Other Biodiesel Benefits

- Reduces PM and toxic emissions
- Biodiesel can be used with no engine modification

What is Biodiesel?

- Made by reacting oils or fats and alcohol to form biodiesel
- Glycerol by-product

Transesterification



Biodiesel and Biodiesel Blends

- B100 refers to pure 100% biodiesel
- Biodiesel blends are noted as B**XX**
 - Example: B20 is 20% biodiesel, 80% diesel

Can Biodiesel be Used in CA?

Yes if:

- Meets ARB diesel regulations for sulfur and aromatics
- Meets Division of Measurement Standards specifications
 - Limits retail sales to B20 or less
 - B100 can be used in non retail or with a fuel variance

Users of Biodiesel in California

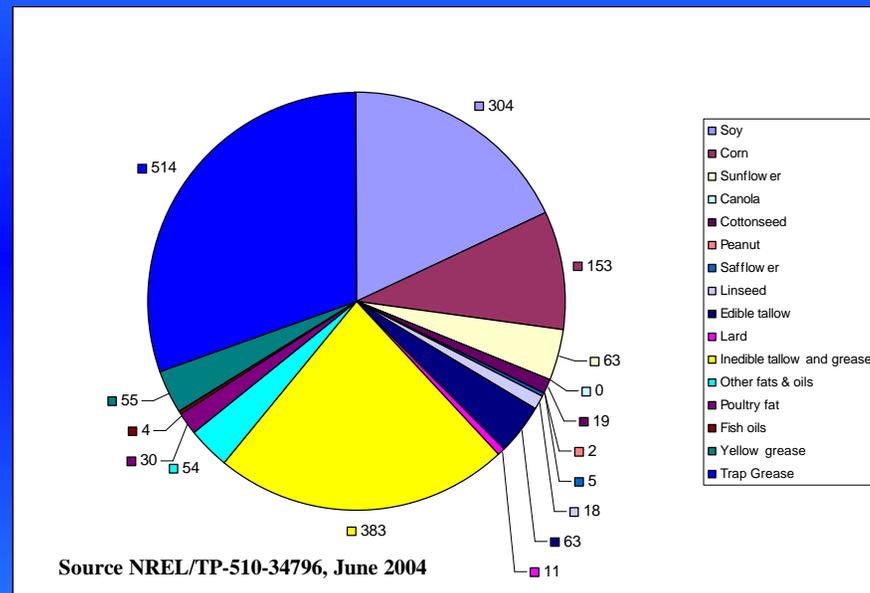
- **Federal government:** several military and national park installations
- **Municipalities:** City of Berkeley; Alameda Co.
- **Utilities:** PG&E; SoCal Edison; SDG&E
- **Private companies:** Fetzer Winery; Thanksgiving Coffee Co.; JR Cardenas Construction
- **Individuals:** Fuel cooperatives; card lock stations

*Report of the Biodiesel Workgroup, CA Energy Commission, Sacramento, CA, Oct 12, 2004

Biodiesel Production and Distribution

Potential Annual Biodiesel Volume Based on Available Feedstocks

Volume of B100 in 2001 (millions gal/yr)



- 2001US potential annual capacity 1.6 billion gallons
 - Greases, animal fats, vegetable oils

*Source: Bob McCormick, Biodiesel Research Update, US DOE 10th Annual Diesel Emissions Reduction Conference Coronad, CA Aug 30, 2004

CA Biodiesel Facilities

- 4 Production Facilities
- 29 Distributors
- 23 Retail Outlets

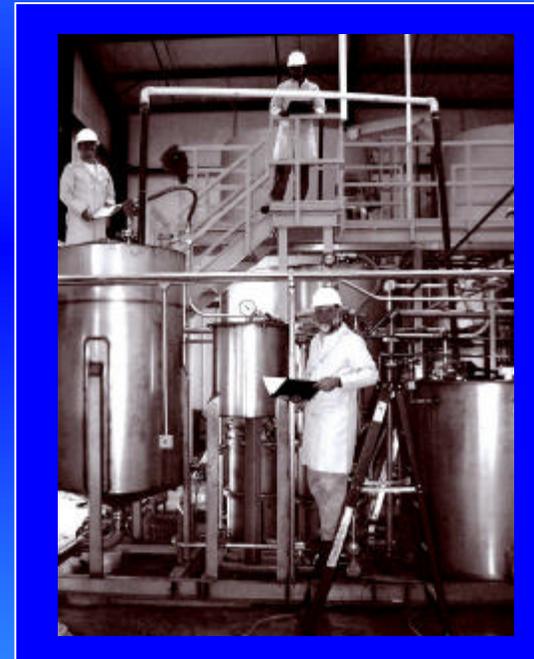


Photo courtesy Russ Teall

Biodiesel Production Capacity in California

- Current capacity
 - 2005 16 million gallons/year*
 - Represents 1/2 percent of CA diesel production

*Email Fred Wellons

Emissions



Emission Studies

- US EPA Draft Technical Report
- US EPA Tier I Study
- Montreal Biobus Study
- Recent NREL Studies

Biodiesel Emission Impacts

	B20	B100
HC	-21%	-67%
PM	-10%	-48%
CO	-11%	-48%
NO _x	+2%	+10%

Toxics

- Generally toxics decrease
 - US EPA Draft showed a 15% reduction of volatile toxic emissions
 - Tier 1 significant reductions of PAHs, formaldehyde and acetaldehyde, and VOC toxics
 - Biodiesel and biodiesel blends reduce emissions of PM, a toxic air contaminant.

Costs and Incentives

Cost Breakdown Based on Feedstocks

	Soy	Rcyl grease	Diesel
Feedstock	\$2.22	\$1.09	\$1.31
Processing	\$0.47	\$0.47	\$0.46
Est Prod Costs	\$2.69	\$1.56	\$1.77

Glycerol sales reduces biodiesel cost by \$.15 per gallon

Diesel cost do not include distribution cost and taxes

Source: Biodiesel estimates from NREL, diesel estimates from EIA and CEC

Credit and Incentive Programs

- Production Level: Incentive funds
- Blenders Level: Biodiesel Tax Credit
 - \$1.00/gal credit for animal fats and vegetable oil biodiesel
 - \$0.50/gal credit for recycled grease-biodiesel

Fuel Issues



Compatibility with Verified Diesel PM Controls

- Compatibility demonstration of B20 underway
 - Would allow verified devices to use B20

Acceptance of Biodiesel

- Engine and vehicle manufacturers concern
 - B5 approved
 - Engine warranty Issues
- Distributors
 - Blending and contamination issues
- End-user
 - Lower energy content than diesel
 - Durability and performance
- Need fuel specifications for B100 and blends
 - Fuel stability specifications
 - Need for fuel blending level test method

Recent Activities

ASTM Specifications

- ASTM D6751 establishes fuel specifications for B100 as a blending component of diesel fuel
 - Goal: Consistent quality of biodiesel blending component
 - No ASTM specifications for finished biodiesel blends or B100 as a fuel

ASTM Ongoing Efforts

- Modification of D975 diesel fuel standard to include biodiesel up to B5
- Development of new ASTM standard for B20
- Update B100 blendstock specifications

ARB Biodiesel Workgroup

- Established in 2004 to assist the ARB in determining the need to develop biodiesel specifications
- First meeting held in March 2004
- Second meeting held in June 2005

Coordination with the California Energy Commission

- Biodiesel considered a renewable fuel
- Supports energy diversity
- Determine biodiesel market feasibility
- Assess air quality impacts

Goals

- Incorporate B20 in Diesel Retrofit Program to take advantage of its benefits
- Resolve NO_x issues
- Address acceptability issues

Next Steps

- Continue to work with ASTM, CEC, and industry to resolve remaining issues