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Biodiesel Plant Investment— Making the Correct Decisions

Presented by:
Leland Tong
Steve Howell

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Goals and Objectives

- IBFG Background
- Quick Biodiesel 101
- Understand the critical elements to consider when investing in a biodiesel plant
 - Detailed discussion on specific topics such as demand, policy, feedstock supply, and technology
- Provide a venue to ask specific questions relating to plant investment

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Overall Purpose of IBFG

- Provide the most accurate, up-to-date, detailed, independent information on biodiesel and the biodiesel industry
- Provide Information you need to make an intelligent decision on a biodiesel plant....

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IBFG Services Overview

- Biodiesel Feasibility Studies and Business Plans
 - Site Selection
 - Technology Selection
 - Economic Analysis
 - Market and Legislative Analysis
- Critical Review and Due Diligence of Feasibility and Business Plans
 - Client Sponsored
 - Lender Sponsored

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Biodiesel 101

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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.

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Biodiesel Raw Materials

Oil or Fat

Soybean
Corn
Canola
Cottonseed
Sunflower
Beef tallow
Pork lard
Used cooking oils

Alcohol

Methanol
Ethanol

Catalyst

Sodium hydroxide
Potassium hydroxide

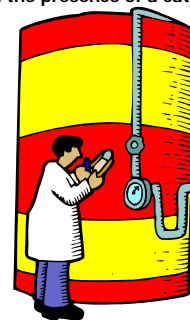
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The Biodiesel Reaction

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.)

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Biodiesel Physical Properties



- High Cetane
 - (>50 vs. 42)
- Flash Point
 - (260° F vs. 150° F)
- Virtually Zero Sulfur
 - Meets 2006 ULSD rule
- No Aromatic Content
- Superior Lubricity
- Integrates into existing petroleum infrastructure

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B5 Performance Properties

- B5 has Similar Performance to Petrodiesel:
 - Torque
 - Horsepower
 - Mileage
 - Range
 - BTU Content



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Environmental Attributes

- Energy Balance - for every one unit of energy needed to produce biodiesel, 3.2 units of energy are gained.
- Biodegradable and Non-Toxic - Tests sponsored by the United States Department of Agriculture confirm that biodiesel is safer than diesel and biodegrades as fast as dextrose, a test sugar.
- Greenhouse Gases – A 78% life cycle decrease in CO₂ according to a USDA and DOE study.

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Cleaner Emissions

Emission Type	B100	B20	B2
Total Unburned Hydrocarbons	-67%	-20%	-2.2%
Carbon Monoxide	-48%	-12%	-1.3%
Particulate Matter	-47%	-12%	-1.3%
Oxides of Nitrogen (NO _x)	+10%	+2%	+2%

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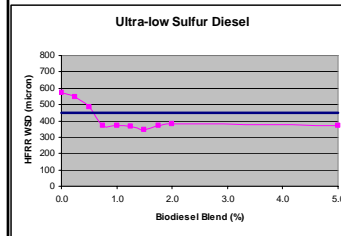
Biodiesel Health Properties

- Reduces particulate emissions
- Reduces targeted compounds thought to cause cancer: PAH, nPAH
- Biodiesel blends did not generate any unexpected new hydrocarbon species
- Significantly reduces the mutagenicity of exhaust in both the gaseous and particulate phases



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Enhanced Lubricity



- Equipment benefits
 - Superior lubricity
 - B2 has up to 66% more lubricity than #2 Diesel
- EPA requires sulfur reduction in 2006
- No overdosing concerns

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Cold Flow Properties

- Biodiesel (B100) freezes faster than most petrodiesel
- Untreated B20 freezes about 2-10° F faster than petrodiesel, depending on:
 - the cold flow properties of the biodiesel
 - the cold flow properties of the petrodiesel
- B2 differences are imperceptible
- Traditional cold weather options for diesel work well with biodiesel and blends
 - Blend with kerosene, use of additives
 - Block and filter heaters
 - In-door vehicle storage

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Goals of Handbook

- Guide those wishing build a biodiesel plant
- Serve as a reference tool for key considerations and important questions ask and answer
- Provide an overview of the biodiesel plant development process

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Key Considerations

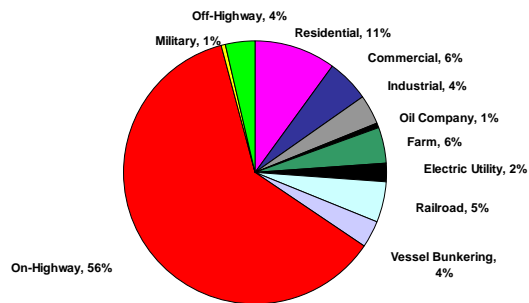
- Biodiesel Demand
- Legislation and Regulatory Issues
- Feedstock Supply
- Distribution
- Industry Capacity and Competition
- Technology Selection
- Financing

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Biodiesel Demand

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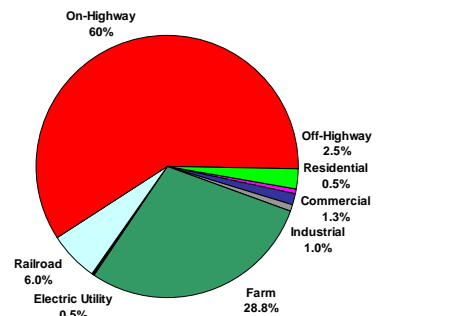
US Distillate Fuel Uses



US Total distillate consumption 2003: 60.2 billion gallons

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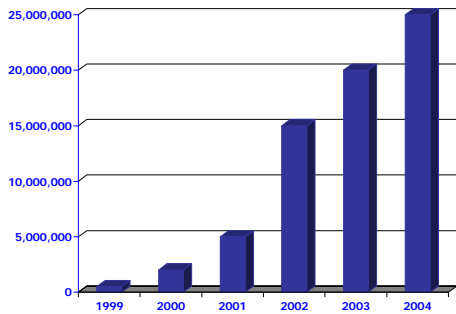
NE Distillate Fuel Uses



US Total distillate consumption 2003: 634.8 Million gallons

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B100 Fuel Survey Results



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How is Biodiesel being Used?

- As a neat fuel (B100)
 - Federal, state, and alternative fuel providers
 - EPA Act and Executive Order Compliance
 - Emissions Reductions
- As a blending stock with petrodiesel (B20)
 - Lubricity and Ultra Low Sulfur Diesel Fuel
 - Agriculture supporting its own product
 - Terminal locations primarily throughout the Midwest

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Regulated Fleets

- Almost all Federal Agencies with a diesel Fleet use biodiesel
 - ✓ Marine Corps
 - ✓ Air Force
 - ✓ Postal Service
 - ✓ Dept. of Interior
 - ✓ NASA
- EPACT and E.O. compliance



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Strong Growth in Farm Use

- More than 1000 petroleum distributors now offer biodiesel to farmers
- 30% of farmers use biodiesel according to USB research
 - Up from 23%



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On-Highway Market

- Largest market for diesel except in the Northeast
 - B2 in all on-highway diesel would require over 740 million gallons of B100 annually
- Extremely Cost Sensitive
- Market Needs
 - Education
 - Infrastructure
 - Incentives

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Legislation and Regulatory Issues

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Biodiesel Tax Credit

- Credit taken at the blender level
 - Enables biodiesel blends to be marketed more competitive to diesel fuel
 - Available for blends up to B99.9
- Structured to benefit all consumers (taxable and tax exempt markets)
 - Also including heating oil
 - B100 sales; income tax only
- Expires December 31, 2008
 - Implied investment risk



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How will it affect price?

- DTN's Alt Fuels Index on 8/18/05:
 - No. 2 diesel: \$1.92/gal.
 - B100: \$2.76/gal.
 - The tax incentive could lower the price of B20 by 20 cents
- Informal analysis: Given current crude oil prices, we could see a substantial increase in demand after the incentive has been fully implemented.



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Additional Federal Initiatives

- **Renewable Fuels Standard**
 - 7.5 billion gallon requirement by 2012 included in the House version of the Energy Bill
 - Available to both ethanol and biodiesel
 - Refiners will need determine what combination or choice makes economic and logistical sense

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CCC Bioenergy Program

- Program originally funded at \$150,000,000 per year through FY2006.
 - FY 2005 funded at \$100 million, FY 2006 could be \$60 million
- Available to both ethanol and biodiesel plants.
 - No one producer can receive more than 5% of the program funding (\$7.5 million).
- Payments are based upon soybean prices in the county the plant is located in.
- Prorate factor has consistently been below 1.0 for last two years
 - 76.975%, 62.792%, 55.852%, 57.623%, 39.62% respectively
- This CCC Bioenergy payments program will not be continued past 2006

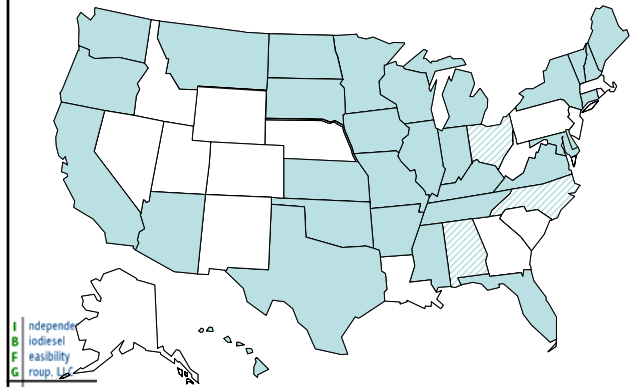
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State Policy—Biodiesel

- Remains critical to the industry.
- States are increasingly taking proactive steps to implement policies to enhance the use of biofuels.
 - 2004 130 biodiesel related bills 27 passed.
 - (30% increase over 2003)
 - 2005 44 biodiesel related bills 18 states.

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State Biodiesel Initiatives



Feedstock Supply

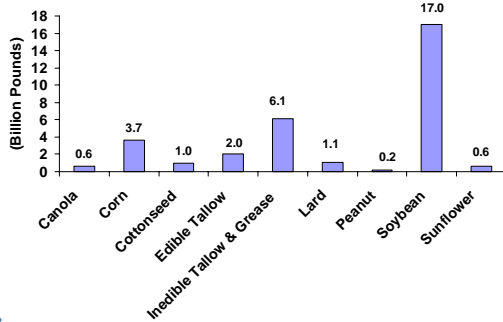
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Key Feedstock Issues

- Quality
- Price
- Consistency of Supply

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2003 US Fats & Oils Production



Total US Market: 30.3 billion lbs/yr

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Biodiesel: U.S. Looking Forward

- **Current Potential: 1.7 Billion gal/year**
 - Displaces 5.5% of national on-hwy. demand.
- **Near-Term Potential: (2015): 3.5 Billion gal/year**
 - Displaces 6.8% of national on-hwy. demand.
- **Long-Term Potential: (2030): 10 Billion gal/year**

(Source: NREL; Biomass Oil Analysis: Research Needs & Recommendations. June 2004)

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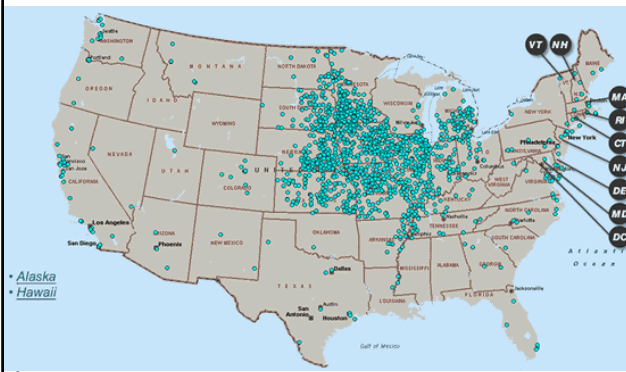
Infrastructure

- Fuel available through direct shipment or from over 1,000 petroleum distributors nationwide
- About 400 public retail filling stations nationwide
- Movement towards biodiesel at the terminal

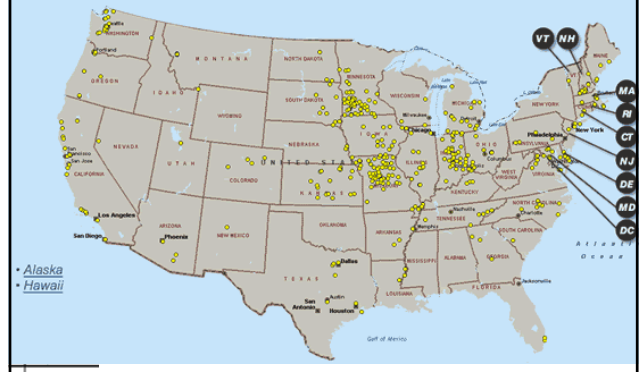


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Distribution Outlets (August 05)



Retail Outlets (August 05)



Biodiesel Capacity (Current Competitors)

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Producers and Marketers

- In 1996, there were two registered biodiesel suppliers.
- In 2005, there are more than 39 companies who have invested millions of private dollars into the development of the biodiesel manufacturing plants and industry development activities.

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Production Locations (August 05)

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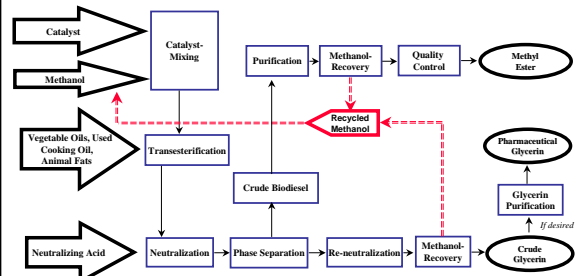
Proposed Plants (August 05)

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Biodiesel Technology

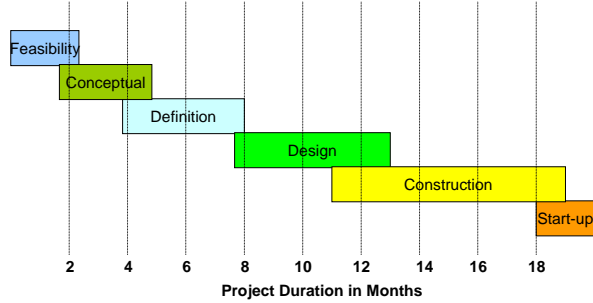
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Biodiesel Production Process



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Biodiesel Plant Project Schedule



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Critical Risk Factors

- Legislation
- Feedstock Market Swings
- Diesel Fuel Market Swings
- New Biodiesel Markets

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Summary



- Biodiesel is an exciting new industry
- Many opportunities are available
- As are many pitfalls

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