

# Biodiesel Overview

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# Biodiesel Overview

## Outline

- Biodiesel Glossary
- Current Deere Position
- Present Global Situation
- Trade Association Positions
- Major Issues Impacting Industry Growth - Rate Limiters
- Steps for Successful Growth
- Questions



# Biofuels Glossary

## Biodiesel

- Comprised of Mono-alkyl esters of long chain fatty acids (Fatty Acid Methyl Esters or FAME)
- Derived from vegetable oils or animal fats
- Designated as B100 meeting ASTM D6751 (US), EN 14214 (EU) IRAM 6515 (Argentina), ANP 42/2004 (Brazil), Fuel Standard Determination 2003 (Australia)
- Transesterification: standard process to make biodiesel
  - Soybean Methyl Ester - SME, predominantly in SA and US
  - Rapeseed (or Canola) Methyl Ester - RME, predominantly in Europe
  - Palm Methyl Ester - PME, predominantly in Asia
  - Animal fats (beef tallow, pork lard)
  - Yellow greases (waste cooking oil or recycled greases)
  - Other feedstocks (jatropha curcas, cottonseed, sunflower, coconut, sesame, etc.)
- Energy content of biodiesel (B100) is 90% of petroleum diesel



# John Deere Leadership in Biodiesel

5% biodiesel blend (B5) approved for general use in all John Deere products - December 2001



2% biodiesel blend (B2) for U.S. factory fill when equipment leaves John Deere factories - March 2005

# Why B2 as a Factory Fill?

Readily available at a competitive price

Meets the high quality fuel standards that we have set for our engines

Deere requires that the Biodiesel fuel blended into the B2 must be from a BQ 9000 Accredited producer

Excellent lubricity characteristics

Easily blended

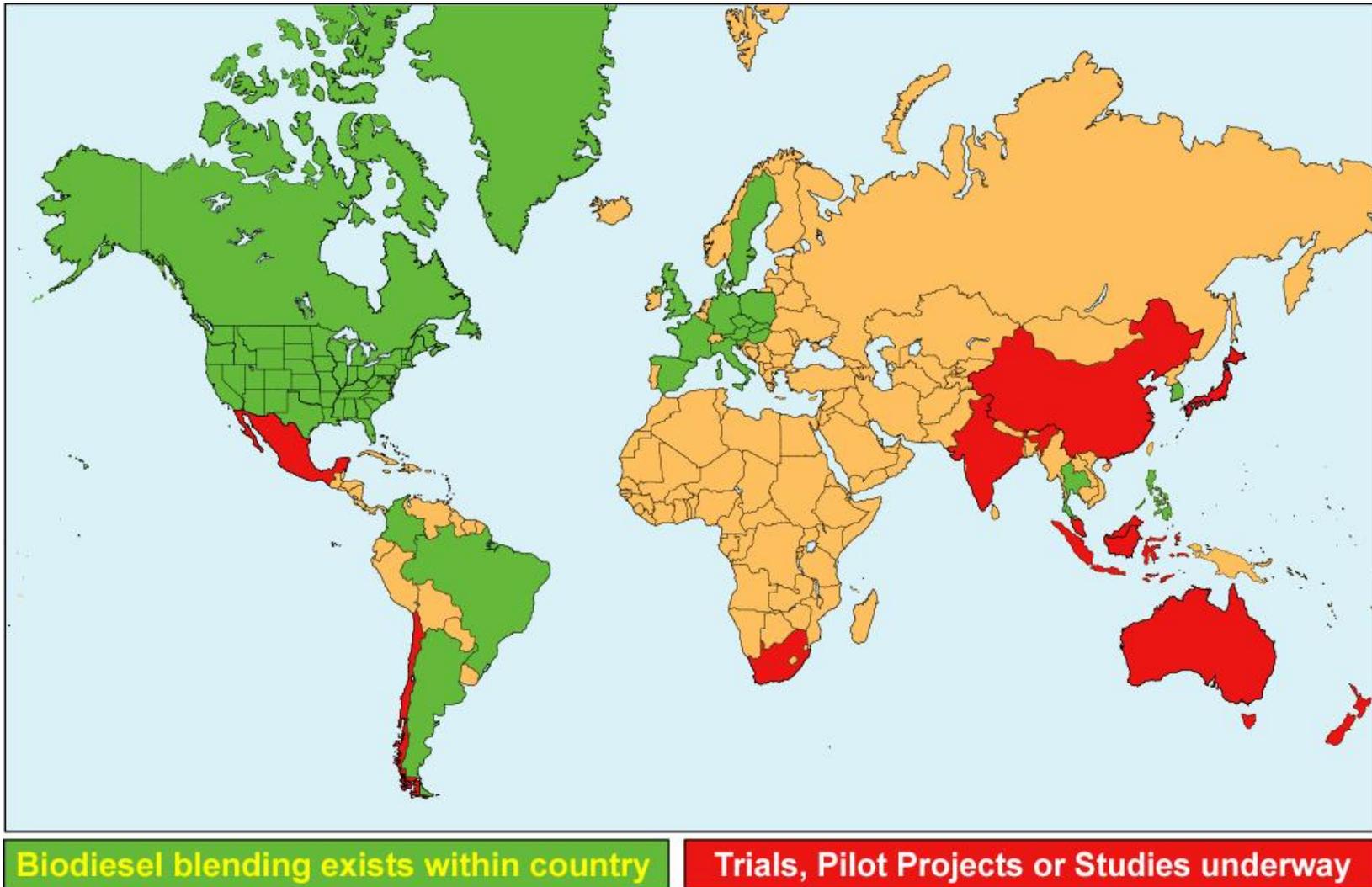
Can be used year round

Positive step toward adoption of renewable fuels

If B2 were used in all diesel fuel we could displace 1 billion gallons of foreign oil per year



# Global View of Biodiesel Usage, 2006



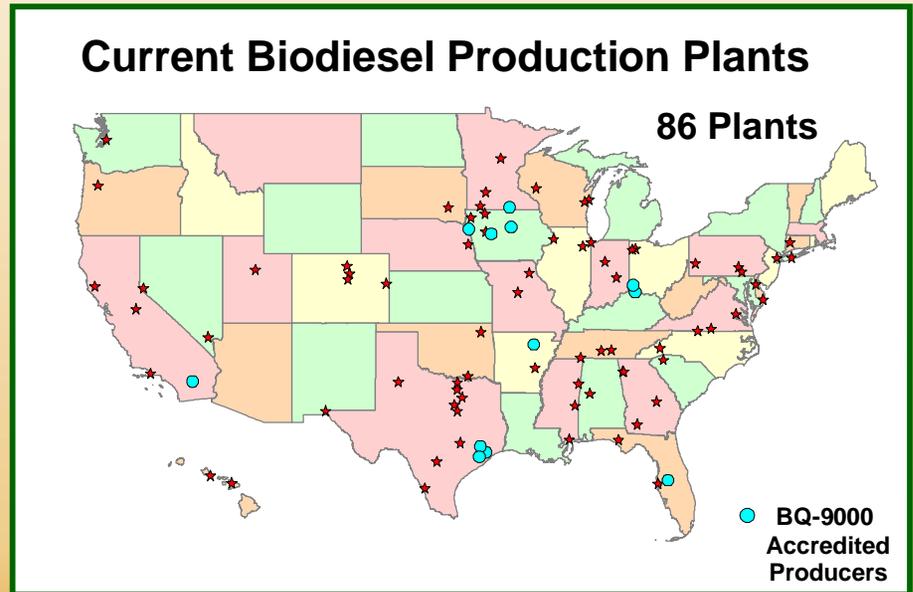
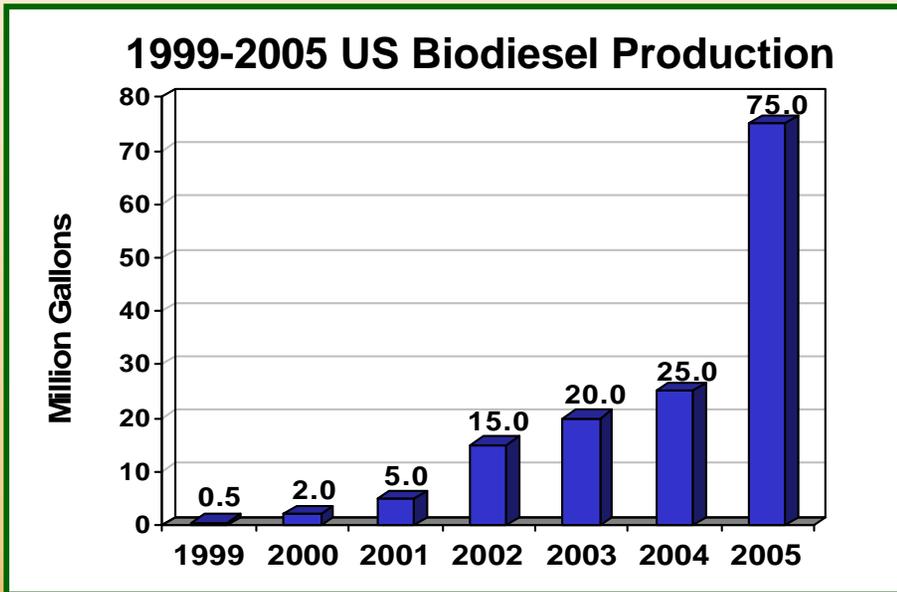
Source: IFQC Global Biofuels Center, August 2006.

Source: IFQC, 2006.

# Present Global Situation – Biodiesel Production Increasing

## United States

- 2004 to 2005 production triples to 75M gallons
- 2006 production capacity is approximately 600M gallons
- Production capacity is projected to be 1.7B gallons by mid-2008
- Soybeans are primary feedstock



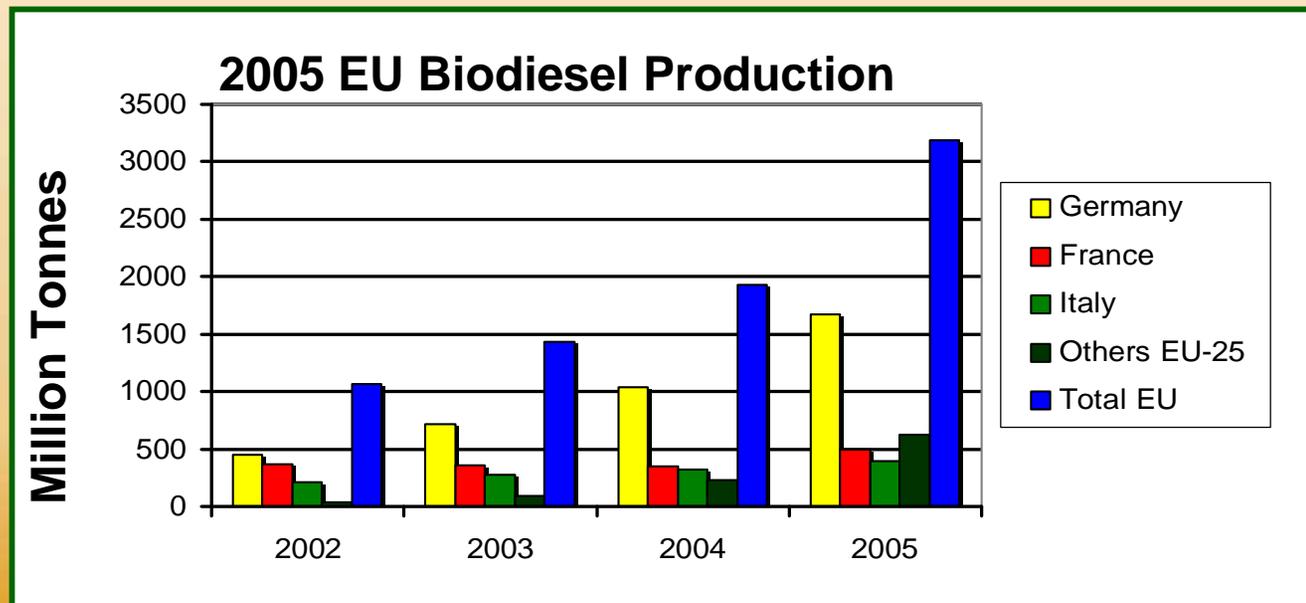
Source: National Biodiesel Board



# Present Global Situation – Biodiesel Production Increasing

## Europe

- EU 2004 to 2005 production increased 65% to 935M gallons (3.2M tonnes)
  - German production increased more than 50% per year from 2003 to 2005
  - 2005 German production was 490M gallons (1.7M tonnes)
- EU 2006 production capacity is 1.7B gallons (5.8M tonnes)
- Rapeseed is primary feedstock



Source: European Biodiesel Board

# Present Global Situation – Biodiesel Production Increasing

## Brazil

- Current production capacity is 53M gallons (203M liters) from 18 producers
- 20+ additional plants expected to become operational by the end of 2007
- Production capacity is projected to be 400M gallons (1.5B liters) by end of 2007

## Argentina

- Current production capacity is 18 M gallons (68M liters) from 10 producers

## Australia

- Current production capacity is 80 M gallons (287 M liters) from 8 producers
- 6 additional plants are expected to become operational by the end of 2007
- Production capacity is projected to be 200 M gallons (750 M liters) by end of 2007



# Trade Association Positions on Biodiesel

Association	Position
Fuel Injection Equipment Manufacturers	approves up to B5
Engine Manufacturers Association (EMA)	approves up to B5



# Biodiesel Rate Limiters / Issues

Standards, quality, and handling issues are primary reasons engine and fuel injection equipment manufacturers limit approval levels

- Some B100 standards are incomplete
- Biodiesel blend standards above B5 do not exist
- Quality control for B100 and blended fuels are lacking
  - Filter plugging w/ B2 in Minnesota due to out of spec B100 (high glycerin level)
  - 50% of B100 samples checked by NREL in a recent study did not meet ASTM D 6751

Production capacity and feedstock availability to meet growing demand

Long-term tax incentives required for industry survival

Long term performance, emissions, and durability impact unknown



# Steps for Successful Biodiesel Growth

Promote B2 as the preferred blend while the industry solves quality, distribution, supply, and performance issues, then expand to higher blends

Engage with Engine Manufacturers Association, National Biodiesel Board, Euromot, ASTM and other industry groups to advance biodiesel standards, promote production quality, handling and distribution of biodiesel fuels

Work with federal and state authorities to craft / refine renewable energy policies

Continue testing to ascertain the severity of potential performance and durability problems and evaluate / develop solutions



# Questions



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