



Fuels & Industrials



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Biodiesel

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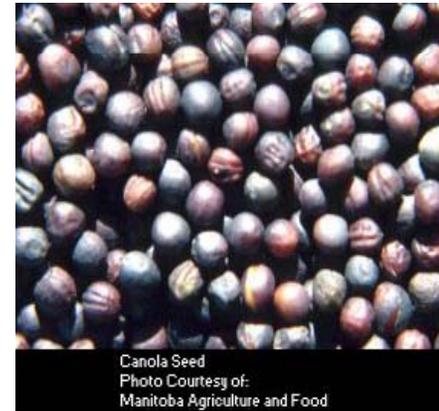
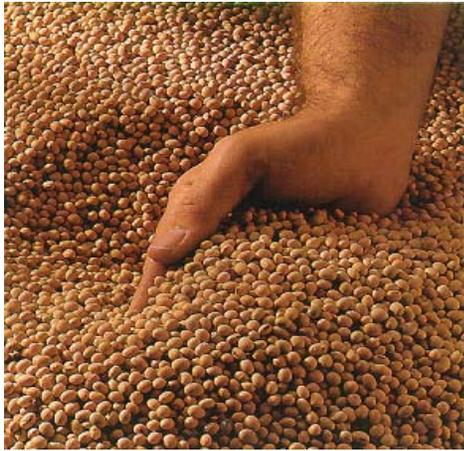
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Biodiesel – Inputs



Canola Seed
Photo Courtesy of:
Manitoba Agriculture and Food



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Biodiesel – General

What is Biodiesel?

Biodiesel is defined as the mono alkyl esters of long chain fatty acids, Commonly referred to as a Methyl Ester

What are the Inputs?

Vegetable oil, Animal Fat, Yellow Grease and Spent Oil
can be used.

Although biodiesel does not contain petroleum, it can be blended with diesel at any level or used in its pure form

- **Must meet ASTM D 6751 Quality Standards**



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General Information – Biodiesel

100 pounds + 10 pounds = 100 pounds + 10 pounds
Triglyceride Methanol Biodiesel Glycerine
(Vegetable oil (Catalyst) (Fatty Acid)
or animal fat)

B100 = Biodiesel

Specified by ASTM D 6751

B20 = 20 % B100 blended with 80% petrodiesel



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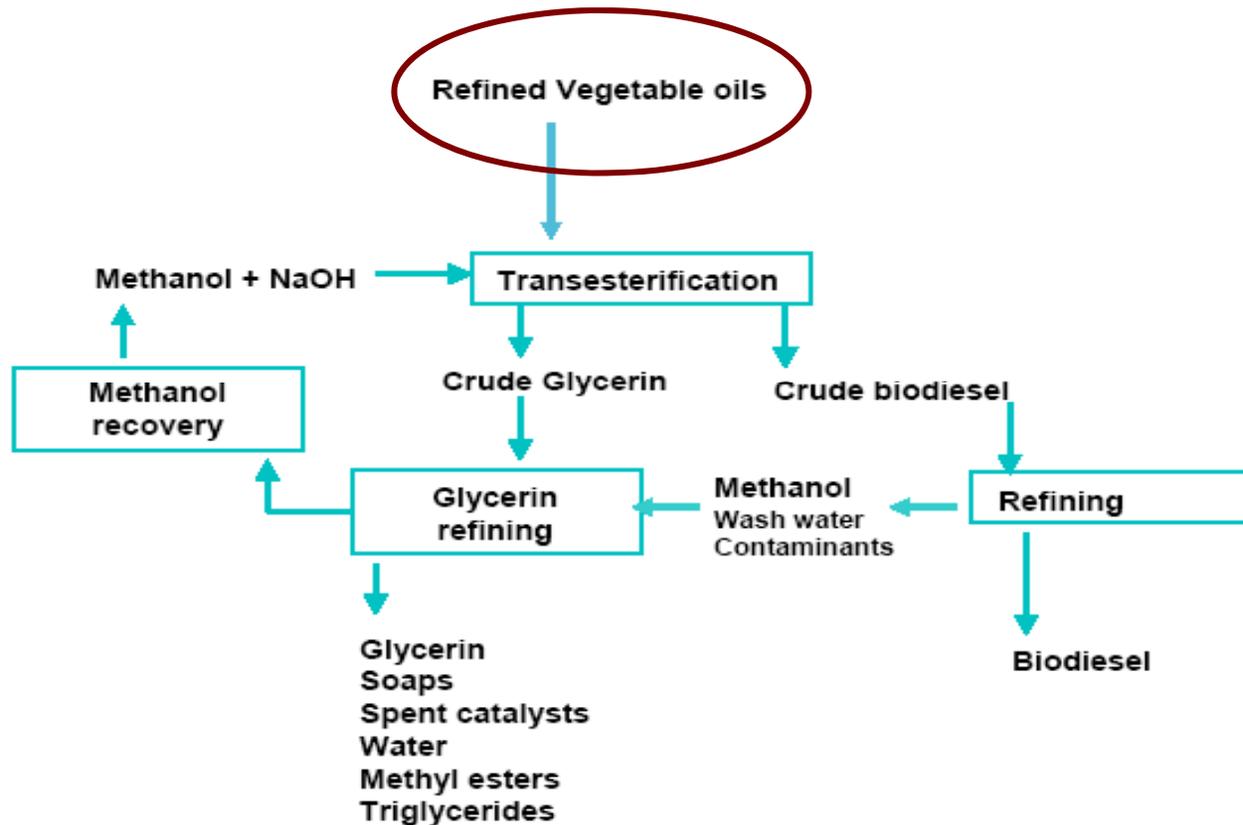
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Biodiesel - Transesterification



Transesterification



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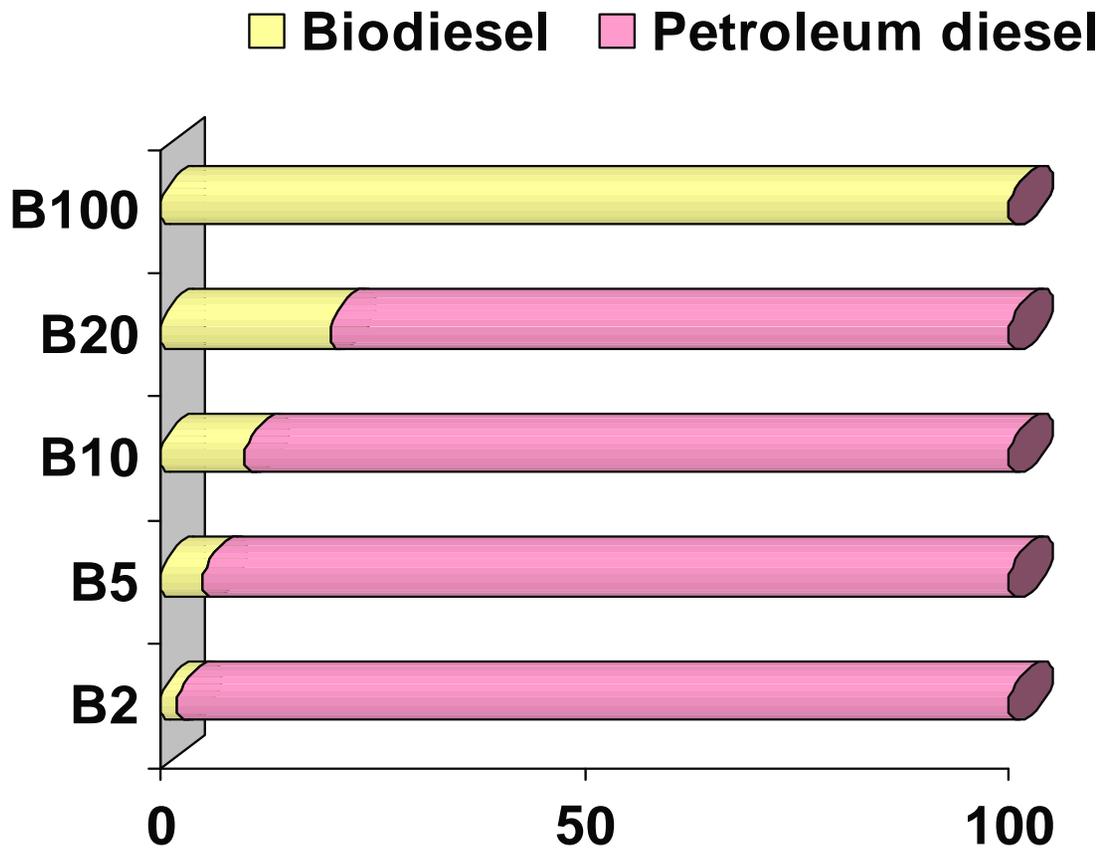
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Biodiesel Blends



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Biodiesel Capacity

- ▶ **Current Existing Capacity**
 - 1.85 B Gallons-based on name plate capacity
- ▶ **Capacity under construction or expansion**
 - 1.37 B Gallons-based on name plate Capacity
- ▶ **3.22 B Gallons Total current capacity and under construction or expansion**

Source: National Biodiesel Board



Biodiesel – Production USA

	Production
	Gal/Year
2000	1,989,400
2001	6,437,200
2002	8,814,600
2003	18,400,000
2004	18,900,000
2005	75,000,000
2006	225,000,000
2007	450,000,000*

Source CCC Data

*Estimate



USDA Projections

- ▶ 2007-2008 Crop Year
 - 518 Million Gallons from Soybean oil*

*USDA December 2007 Crop Report



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Blenders Tax Credit

- ▶ \$1.00 per gallon of B100 Biodiesel
 - Must meet ASTM D 6751 to qualify for the credit
 - Paid to the blender
 - Has been the main catalyst for growth in the US



Biodiesel Legislative Priorities

- ▶ Extend Tax Credit beyond 12-31-2008
- ▶ Create a Federal RFS for biodiesel
 - Biodiesel Mandate Included in Recent Energy Bill
 - ▶ 500 M Gallons in 2009
 - ▶ 650 M Gallons in 2010
 - ▶ 800 M Gallons in 2011
 - ▶ 1.0 B Gallons in 2012
- ▶ CCC Bioenergy Program (In the Farm Bill)



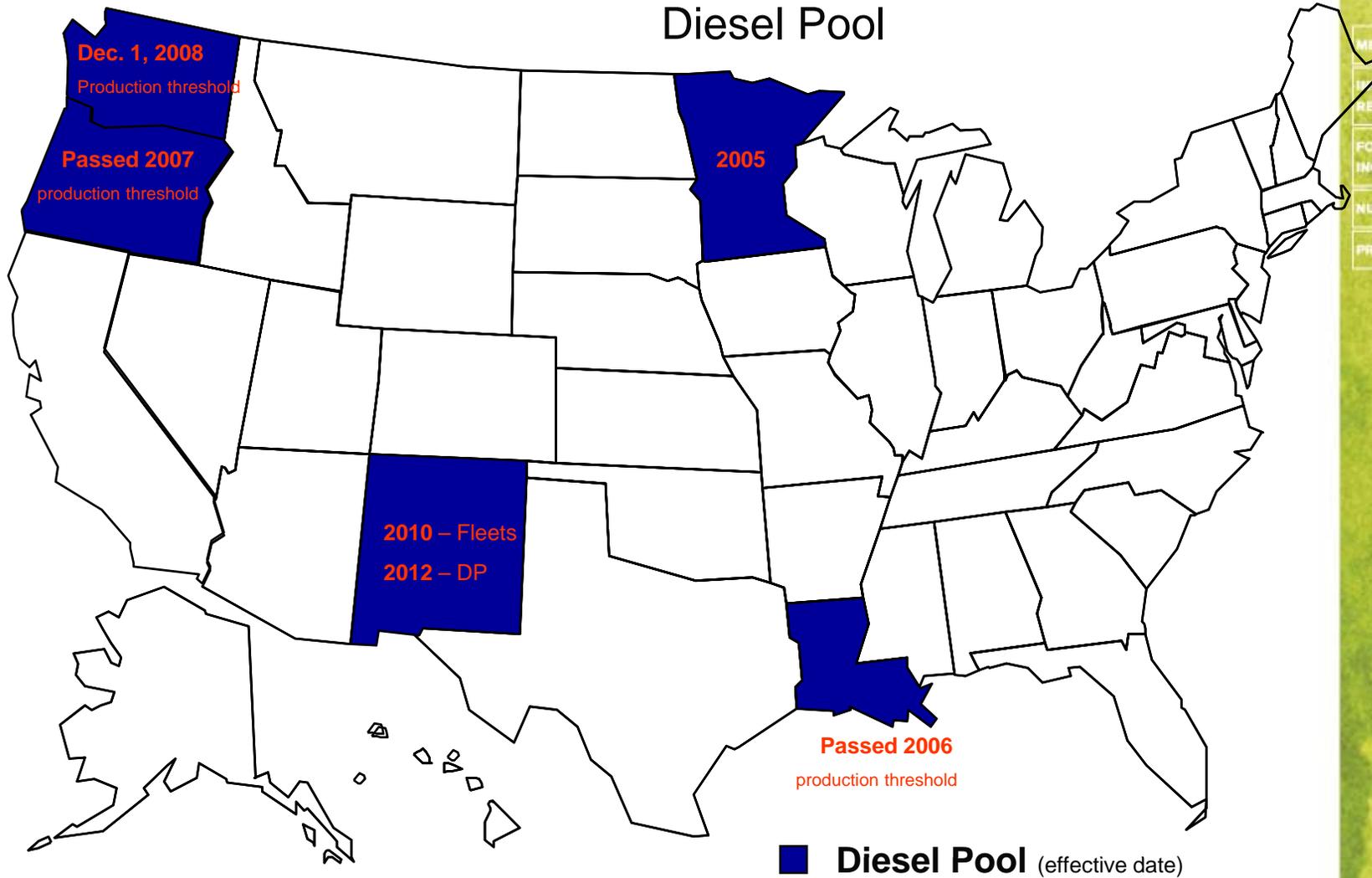
State Programs

- ▶ Currently over 300 Bills specifically related to Biodiesel
 - More than 40 have become law to date
 - Ranging from Mandates, Incentives, Fleet use etc.
 - Existing Mandates: MN, LA, WA, OR, NM
 - ▶ More states considering mandates
 - ▶ MO, IA, with MN possible increase to B5 or higher
 - Sales Tax Incentives: Such as IL Tax Exemption for B11
 - Various State initiatives for fleet use
 - Producer incentives: MO, & TX



Current State Biodiesel Requirements:

Diesel Pool



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ASTM D 6751

▶ Recent Changes

- Sodium & Potassium, Max 5 PPM
- Calcium & Magnesium, Max 5 PPM
- Oxidative Stability Parameter, Limit of 3 hours
- Flash Point, If over 130 deg. F, then no test for Methanol
- Most recent version of ASTM is 6751-07 b

▶ Proposed Changes

- Cold Soak Filtration Requirement
- Change Water and Sediment Test to a separate water spec.



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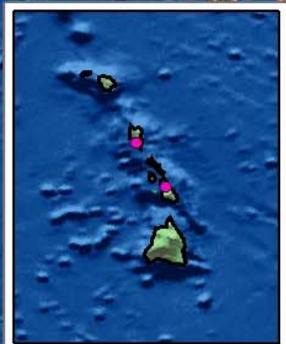
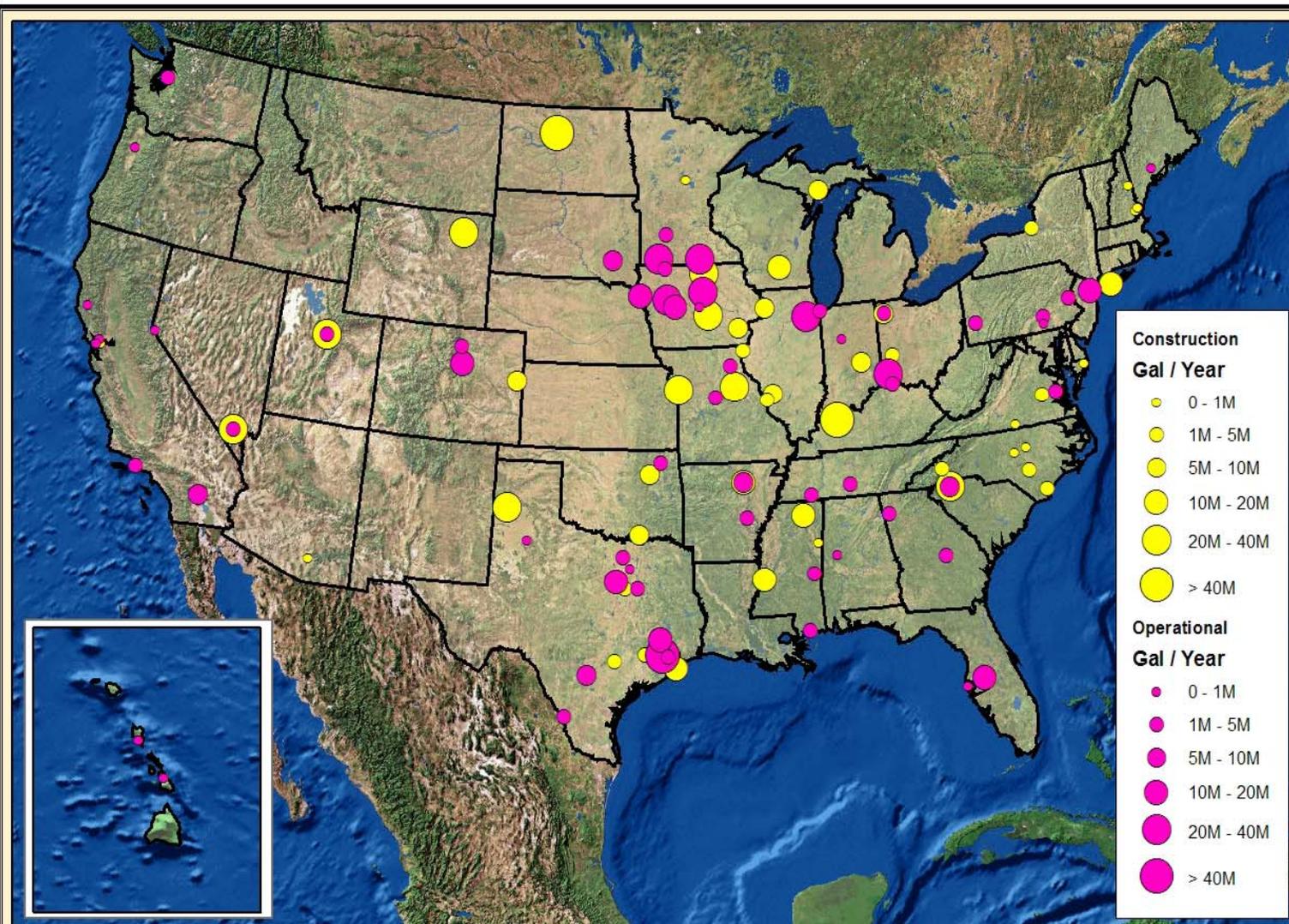
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Biofuel Legislation in Selected Countries

- **EU:** indicative level of 5.75% 2010
 10% blending obligation 2020 ?
- **USA:** renewable fuel standard 7.5 bln
 gallons by 2012
 tax credit for biodiesel
- **Canada:** 5% by 2012
- **Brazil:** 2% biodiesel by 2008, 5% in 2013
- **Argentina:** 5% biodiesel 2010
- **Malaysia:** mandate for biodiesel planned
- **Indonesia:** mandate under consideration
- **Thailand:** ethanol mandate discussed

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U.S. Biodiesel Production Capacity

Operational & Construction Plants as of Aug 2006

CONFIDENTIAL
Archer Daniels Midland

August 2006



ADM's Involvement

▶ ADM Plants: 415,000,000 gallons world wide

– Leer, Germany	40,000,000 gallons	- Active
– Hamburg, Germany	125,000,000 gallons	- Active
– Mainz, Germany	85,000,000 gallons	- Active
– Velva, ND	85,000,000 gallons	- Active
– Mexico, MO*	30,000,000 gallons	- Active
– Brazil	50,000,000 gallons	- Active

* DENOTES JOINT VENTURE

ETP = estimate time of production



Biodiesel Performance



- High lubricity
- Cold flow
 - ✓ B2 the same as #2 petroleum diesel
- High flash point
 - ✓ 260°F vs. 117°F for diesel
- Safest fuel to use, handle & store



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Biodiesel Performance

- Similar to petroleum diesel
- Highest BTU content of any alternative fuel
- High cetane
 - ✓ Minimum cetane of 47, which is higher than most #2 diesel



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General Information – 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%

Source: NBB



Biodiesel Technical Manual

- ▶ Developed by ADM
- ▶ Available on line

<http://www.admworld.com/naen/mktcol/fuels.asp#paintsSection>

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Thank You !



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