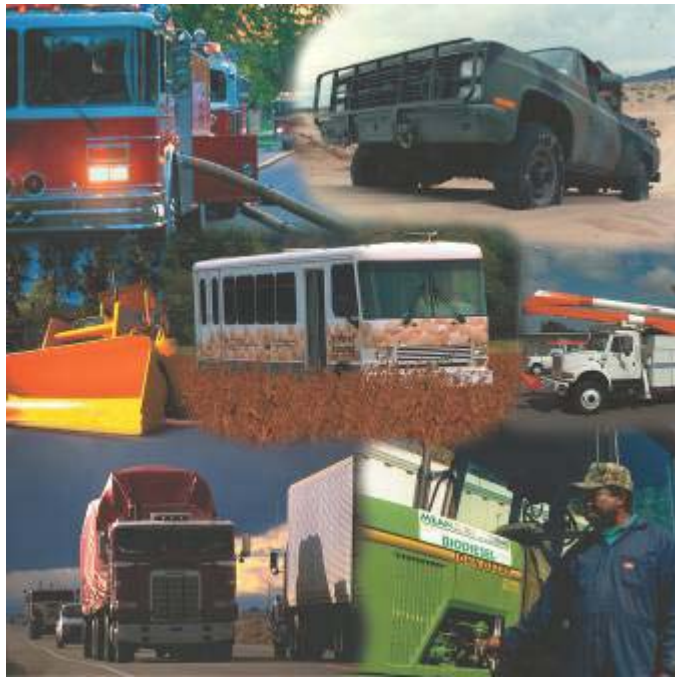


Biodiesel Train-the-Trainer



Joe Jobe

Executive Director/
National Biodiesel Board

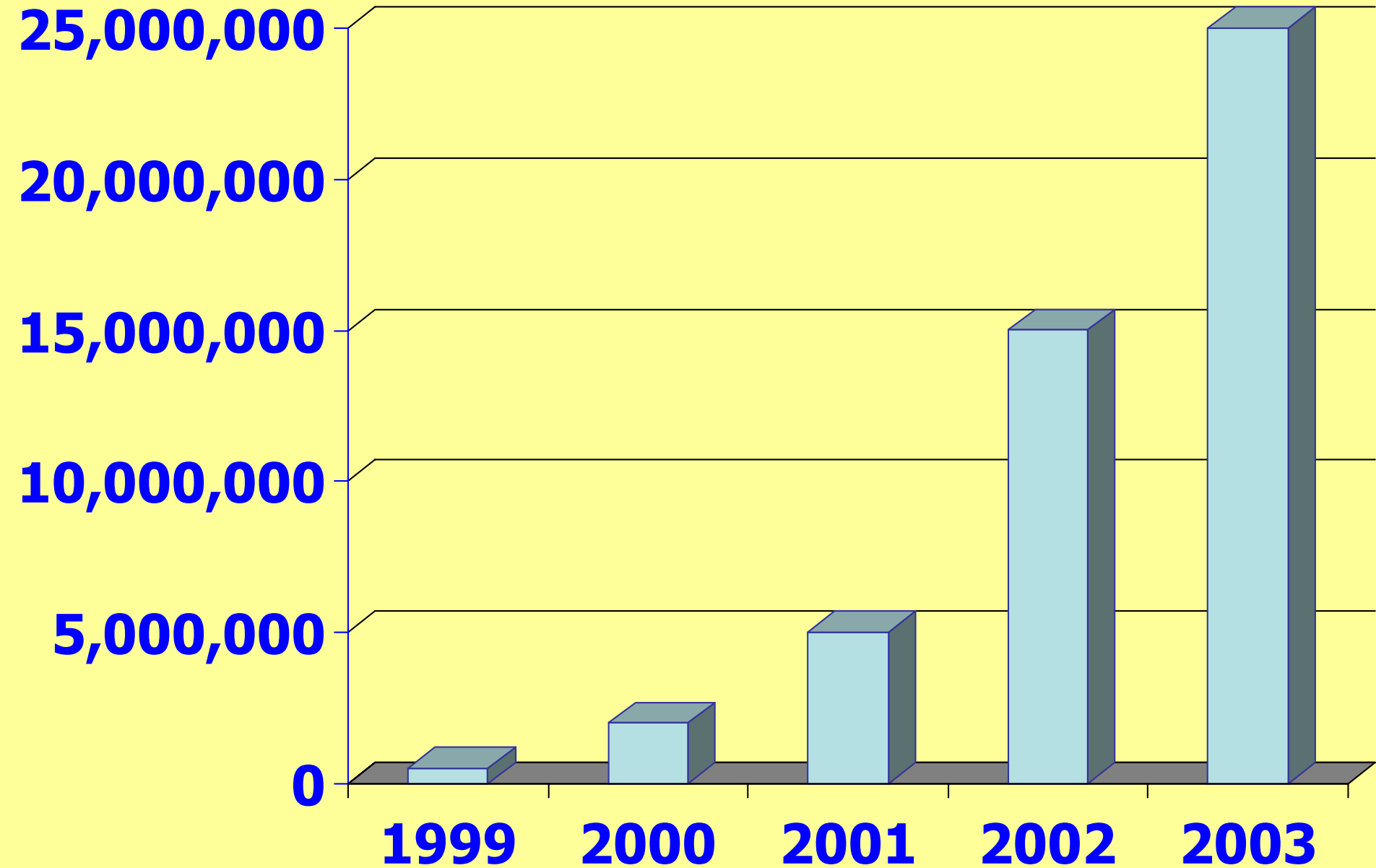


Today's Topics

- Industry Overview
- Update on Legislation
- OEM Activities
- Cold Flow
- ASTM D 6751 Specification
- Grant Opportunities/National Program
- Biodiesel Messaging with Media



B100 Fuel Survey Results

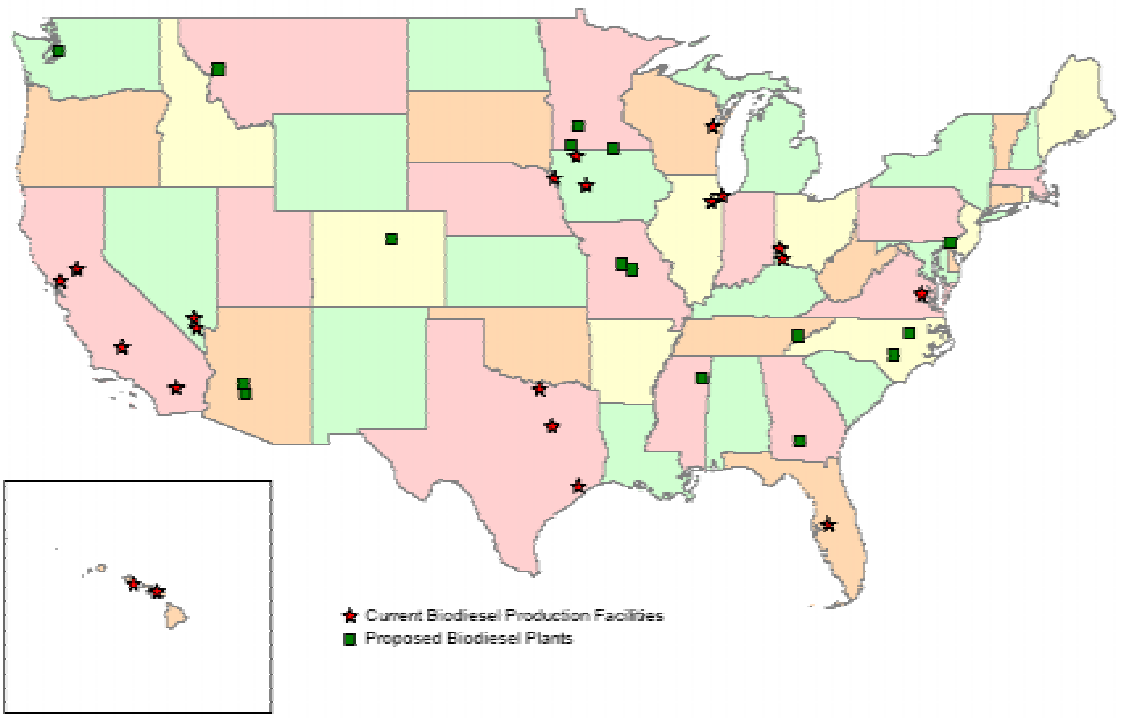


Production

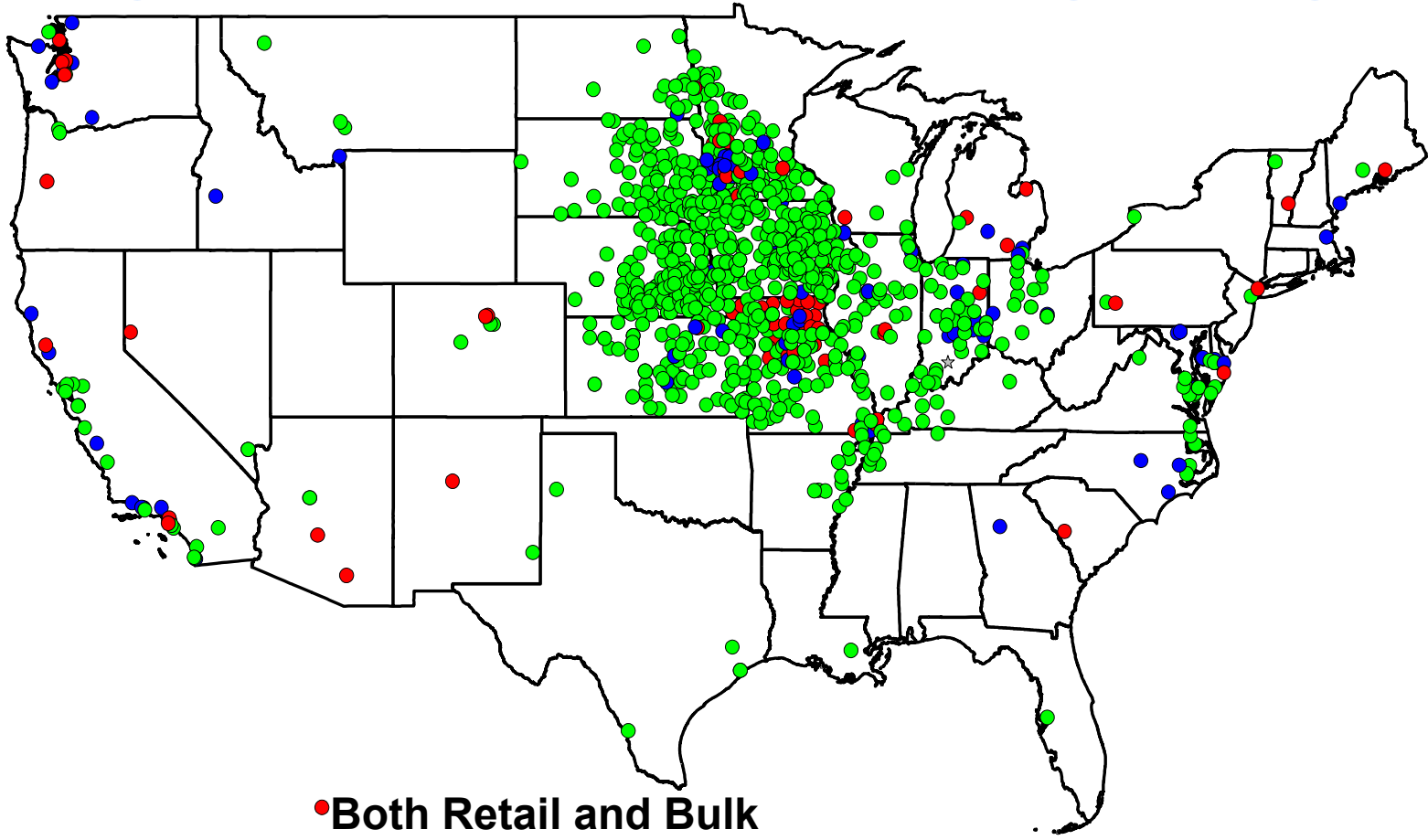
Current and Potential Biodiesel Production

Current and Proposed Biodiesel Production Plants

March, 2004



Biodiesel Distribution Points



- Both Retail and Bulk
- Bulk Distribution
- Retail Outlet



INFRASTRUCTURE

- More than 1000 petro distributors carry biodiesel
- Movement towards biodiesel at the terminal
- Indiana, Kansas, Wisconsin and Iowa



Public Pumps

- Up to about 200 nationwide
- Colorado is on the map with B20 pumps
 - ◆ 5 now, at least 10 more soon
 - ◆ Blue Sun Biodiesel



BIODIESEL MARKETS

- **B20** – EPACT, municipal, school buses
- **B100** – Niche markets: power generation, garbage truck fleets, California market
- **B2** – Lubricity component for Ag Fuels, premium diesel fuels, RFS compliance w/ ULSD
 - ◆ Low blend is now an important strategy to Clean Cities program as well



Industry Priorities

- 1) National Energy Initiatives
- 2) State Energy Initiatives
- 3) Original Equipment Manufacturer Development
- 4) 2007 Engine Testing and Technology Development Program



Legislative Update

...and the first biodiesel tax incentive



Biodiesel Tax Incentive

- Federal Excise Tax Credit
- One penny per percentage of biodiesel per gallon for “agri-biodiesel” made from virgin veg oils and animal fats, and 1/2 penny per percentage of biodiesel made from other feedstocks



Biodiesel Tax Incentive

- The benefits are available to fuel blenders/distributors and other diesel excise tax payers, who carry an excise tax liability, in the form of a credit against the motor fuels excise tax or a credit against income tax.
- Biodiesel is eligible to meet Renewable Fuels Standard



Biodiesel Tax Incentive

- Currently IN the Senate Transportation Bill (S. 1072)
- Currently IN the Senate version of the Foreign Sales Corporation/Extraterritorial Income (FSC/ETI) bill (S. 1637)
- In the Energy Bill, Energy Bill "Lite"





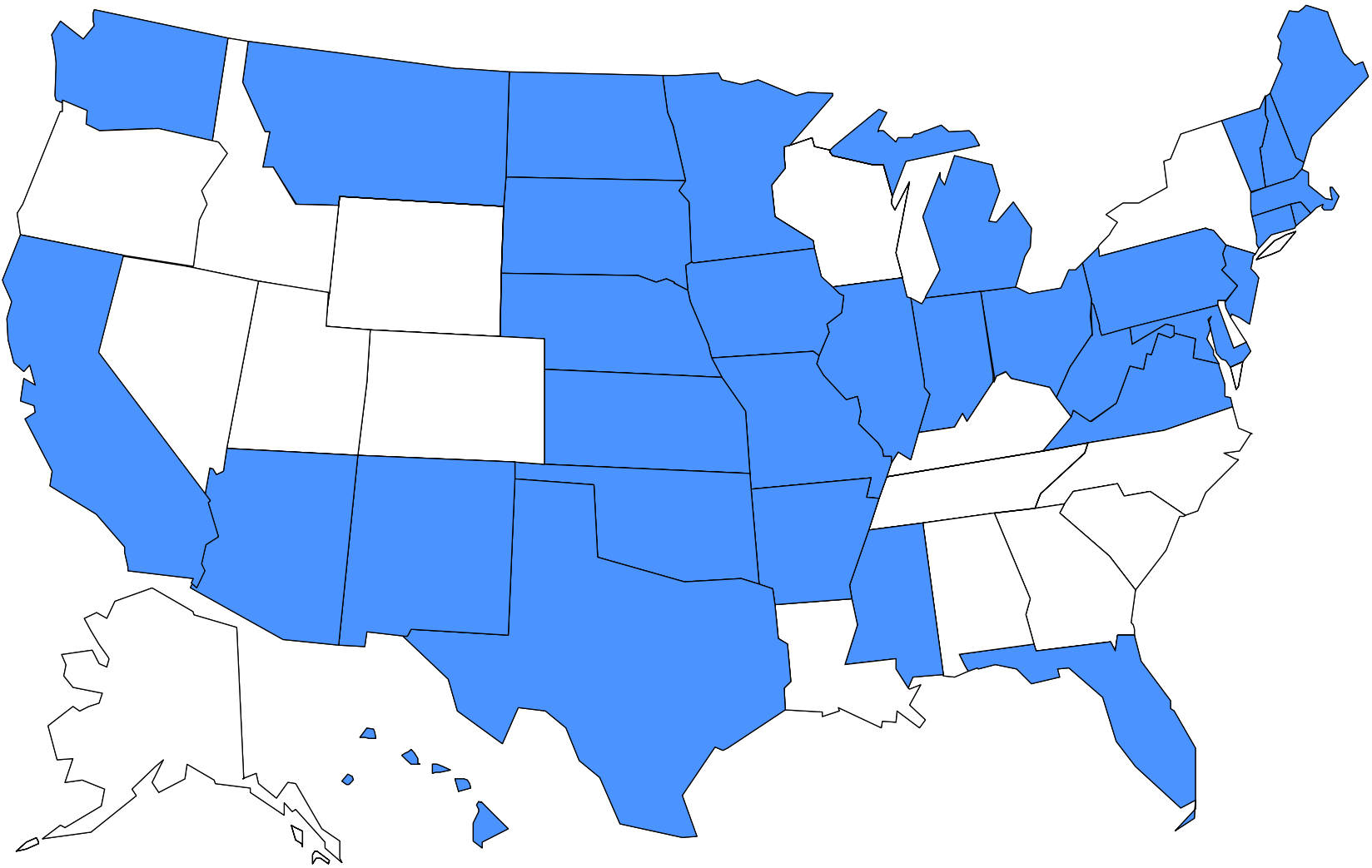
State Regulatory Activity

Approximately 90 biodiesel specific bills were introduced last session in 33 states.



BIODIESEL

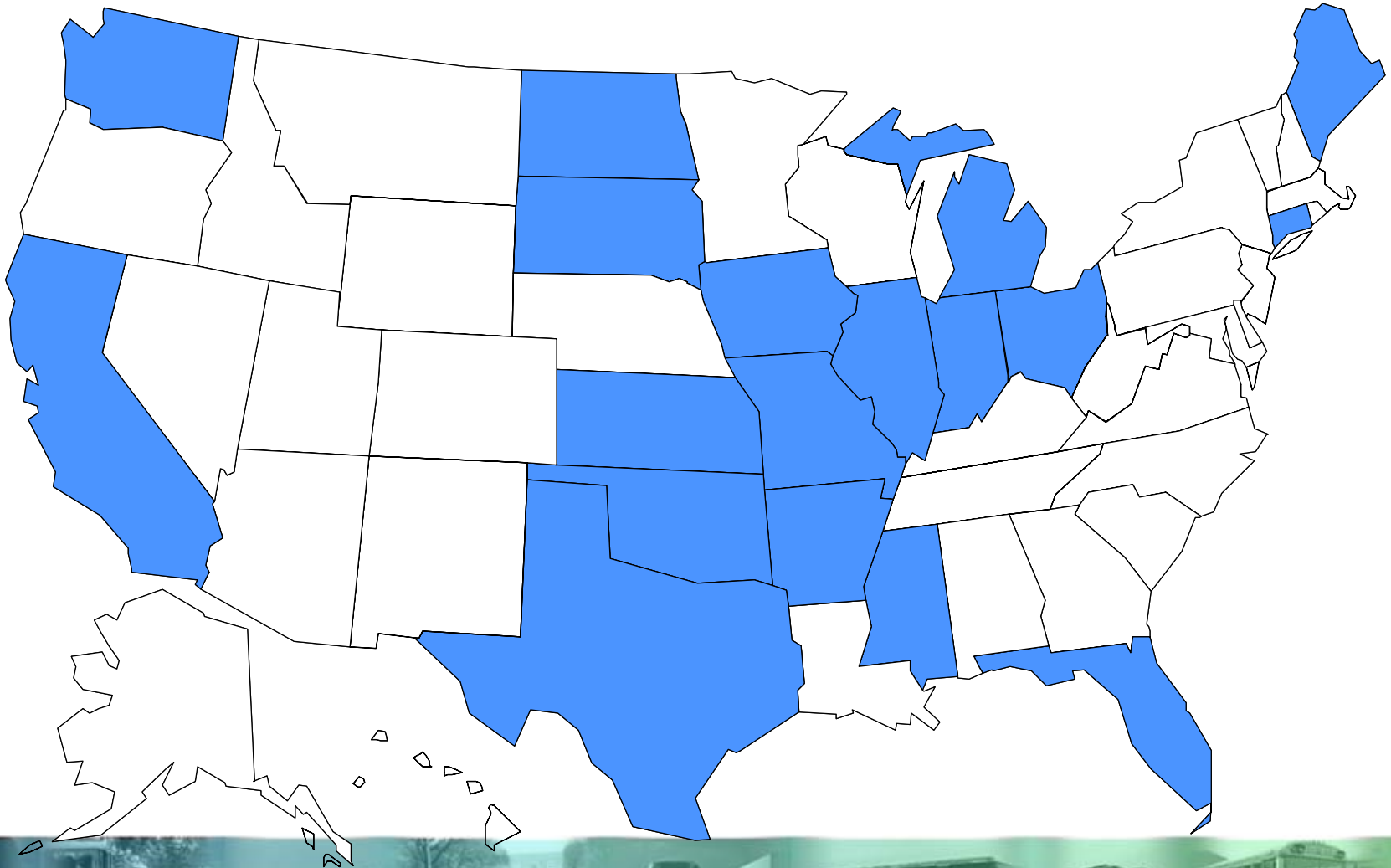
TM by the National Biodiesel Board



Twenty-six biodiesel specific bills passed.



Passed Biodiesel Legislation



State Biodiesel Legislation

- Minnesota B2 Requirement (passed 2002)
 - ◆ Effective July 1, 2005
 - ◆ 16 m gallons per year
- Illinois sales tax exemption
- North Dakota income and excise tax exemption
- Arkansas income tax credit on equipment



OEM Acceptance

Warranty position statements, industry outreach



OEM Biodiesel Positions

➤ OEM's:

- ◆ B100 Must Meet ASTM D 6751
- ◆ Most OEM HQ's have B20 experience:
 - Won't void warranty
 - Problems caused by the fuel are the responsibility of the fuel supplier
 - Want to see additional experience in the field
- ◆ Higher blends OK'd based on experience of OEM and their technology



Warranty Statements

Caterpillar

Cummins

Detroit Diesel

International

John Deere



Cold Flow

...Biodiesel's Achilles' Heel?



Can't Use B20 in Cold Temps?

- Tell THAT to Lou
Summerfield, Glacier
National Park (MT)
- ◆ B20 used in 60+ vehicles/equipment year around
 - ◆ 8000+ gallons of B20 consumed in 2003
 - ◆ Used in temps down to -35



Cold Weather Performance

- B100 freezes faster than most US petrodiesel
- Untreated B20 freezes about 2-5 °F faster than #2 petrodiesel, depending on:
 - ◆ the cold flow properties of the biodiesel
 - ◆ the cold flow properties of the petrodiesel
- The same precautions taken with petrodiesel can be used to insure trouble free operation with biodiesel:



Cold Weather Performance

- Various options exist to insure the fuel does not gel:
 - ◆ Pour and cloud can be addressed with kerosene blending.
 - ◆ Desirable CFPP results can be attained with conventional flow improver technology. Although additives don't work as well on B100 as they do with B20 or petrodiesel.
 - ◆ Fuel heaters or indoor vehicle storage can also be substituted for the use of kerosene or additives.



Cold Weather Performance

- Most diesel vehicle fueling systems recycle warm fuel back to the fuel tank--once started it is usually OK

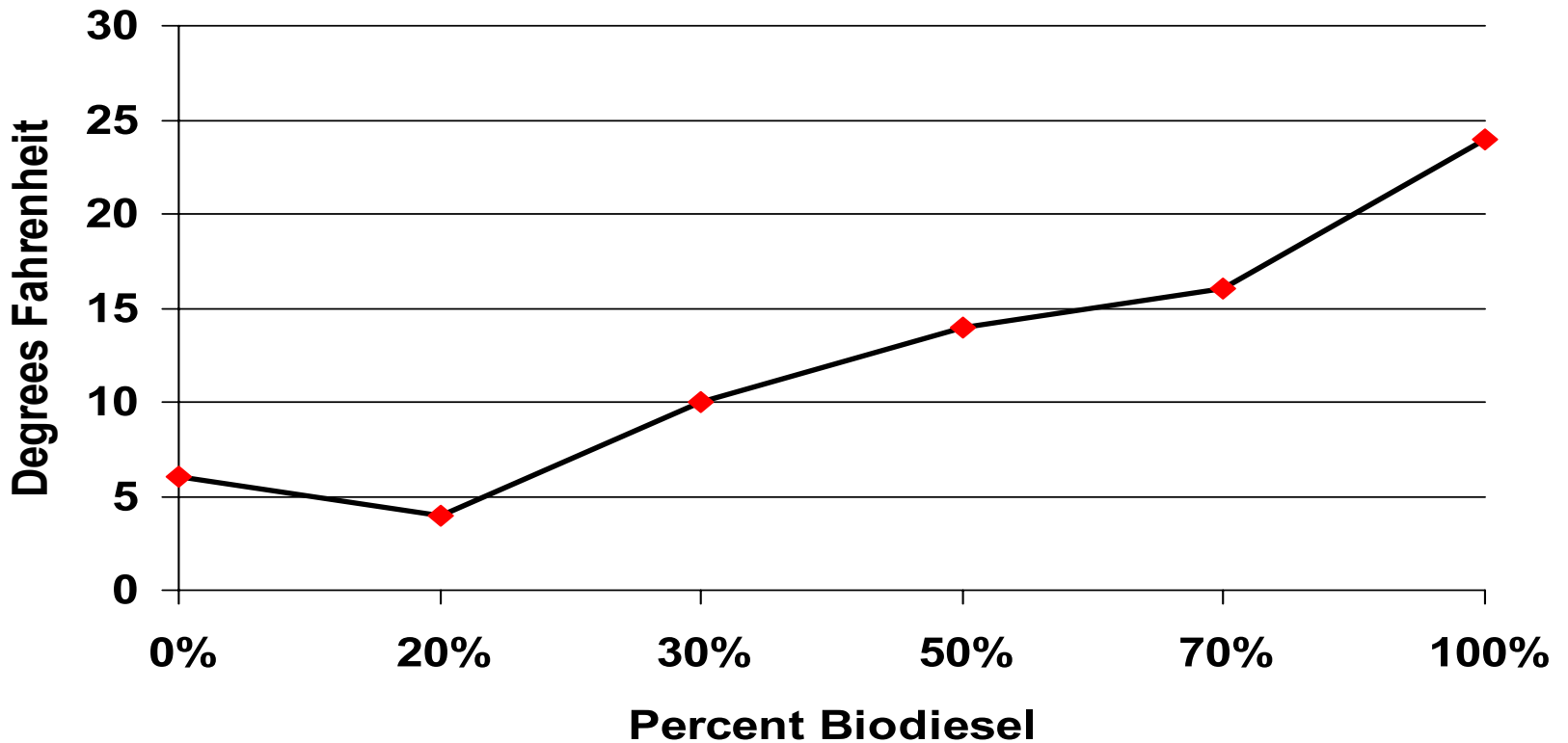


Cold Flow Characteristics

	Cloud Point (°F)	Pour Point (°F)	Cold Filter Plugging Pt
Soy Methyl Esters	32	25	22
#2 Diesel	4	-30	1
2% Soy in #2	6	-25	1
5% Soy in #2	8	-20	-1
50% #1 and 50% #2	-6	-45	-12
2% Soy in 50/50	-6	-40	-14
5% Soy in 50/50	-6	-40	-14
#1 Low Sulfur Diesel	-54	-70	<-30
2% Soy in #1	-45	-60	<-30
5% Soy in #1	-32	-55	<-30



Cold Filter Plug Point IP 309



Cold Flow Additives

- Used seasonally to provide optimum cold weather protection
- Functions by interfering with wax crystal growth
- Use level depends on wax content and temperature



Splash Blending

- Biodiesel is slightly heavier than petroleum diesel with a gravity value of 0.88 versus 0.85
- When possible Biodiesel should be splash blended on top of petroleum diesel
- Blends will not separate in the presence of water however execute proactive tank management



Cold Weather Blending & Storage

- Safe to store underground however lines leading to injection or blending point will require heat of some type
- Above ground storage systems will require insulation, agitation or heating systems to store neat Biodiesel prior to blending
- Neat Biodiesel pour point 30-35 °F



NOx Emissions

...Biodiesel's Other Achilles' Heel?



NOX Additive

- Clean Diesel Technologies
- Southwest Research Institute
- 5% reduction in NOX
- 23% reduction in PM
- www.cdti.com
- (203) 327-7050



ASTM D 6751 Specification



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.



The ASTM Process

- American Society for Testing and Materials
- US Consensus body that sets fuel and lubricant specifications recognized by EPA and customers
- ASTM biodiesel task force formed in 1994
 - ◆ Develop a specification for biodiesel
- ASTM Process is Consensus Ballot:
 - ◆ Users (consumers, engines), Producers, Gen. Interest
 - ◆ One negative vote can defeat a ballot



ASTM D 6751

<u>Property</u>	<u>ASTM Method</u>	<u>Limits</u>	<u>Units</u>
Flash Point	93	130 min.	degree C
Water & Sediment	2709	0.05 max.	vol. %
Carbon Residue (100% sample)	4530	0.05 max.	wt. %
Sulfated Ash	874	0.02 max.	wt. %
Kin. Viscosity, 40C	445	1.9 - 6.0	mm ² /sec.
Sulfur	5453	0.05 max.	wt. %
Cetane	613	47 min.	
Cloud Point	2500	By Customer	degree C
Copper Corrosion	130	No. 3 max.	
Acid Number	664	0.80 max.	mg KOH/g
Free Glycerin	6854	0.020	wt. %
Total Glycerin	6854	0.240	wt. %
Phosphorous	4951	10 max	ppm
Distillation, T90 AET	1160	360 max	degree C



Important Biodiesel Parameters

- Complete Reaction/Removal of Glycerine
 - ◆ Insured through total/free glycerine
 - ◆ Will cause injector coking, filter plugging, sediment formation
- Removal of Catalyst
 - ◆ Insured through sulfated ash
 - ◆ May cause injector deposits and/or filter plugging



Important Biodiesel Parameters

- Removal of Alcohol
 - ◆ Insured through flash point
 - ◆ May cause premature injector failure, safety concern

- Absence of Free Fatty Acids
 - ◆ Insured through acid value
 - ◆ Will cause fuel system deposits and effect fuel pump and filter operation



Common Questions and Answers – Beyond FAQ

- What is going on with the Energy Bill
- What does “Big Oil” think of biodiesel.
- Who is using it?
- How much does Biodiesel cost?
- What is happening with state legislation?
- Where can I get it?
- Will it hurt my engine?
- Will it affect my engine warranty?
- Does it gel up in the wintertime?
- I heard it increases NOx?
- Is it stable?
- Does it increase bacteria growth in my storage tank?
- I heard it will clog my fuel filters?
- What’s the future of the biodiesel market?
- What are the remaining barriers?
- Does it really smell like french fries?



NBB Technical Library

National Biodiesel Board

www.biodiesel.org

1-800-841-5849



- Educational Videos Available
- Informational Resources
- Technical Resources
- On-line database

