



2013 Northeast Diesel Collaborative Partners Meeting

Alternative Fuels and Advanced Technologies
to
Improve Efficiency and Reduce Fuel Consumption

Biodiesel Americas First Advanced Biofuel

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Topics for Today

- The National Biodiesel Board, NBB
- Biodiesel - Americas First Advanced Biofuel
- OEM Acceptance
- OEM Recommendations
- Biodiesel Emissions Technology Compatibility
- Biodiesel Resources



National Biodiesel Board

- The National Biodiesel Board (NBB) is the trade association for the U.S. Biodiesel Industry
- Receives funding from 3 sources:
 - ✓ Soybean Check-off program (i.e. farmers)
 - ✓ Government Grants and programs
 - ✓ Biodiesel Producer contributions
- Primary Functions are Technical, Regulatory, Marketing and Lobbying, Education and Outreach
- Over \$100MM in R&D over last 15 years primarily from soybean farmers



NBB Objectives

- Provide comprehensive training about biodiesel production, handling, use, performance, quality, and emissions
- Provide access to industry experts for more detailed questions and answers about biodiesel
- Introduce the National Biodiesel Board's Ambassador Technical Training programs and the program resources.



Biodiesel is America's first Advanced Biofuel

Defined by:

- U.S. EPA Lifecycle Analysis
- ASTM Fuel Specification





EPA Definition, 40 CFR 80.1401

Advanced Biofuel a renewable fuel with lifecycle GHG emissions 50% less than petroleum baseline.

Biodiesel mono-alkyl ester that meets ASTM D 6751.

Renewable Fuel and Renewable Biomass, (feed stock).

Feed Stock must come from waste or existing agricultural land.

Program Compliance and Recordkeeping

The new compliance requirements for a biodiesel producer.

- [Registration with EPA](#)

- [RIN Generation](#)

- [Reporting](#)

<http://www.epa.gov/otaq/regs/fuels/fuelsregistration.htm>

- [Record Keeping](#)

<http://www.epa.gov/otaq/renewablefuels/index.htm>

Quality Assurance

Biodiesel B100 ASTM D6751 - Performance-based standard
feedstock and process neutral

Diesel ASTM D975 – Covers petroleum diesel and blends up to B5

Heating Oil ASTM D396 – Covers heating oil and blends up to B5

Biodiesel Blends B6 to B20, ASTM D7467 – Covers blends (B6-B20) for on/off road engines.
Designed so that B100 meets D6751 and petroleum fuels meet their respective D975, or D396.



Biodiesel B100, BQ9000 – Voluntary Quality Assurance Programs





Using Blends B2 to B20:

Biodiesel Use and Handling Guidelines:

- Biodiesel, B100 pure biodiesel must meet ASTM D6751 specification before blending with petroleum diesel.
- Petroleum Diesel must meet ASTM D975 Specification before blending.
- Purchase biodiesel and biodiesel blends from reputable companies registered under the BQ-9000 fuel quality program. This helps insure ASTM grade biodiesel and that the product is fully blended.
- Be aware of the biodiesels cold weather properties and take appropriate precautions as with petroleum diesel. When operating in cold climates, use winter blended fuel.
- Perform regularly scheduled maintenance as dictated by the OEM engine operation and maintenance manual.



Benefits of Biodiesel

- Over 80% Direct Lifecycle Carbon Reduction
- Classified as an “Advanced Biofuel” by US EPA
- B100 is Biodegradable and Non-toxic
- Reduces PM, CO, HC by up to 50% compared to petroleum diesel in non-after treatment engines
- Energy Balance 5:45 : 1
- No Food vs. Fuel Issue—oils/fats are minor by-products of high quality meats and meal
- Biodiesel is a Renewable Biodegradable Domestically Produced Alternative Energy Resource

Performance Benefits

- Biodiesel blends up to B20 can be used in any diesel engine without modification, according to OEM recommendations
- High Cetane (avg. over 50)
- B20 provides similar horse-power, torque, towing capability and fuel economy
- High Lubricity, even in blends as low as 1-2%
- Ultra Low Sulfur avg < 2 ppm
- Reduces HC, PM, CO in diesel engines



B5: The official fuel of the
2009 Volkswagen Jetta TDI Cup
Racing Series.

Current B5 Positions

Approve B5:

- Audi **
- BMW
- Mazda
- Mercedes
- Mitsubishi **
- PACCAR:
- Peterbilt / Kenworth
- UD Trucks **
- Volkswagen **

** Actively researching B20



OEMs Supporting B20+





OEMs Supporting B20+

New OEM B20 Support Statements in 2012:



Daimler Trucks North America



WESTERN STAR®





New in 2012: Volvo Trucks & Mack Support B20



Volvo & Mack B20 warranty statements:

“Use of biodiesel up to a maximum of 20% (B20) in and of itself, will not affect the manufacturer's mechanical warranty as to engine and emissions system related components, provided the bio fuel used in the blend conforms to ASTM D6751, B1 to B5 blends conform to ASTM D975, and B6 to B20 blends conform to ASTM D7467.

Engine and after treatment emissions system component warranties are valid providing the B20 blend meets the respective ASTM standard. Customers will need to utilize oil sampling to establish appropriate drain interval(s) for their specific application(s).”





New in 2012: Daimler Trucks NA

All DTNA truck models equipped with **Cummins engines** are approved for use with **B20 biodiesel** blends.

DTNA truck models equipped with **Detroit Diesel engines** are currently approved for **B5**, **however B20 is allowed upon request**. For those customers wishing to use **B20** in Detroit Diesel engines, please contact jason.martin@daimler.com



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B20 Approved



Ford approves
B20 in all its
2011 MY and
beyond



Class 2 - 5 Super
Duty &

Class 6,7
Medium Duty
Trucks



2010 and prior models approved for use
with B5 under warranty.

B20 Approved for Fleets

- Chrysler currently supports the use of B20 in the 6.7L Ram 2500/3500 pickup for government, military and commercial fleets
- Chrysler plans to extend full B20 support for all their diesel vehicles equipped with Cummins engines by January 2013
- New diesel Jeep Grand Cherokee coming in 2013 (biodiesel blend TBA)

CHRYSLER



RAM

Jeep[®]



All 2011 MY and beyond GM Heavy Duty Products are approved for B20:



Chevrolet
Silverado



GMC
Sierra

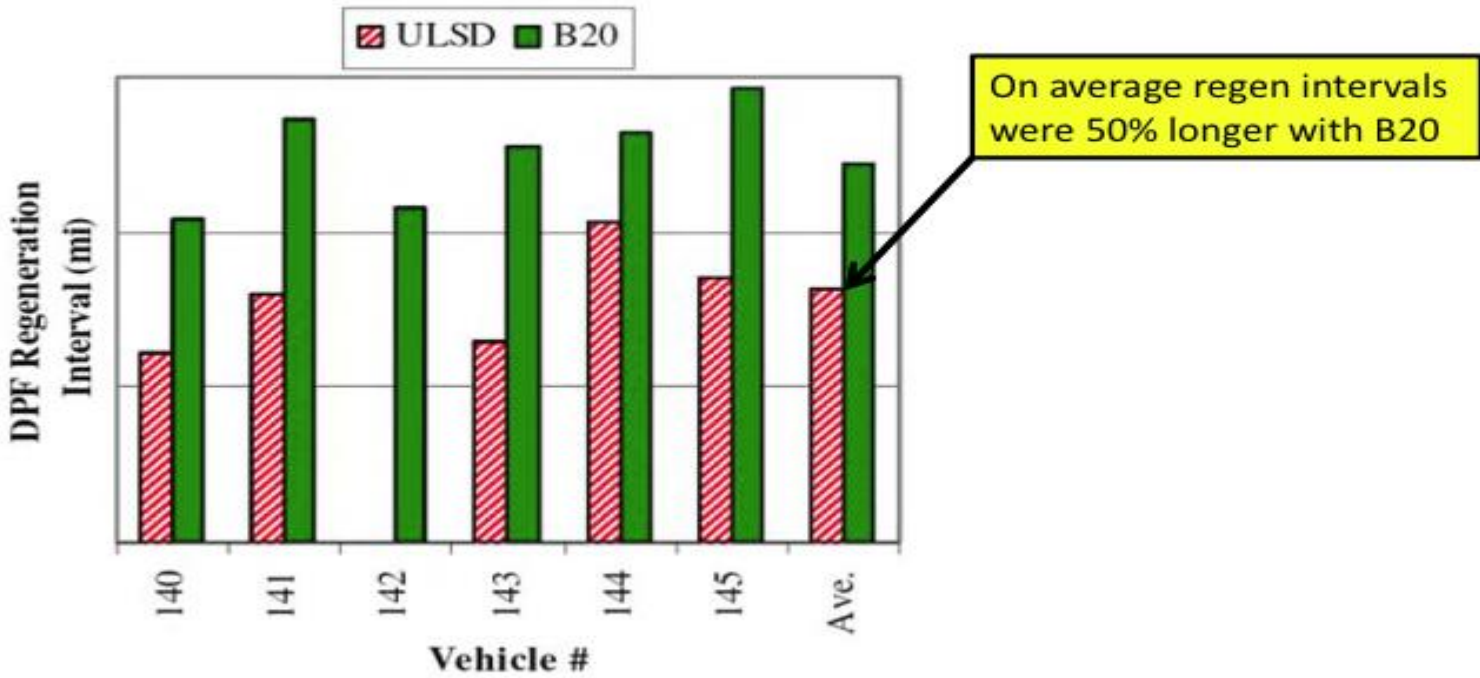


Chevrolet
Express



GMC
Savana

DPF regeneration frequency – Ford study



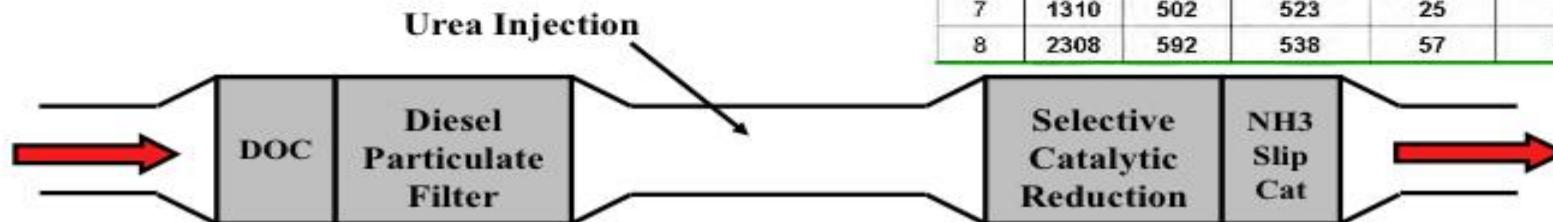
Published Data SAE 2010-01-2103
Rob Zdrodowski – Ford

Biodiesel impact on SCR performance

- Tests conducted on 2002 Cummins ISB retrofitted with a DPF + SCR system
- Compare SCR catalyst performance with ULSD and Soy B20
- Measure relative importance of catalyst temp, exhaust chemistry and catalyst space velocity
- Measure B20's impact on these system variables and on overall NOx conversion



Mode	Speed (rpm)	Torque (ft-lbs)	Temp* (°C)	SV* (1000/hr)	NO ₂ -NOx* (%)
1	2500	115	299	43	83
2	2412	261	372	48	60
3	1118	306	408	13	26
4	2412	330	415	51	46
5	1700	400	449	34	24
6	1820	450	476	41	19
7	1310	502	523	25	6
8	2308	592	538	57	10



Effect of Biodiesel Blends on Urea SCR Catalyst Performance with Medium-Duty Engine (SAE 2008-01-2484)



Summary: New Technology Diesel Engines , NTDE and Biodiesel

Short term emissions tests show that today's NTDE with B20 meet or exceed the significantly lower (~90% lower) engine/vehicle emissions standards for NOx and PM from NTDE..

- Potentially even B100, although very few data points with B100.

Additional work is on-going to confirm that the biodiesel specifications are set to insure.

- Long term durability of the after treatment systems on NTDEs.
- Catalyst long term effectiveness is the same as petroleum diesel.

Today's NTDEs resolve potential NOx concerns with B20 blends, even when using CARB like diesel fuel.

- And the biodiesel industry is working with OEMs on future engines

New emissions after-treatment technology—or use of blend level sensors and modifying timing slightly—provides a path forward for low NOx from new or existing engines



Biodiesel Resources

➤ www.biodiesel.org.

- Biodiesel Training Toolkit
- News Releases & Information Resources
- Technical Library, Spec Sheets & Videos
- OEM Warranty Positions on Biodiesel

➤ www.BQ-9000.org.

- Listing of BQ-9000 Certified Companies

➤ www.biotrucker.com.

- Listing of Bio-Trucker retail sites

➤ www.biodieselautomotive.org.

- Dedicated to information exchange for biodiesel & diesel technicians

