The Green Choice: Biodiesel Health and Financial Benefits

Lisa Coffelt, IRFA - Marketing Director
Jason Stauffer, Growmark - Energy Manager
Lisa Coffelt, Marketing Director
Iowa Renewable Fuels Association
Iowa Renewable Fuels Association

• IRFA brings together Iowa ethanol and biodiesel producers to foster the development and growth of the state’s renewable fuels industry through education, promotion and infrastructure development

• Nonprofit Trade Association

• Formed in 2002
What is Biodiesel?

Biodiesel is a renewable fuel made from various vegetable oils and animal fats through a process called transesterification.

*Transesterification is the process of swapping one alcohol (i.e. methanol) for another alcohol (i.e. glycerol).*
ASSESSMENT OF HEALTH BENEFITS FROM USING BIODIESEL AS A TRANSPORTATION FUEL

National Biodiesel Board

Trinity Consultants
13 Study Locations

• Heating oil: New York City (NY), Albany (NY); Boston (MA); New Haven (CT); Providence (RI).

• Transportation: Wilmington, Carson, and West Long Beach (CA) around POLA/POLB, San Bernardino (CA), South Fresno (CA), West Oakland (CA); Portland (OR); Seattle (WA), Everett (WA); Denver (CO).
Reduced Cancer Risk after 100% Change to Biodiesel

South Pedro, CA
Biodiesel (B100) provides immediate community health improvements that can be measured in reduced medical costs and healthcare burdens:

- **Up to 44%** reduced cancer risks and burdens
- **$2.7 billion** savings per year
- **1,082 fewer cases**
- **310 avoided premature deaths (longer lives)**

- **Up to 86%** reduced asthma symptoms
- **$246 million** savings per year
- **17 fewer cases**
- **28 avoided asthma attacks (lesser symptoms)**

- **$11.8 million** savings per year
- **203,000 fewer asthma attacks (lesser symptoms)**

- **$1.0 million** savings per year
- **17,000 fewer restricted-activity days (more exercise)**

- **$17.1 million** savings per year
- **248,000 fewer restricted-activity days (more exercise)**

- **$1.4 million** savings per year
- **21,000 fewer restricted-activity days (more exercise)**

- **$7.6 million** savings per year
- **42,000 fewer sick days (greater productivity)**

- **$624,000 savings per year**

- **4,000 fewer sick days (greater productivity)**
Key Findings

Switching to 100% biodiesel in the home heating oil and transportation sectors would:

- Prevent 340 premature deaths annually.
- Result in 46,000 fewer sick days.
- Potential 45% reduction in cancer risk when heavy-duty trucks such as semis use B100.
- 203,000 fewer or lessened asthma attacks.
Protecting Our Future – Student Health

• Studies show students who ride the school bus are exposed to more exhaust emissions than students who don’t.

• Exposure to exhaust emissions contribute to asthma and other respiratory conditions.

• Adding biodiesel to your fleet will reduce student exposure to
  • Particulate Matter, Carbon Monoxide, and Unburned Hydrocarbons that contribute to smog formation
  • Cancer-causing aromatics
# OEM Support

## 100%

OEMs support B5 and lower

<table>
<thead>
<tr>
<th>OEMs Supporting B20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arctic Cat</td>
</tr>
<tr>
<td>Buhler</td>
</tr>
<tr>
<td>Caterpillar</td>
</tr>
<tr>
<td>Chrysler — Ram &amp; Jeep</td>
</tr>
<tr>
<td>Cummins</td>
</tr>
<tr>
<td>Daimler Trucks, including:</td>
</tr>
<tr>
<td>• Detroit Diesel</td>
</tr>
<tr>
<td>• Frightliner / Custom Chassis</td>
</tr>
<tr>
<td>• Thomas Built Buses</td>
</tr>
<tr>
<td>• Western Star</td>
</tr>
<tr>
<td>Ferris</td>
</tr>
<tr>
<td>Ford</td>
</tr>
<tr>
<td>GMC &amp; Chevrolet</td>
</tr>
<tr>
<td>HDT USA Motorcycles</td>
</tr>
<tr>
<td>Hino Trucks</td>
</tr>
<tr>
<td>Navistar — International / MaxxForce</td>
</tr>
<tr>
<td>IC Bus</td>
</tr>
<tr>
<td>Isuzu Commercial Trucks</td>
</tr>
<tr>
<td>John Deere</td>
</tr>
</tbody>
</table>

## 90%

Medium- and heavy-duty truck OEMs support B20

<table>
<thead>
<tr>
<th>OEMs Supporting B100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case IH</td>
</tr>
<tr>
<td>Deutz AG</td>
</tr>
<tr>
<td>Fairbanks Morse</td>
</tr>
<tr>
<td>New Holland</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OEMs Supporting B5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audi</td>
</tr>
<tr>
<td>BMW</td>
</tr>
<tr>
<td>Hustler Turf Equipment</td>
</tr>
<tr>
<td>Mercedes-Benz</td>
</tr>
<tr>
<td>Mitsubishi Fuso</td>
</tr>
</tbody>
</table>

Source: National Biodiesel Board

www.IowaRFA.org
School Bus OEM Support

- Thomas Built Buses
  - B20 approved in most models

- Cummins
  - B20 approved in most models

- Navistar/International
  - B5 approved for all engine models
  - B6-B20 approved for International® MaxxForce™ Diesel Engines 2007-up

- Blue Bird
  - Built with Cummins, Ford, and GM engines, which all approve B20 in most models

- Check with local dealer or owner’s manual to confirm biodiesel support for your model and year

- OEM warranties do not cover issues caused by ANY fuels

Jason Stauffer, Energy Manager
Growmark FS, Inc.
• ASTM D6751 provides biodiesel specifications
  • 20 tests (currently)
  • Includes both quality and performance indicators

• Certificate of Analysis
  • Should show complete list of specifications and be available on every lot of biodiesel

• BQ-9000 Accreditation
  • Rigorous, externally-monitored quality program

Quality for the Future
Biodiesel in the Winter

• Gelling an issue for all diesel fuel
• Use quality biodiesel
• Treat with same additives as B0 diesel
• Biodiesel successfully used in the winter
  • Iowa DOT
  • Minnesota biodiesel mandate
  • Yellowstone National Park
Biodiesel in the Tank

• Clean, inspect and repair your tanks before filling with biodiesel blends
• Keep tanks water-free
  • Water in a storage tank can happen with any fuel
  • Biodiesel does not attract water into the tank
• Monitor hoses, fills, vents and gaskets for leaks
Better Performance for Years to Come

• Higher Cetane –
  • Over 50 Cetane vs petroleum diesel around 44
  • Smoother and more complete burn

• Lubricity
  • Just 2% biodiesel doubles the lubricity in the finished fuel
Steps to Implementing Biodiesel into Your Fleet
Consider your comfort level with blending

Do it yourself – invest in dedicated biodiesel tank and blend yourself

Buy blended product off the rack or direct from producer
CONFIRM THE QUALITY OF YOUR BIODIESEL SUPPLY

Meet ASTM D6751 standards

Produced by a BQ-9000 accredited producer

If purchasing fuel direct, always request a CoA

Work with a producer that will provide technical support
3 DETERMINE YOUR BLEND-LEVEL

If you’re hesitant, start at a B2 and step up to B20 over time

If starting in winter, consider starting at a lower blend

If emission quality is a key driver, start at a higher blend
4 EDUCATE YOUR EMPLOYEES

Make sure everyone understands the product and what to expect

Educate people about the sustainability benefits of biodiesel
5

REAP THE BENEFITS

Reduced emissions

Increase lubricity and engine performance

Diverse fuel line-up

Positive impact for employees, customers and communities
Case Study: Iowa DOT

• MAINTAINS 9,400 MILES OF ROADWAY and 4,100 bridges
• 1,500 DIESEL VEHICLES in fleet
• Operates 50 FUELING LOCATIONS statewide
• USES BIODIESEL BLENDS YEAR-ROUND, including B20 in warmer weather
• Consumed 60,000 GALLONS OF BIODIESEL in 2016

“We believe we have fewer fuel-system-related failures because biodiesel adds lubricity. Our plow operators can tell if there’s a reduction in horsepower, and we have all the horsepower that we would ever want with biodiesel. And I can say that the pricing tends to be favorable between biodiesel and petroleum diesel.”

–David May
Fleet Manager, Iowa DOT
Lisa Coffelt
lcoffelt@iowarfa.org

Jason Stauffer
jstauffer@growmarkfs.com