

**Iowa Renewable
Fuels Association**

The Green Choice: Biodiesel Health and Financial Benefits

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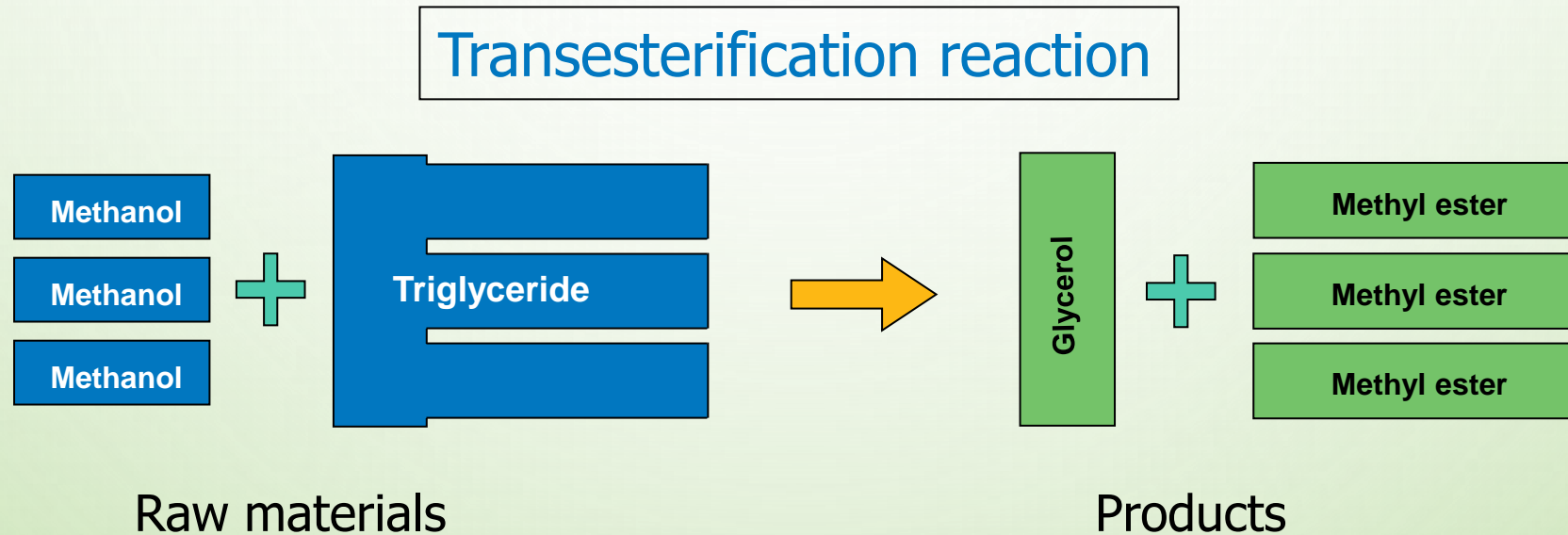
Iowa Renewable Fuels Association

- 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



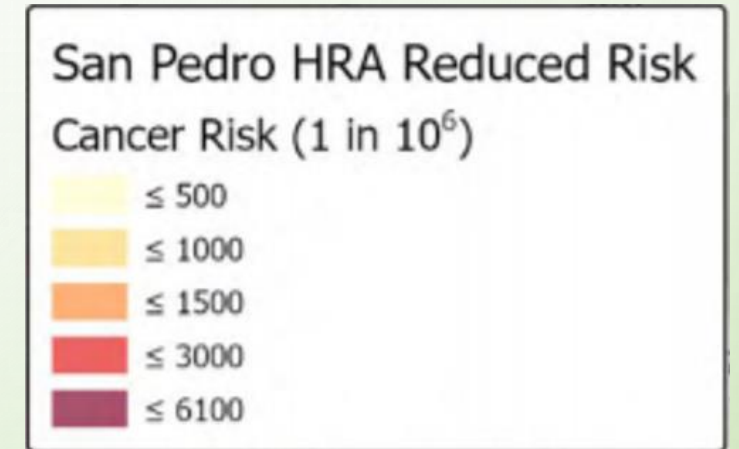
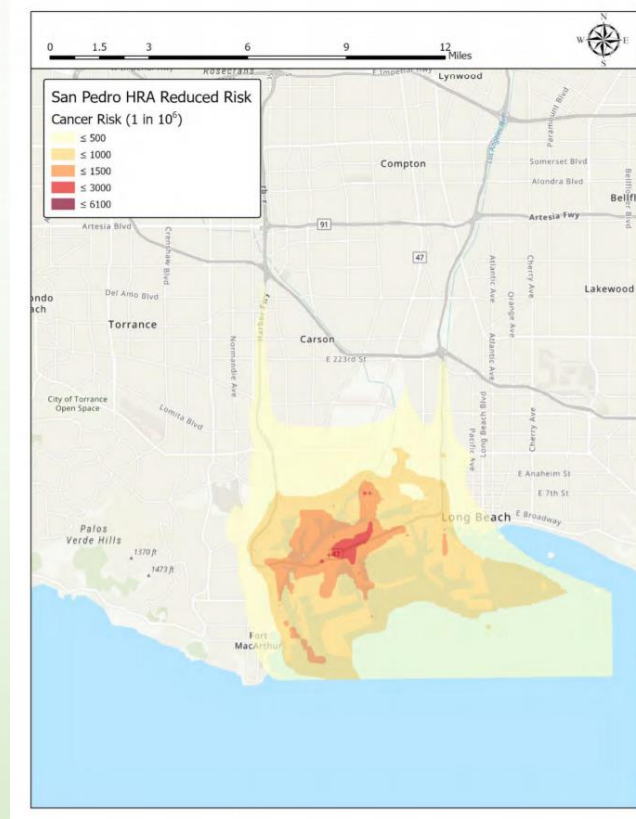
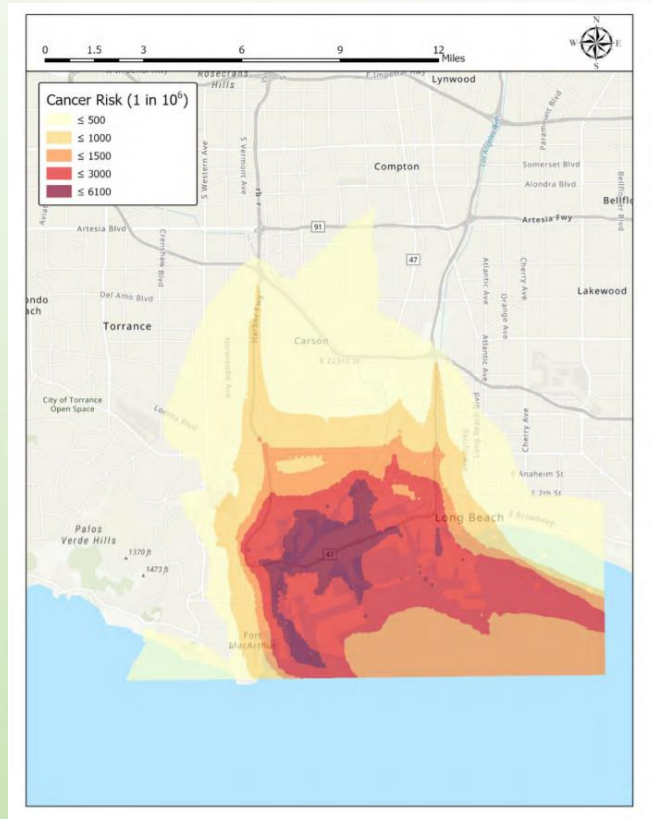
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13 Study Locations

- 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





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



**Up to
44%**



**Up to
86%**

reduced cancer
risks and burdens

1,082 : **17**

fewer cases



**\$2.7
BILLION**



**\$246
MILLION**

savings per year

310 : **28**

Avoided premature
deaths (longer lives)



**\$11.8
MILLION**



**\$1.0
MILLION**

savings per year

203,000 : **17,000**

Fewer asthma attacks
(lesser symptoms)



**\$17.1
MILLION**



**\$1.4
MILLION**

savings per year

248,000 : **21,000**

Fewer restricted-
activity days
(more exercise)



**\$7.6
MILLION**



\$624,000

savings per year

42,000 : **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

90%

Medium- and heavy-duty
truck OEMs support B20

OEMs Supporting B20

Arctic Cat	Ferris	Kubota
Buhler	Ford	Mack
Caterpillar	GMC & Chevrolet	Monaco RV
Chrysler — Ram & Jeep	HDT USA Motorcycles	Perkins
Cummins	Hino Trucks	Tomcar
Daimler Trucks, including:	Navistar —	Toro
• Detroit Diesel	International / MaxxForce	Volvo Trucks
• Freightliner / Custom Chassis	IC Bus	Workhorse
• Thomas Built Buses	Isuzu Commercial Trucks	
• Western Star	John Deere	

OEMs Supporting B100

Case IH	Fairbanks Morse
Deutz AG	New Holland

OEMs Supporting B5

Audi	PACCAR, including:
BMW	• Kenworth
Hustler Turf Equipment	• Peterbilt
Mercedes-Benz	Volkswagen
Mitsubishi Fuso	



Source: National Biodiesel Board

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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

Source: National Biodiesel Board, <https://biodiesel.org/using-biodiesel/oem-information/oem-statement-summary-chart>



Jason Stauffer, Energy Manager

Growmark FS, Inc.



Quality for the Future

- 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



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



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1 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



2

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



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