

BIODIESEL for Educators



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www.biolye.com

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What is Biodiesel?

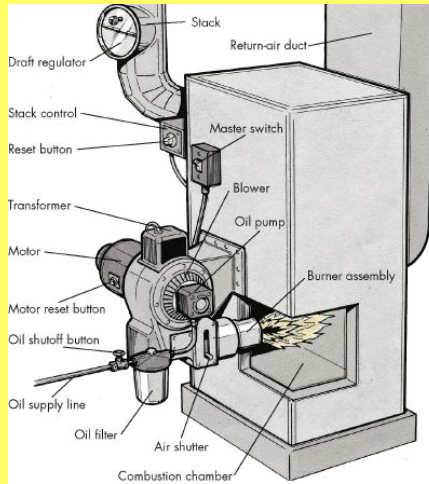


A renewable, non-toxic, biodegradable, safe fuel made from any plant oil or animal fat that can be used in any diesel engine.

Any Diesel Can Use Biodiesel

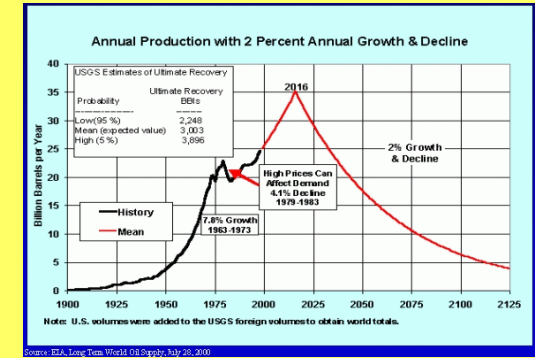


Other applications...



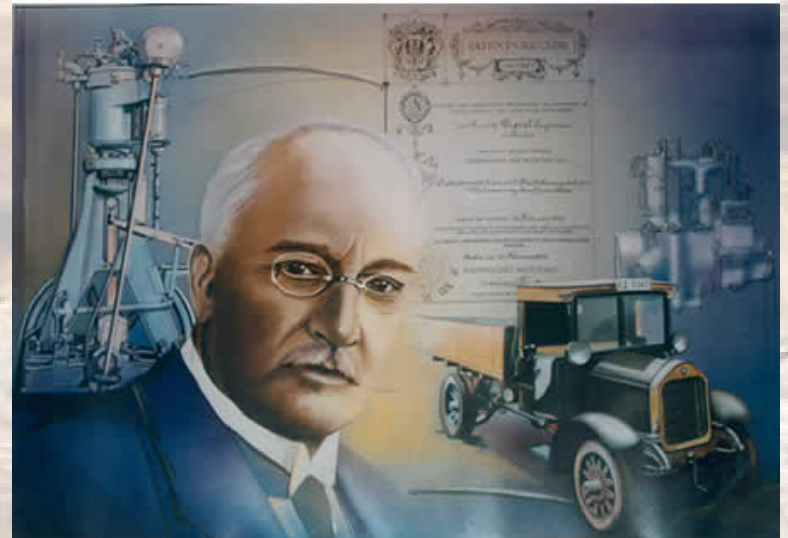
Biodiesel Benefits

- Health
- Environment
- Economic
- Vehicle
- Security
- Sustainability
- Independence

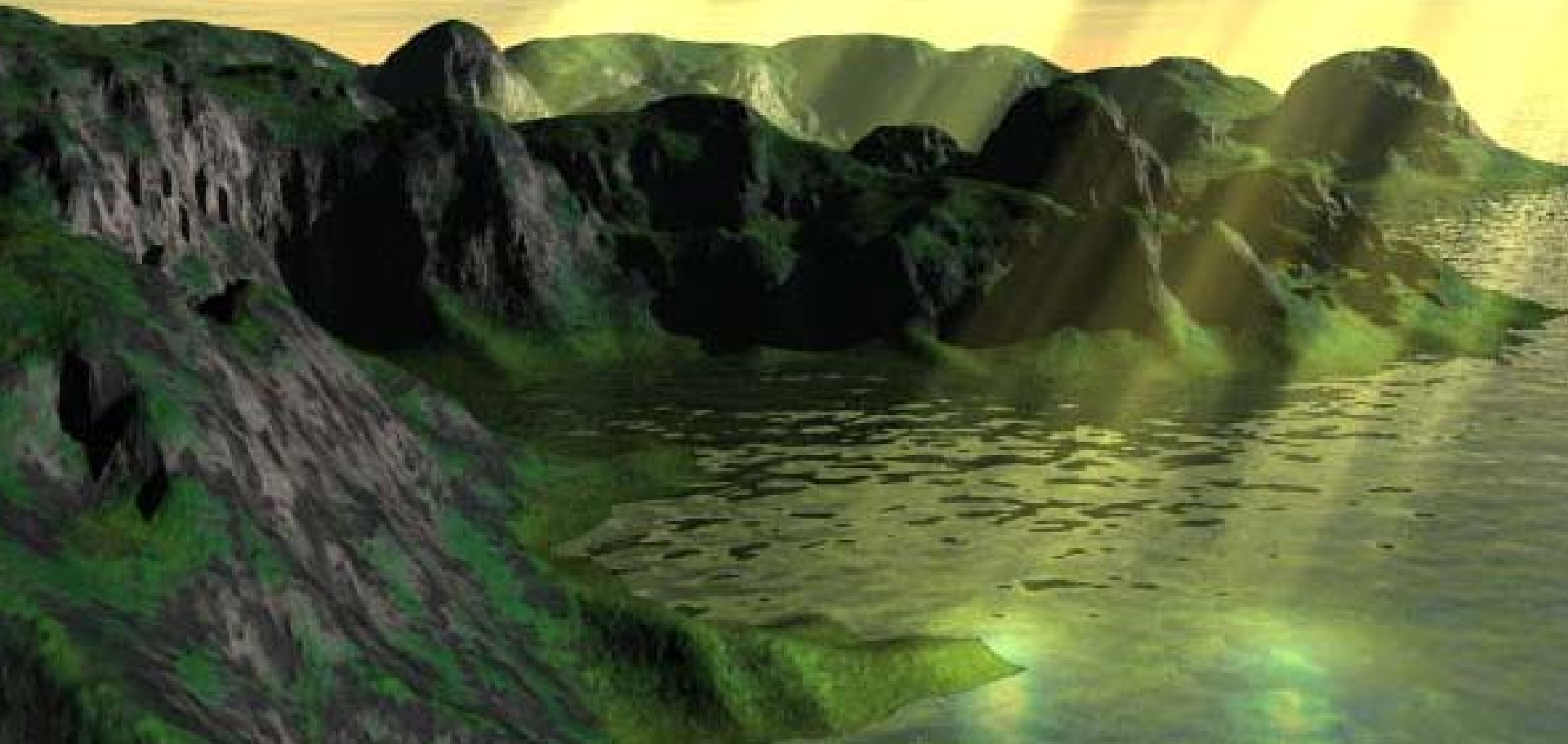


“The use of vegetable oils for engine fuels may seem insignificant today. But such oils may become in the course of time as important as petroleum and the coal tar products of the present time.”

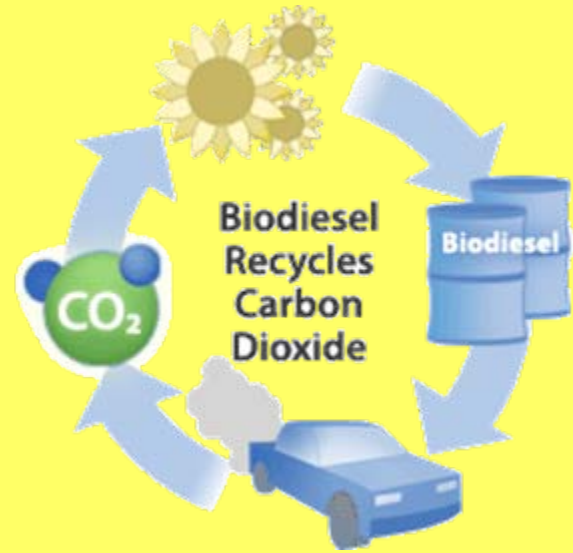
Rudolf Diesel, 1912



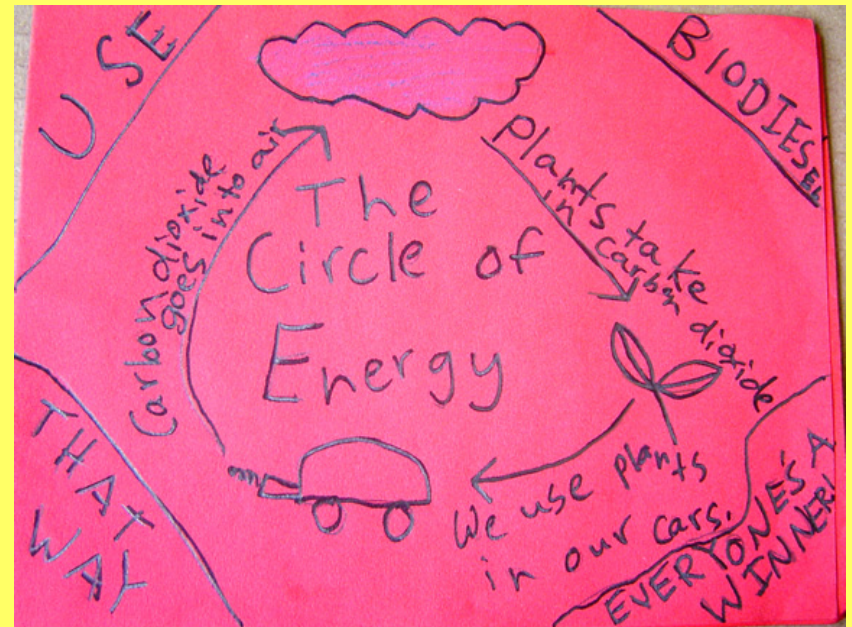
Every hour enough Energy in
sunlight hits the earth to fuel
all human activities for a year!



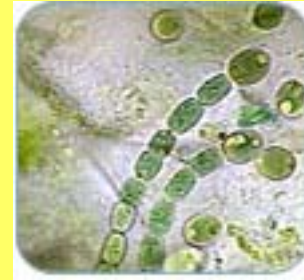
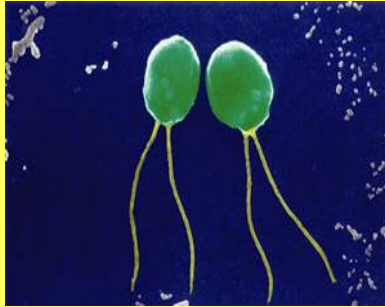
Photosynthesis



Combustion

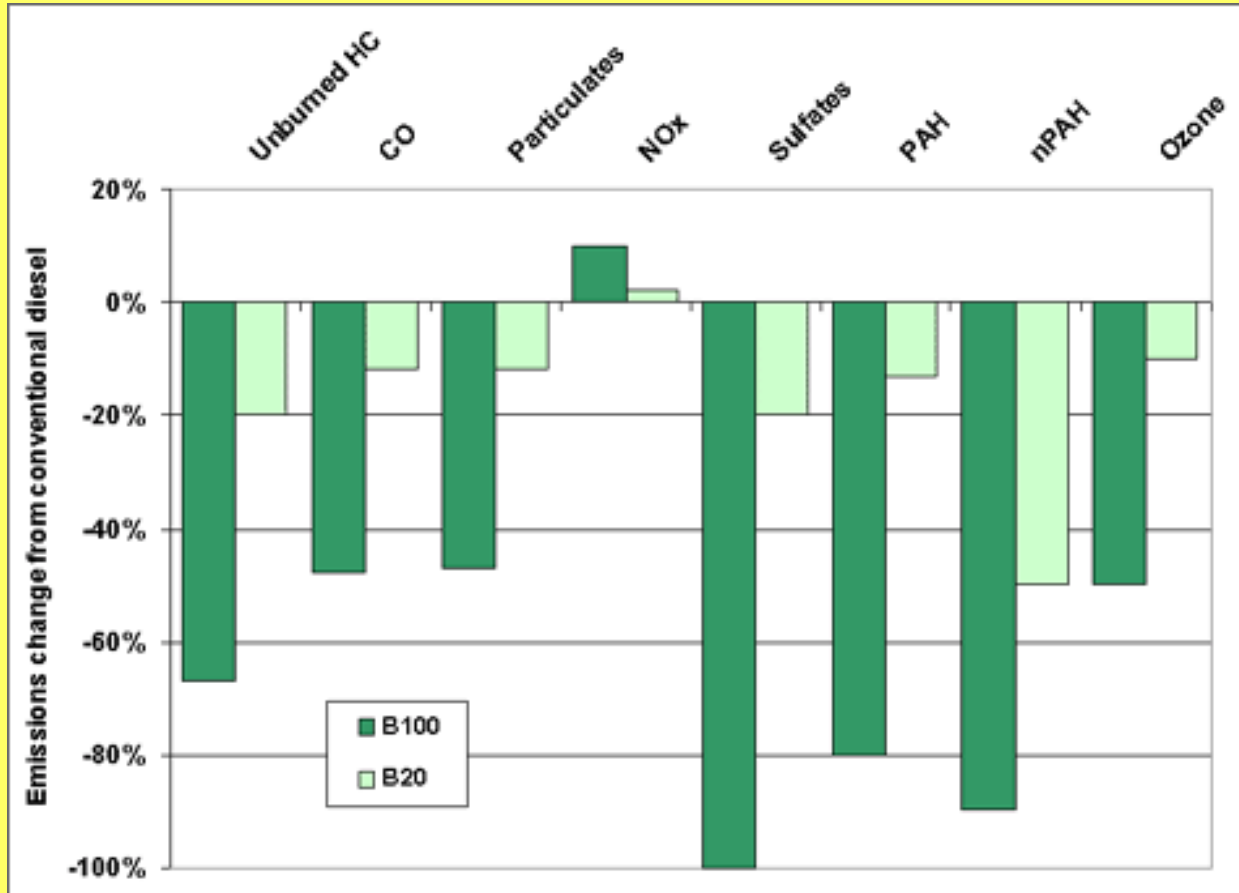


Algae Biodiesel





B100 Emissions vs diesel



Buses Can Make Kids Sick

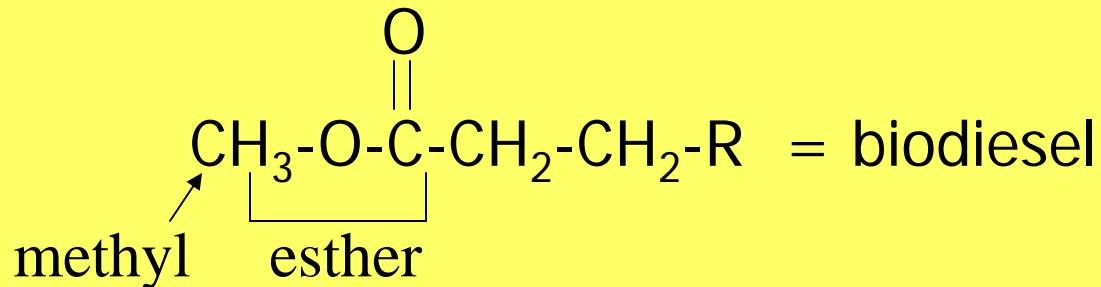


Biodiesel Buses!

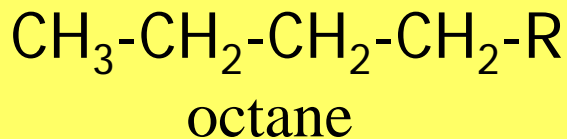


Why is it less polluting?

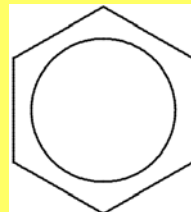
- 11% oxygen by weight \longrightarrow burns more efficiently
- no sulfur or benzene \longrightarrow fewer carcinogens



Compare to gasoline or diesel:

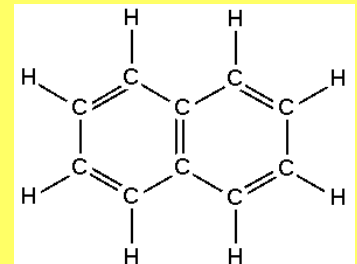


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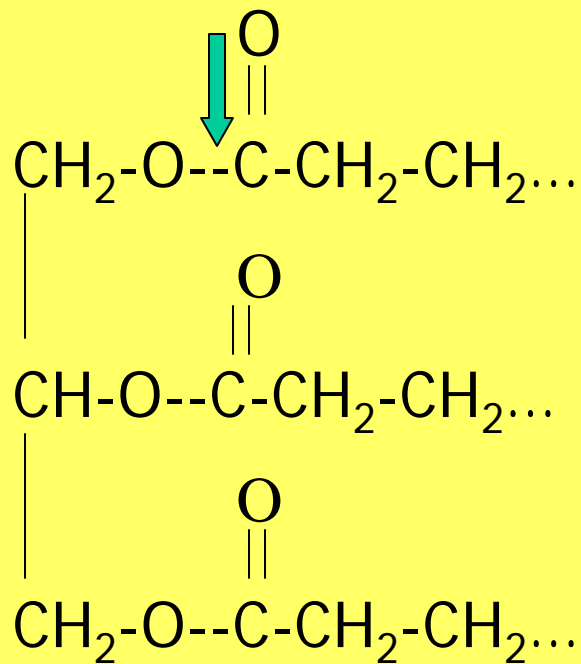
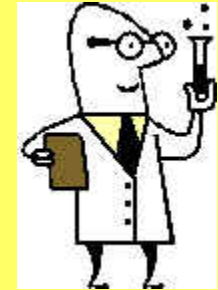
benzene

+



PAH's

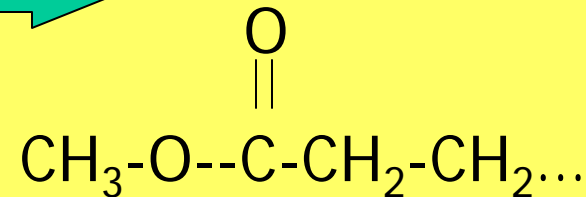
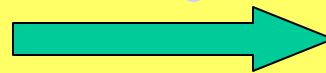
Transesterification



Triglyceride
(plant oils)

+ CH₃OH (methanol)

KOH (lye)



Methyl esters = Biodiesel!

Safety Issues

- Methanol is flammable and toxic
 - store in drum with pump removed
 - work in well-ventilated space and do not breathe- masks don't work
 - wear gloves, apron, face shield for skin and eye protection
- KOH is very caustic
 - use skin, eye protection, dust mask, and do not breathe.
- Tanks
 - Use steel if possible, and vent to outside
- Disposal of byproducts
 - Check w waste treatment



Appleseed Processor



Automated Processor



Hamilton Middle Schoolers Making Bio



Resources



biolyle.com , biolyle@gmail.com

biodiesel.org

groups.yahoo.com/group/biodiesel_in_schools/

blatham.multiply.com/

National Energy Ed Dev Proj- google: "biodiesel
need curriculum"

Piedmont Biofuels curriculum

biofuels.coop/education



Dear Bio-Lyle

I LOVE
YOU ♡



Contacts

Lyle Rudensey

www.biolye.com

www.biodieselcommunity.org

biolye@gmail.com

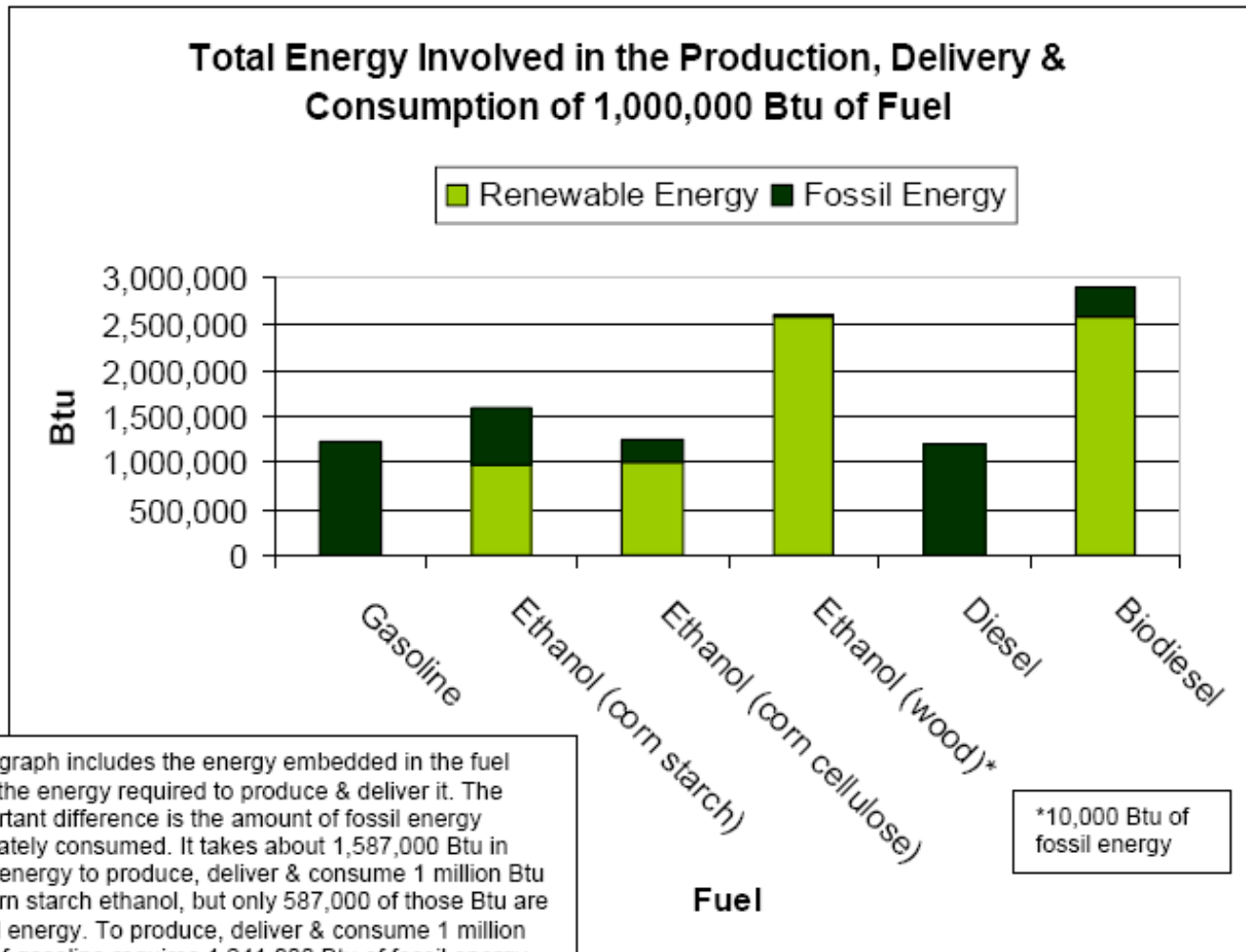
206-354-6802



Fill 'er Up



Energy Balance of Biofuels: It's the Fossil Energy that Matters



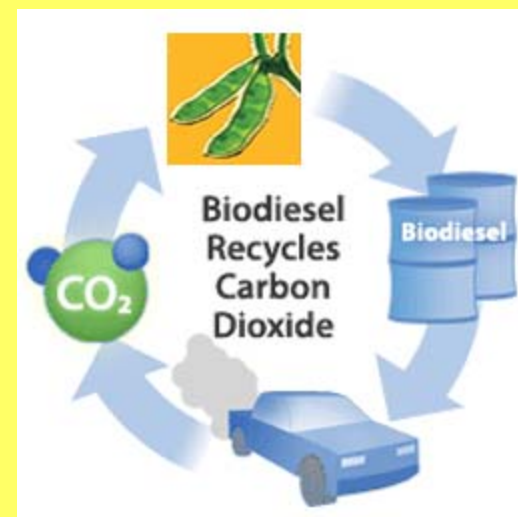
This graph includes the energy embedded in the fuel plus the energy required to produce & deliver it. The important difference is the amount of fossil energy ultimately consumed. It takes about 1,587,000 Btu in total energy to produce, deliver & consume 1 million Btu of corn starch ethanol, but only 587,000 of those Btu are fossil energy. To produce, deliver & consume 1 million Btu of gasoline requires 1,241,000 Btu of fossil energy – more than *double* the amount required for corn starch ethanol. (Sources on back.)

Health Benefits

- Reduced cancer risk
- Reduced asthma
- Non-toxic to handle
- Non-flammable- flash point >300 deg F
- Reduced intake of soot
- Mechanics, bus drivers, students feel better

Environmental Benefits

- 78% less CO₂
- > 90% less carcinogens
- > 55% less particulates
- other polluting emissions greatly reduced
- non-toxic when spilled on land or sea
- biodegradeable- as much as sugar



Energy Ratio

Biodiesel from virgin Soy

- 3.2 X energy produced as it takes to make it
- 78% CO2 reduction

Biodiesel From WVO

- > 7 X energy produced as it takes to make it
- > 90% CO2 reduction

triglyceride



+ M



Methyl esters

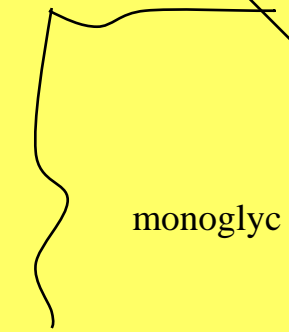


+



Glycerin

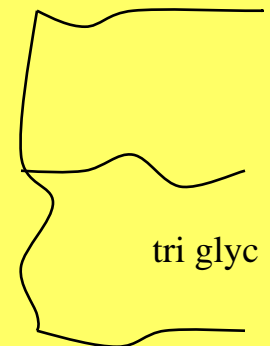
+



monoglyc



di glyc



tri glyc

$\Sigma < 0.24\%$

✓ Dry oil

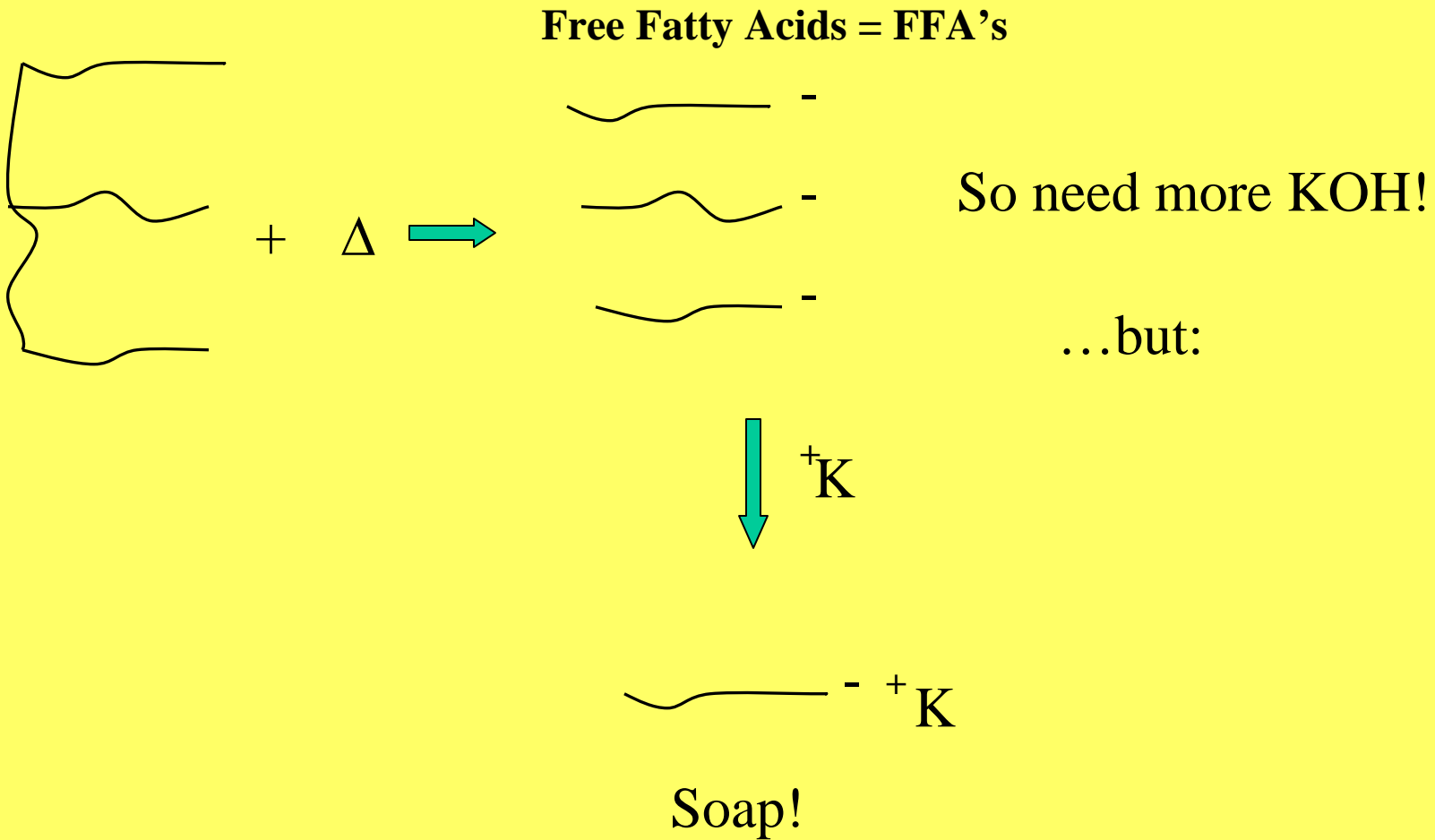
✓ Heat

✓ Proper mixing

✓ Excess methanol (22%)

✓ pH = 8.5 (11g/L KOH + titration)

FFA's



Waste Oil Heater

- Multi-fuel: waste oil, diesel, biodiesel, waste motor oil, glycerin, etc.
- Estimated construction cost: \$200-\$500
- 70,000 – 200,000 BTUs (vs ave woodstove = 65,000 BTU)
- Fuel consumption 0.6 – 2 g / hr
- Skills: MIG or TIG welding, basic electrical, metal fabrication
- Construction time: about 2 weeks
- Plans from utahbiodieselsupply.com

