



energy solutions, pure and simple

Advantages of Biodiesel Use for Emissions
Reductions and Regulatory Compliance

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www.worldenergy.net

Some Interesting Facts

Rudolph Diesel demonstrated the diesel engine at the 1900 Worlds Fair running on Peanut Oil!

The US Government closely looked at biodiesel during WWII in case our petroleum supply line was cut.

Nearly \$90 million has been spent on research, marketing, and production of biodiesel

Biodiesel has been used for years and is widely available in Europe

The Largest Biodiesel plant in the U.S. is in Lakeland, FL.

There is currently enough production to make hundreds of millions of gallons of blended biodiesel in the US

Biodiesel appears to be the fastest growing alternative fuel in the US!

Who is World Energy?

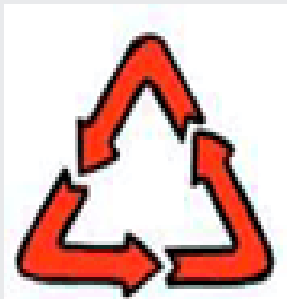
The first alternative energy company backed by a major petroleum company (Gulf Oil)

Strategic partners with Procter & Gamble and Ocean Air Environmental (formally NOPEC) with a combined nearly *200 million gallons!*

We exist to make regulatory compliance easier and more cost effective

To make alternative fuels available anywhere in the country....*Now!*

Taking the “alternative” out of alternative fuels.



Energy Policy Act (EPAct)



Written After the Persian Gulf War to cut US Petroleum Use and dependence.

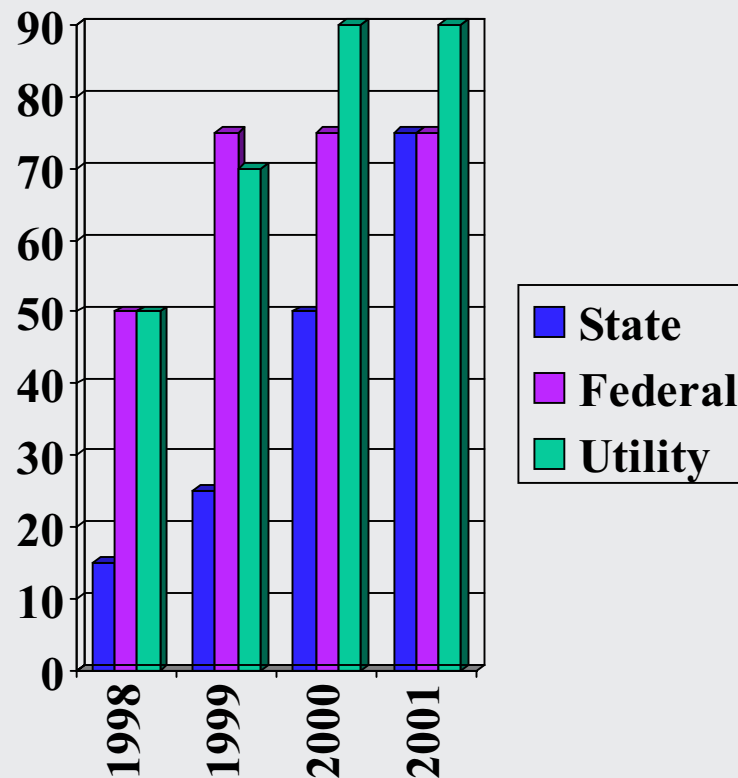
Forces State, Federal, and utility Fleets to move to Alternative Fuels

Municipal and Private fleets to be added in 2002 (?)

Biodiesel added in October 1998

Biofuels are a compliment to the petroleum industry!

EPAct mandates are growing



Utility Fleets are now at 90% compliance levels. State and Federal are at 75%.

For Every 450 Gallons of B100, or 2,250 gallons of blended B20, You earn one LDV credit.

You can use biodiesel for up to 50% of your obligation

Biodiesel credits may not be banked or traded

Biodiesel requires no new refueling infrastructure.

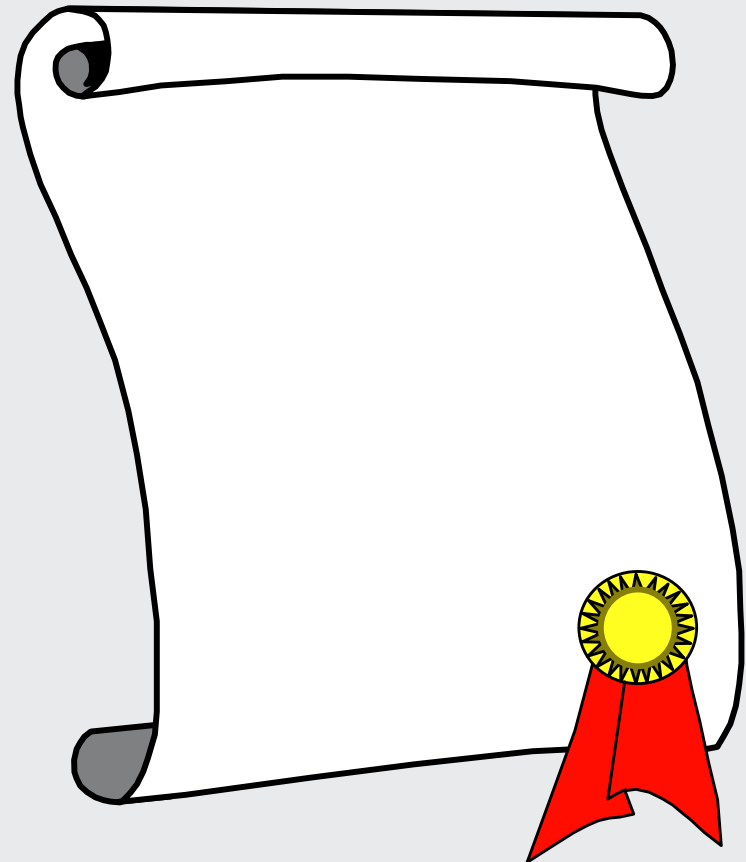
Executive Orders

In August 1999, President Clinton issued an executive order calling for an increased use of biomass energy, or farm products in lieu of fossil fuels.

In September, 1999, Governor Taft of Ohio issued an executive order mandating the use of Soy based biodiesel in Ohio State Fleets.

In April of 2000, Governor Carper of Delaware announced the use of biodiesel in the Delaware State Fleet.

In April 2000 President Clinton issued an executive order to cut petroleum use in Federal fleets by 20% (EO 13149)



What is Biodiesel?

Biodiesel (Methyl Esters) is a diesel replacement fuel made from Virgin Vegetable Oils such as Soybeans or Rapeseed. It can also be made from recycled restaurant oils.

It is all Natural, renewable, and dissolves in water faster than sugar.

It is 11% oxygen by weight and contains no sulfur.

It takes the black smoke from the back of a vehicle and makes the exhaust smell faintly of *Popcorn!*

Biodiesel Lowers toxic emissions and Particulate Matter

Biodiesel is safe to store, and has a high flash point

Biodiesel has greater Cetane (50-56) and Lubricity than diesel fuel

In Fact, 1% biodiesel increases lubricity by up to 30%

Biodiesel requires no engine modification and does not affect engine performance. Just pour and go!

Biodiesel is generally delivered blended with diesel fuel at an 80%(diesel) 20% (biodiesel) blend.

What is biodiesel ?

The Answer to a number of issues!

National Security: A reduction of imported Petroleum

Environment: A reduction in greenhouse gases

Public Health: Less toxic to human health

Economic: Aid to US Farmers

Operations: A performance enhancer to conventional diesel



What is the appeal of Biodiesel?

It works in existing diesel engines with no modification.

It can achieve emissions reductions across an entire diesel fleet.

It is an immediate solution.

It works in heavy duty applications.

It can work in conjunction with any new vehicle program (I.E. CNG in new vehicles, biodiesel in existing vehicles)

It requires no new refueling infrastructure.

Biodiesel is as easy to transition out of as it is to implement.

Biodiesel can be used in conjunction with Ultra Low Sulfur diesel, particulate traps, catalytic converters, or diesel hybrid electric vehicles.

Biodiesel provides direct aid to US farmers.

It is available right now anywhere in the country.

It has a closed carbon cycle
3.2:1 production value (highly efficient)

O.K...so what's the downside?

Very little!

Biodiesel has outstanding cleaning properties, and will clean your fuel lines. We recommend you change your fuel filters after the First tank.

Biodiesel raises cloud points by 3-5° F Virgin, and 10-12° F for recycled product.

*Always spec Virgin product for Winter Operation in colder climates.
Spec your diesel as you normally would for winter operation.*

Always purchase blended B20

Use #1 diesel if a concern exists. Biodiesel lubricity characteristics gives #1 higher lubricity than straight #2.

Biodiesel can degrade natural rubber (pre-1980 engines)

ASTM D6751 will insure quality biodiesel!

Who is Using Biodiesel?

US Air Force

US marines

US post Office

NJ DOT

Ohio DOT

MI DOT

University of
Michigan

Low Blends B2-B5

Farm Community

Detroit Edison

Commonwealth

Edison

Staten Island Ferry

Numerous

Municipalities

School Bus Fleets

Biodiesel Emissions

Regulated

	B100	B20
Total Unburned Hydro Carbons	-93%	-30%
Carbon Monoxide	-50%	-20%
Particulate Matter	-30%	-22%
Nox	+13%	+2%

Non Regulated

Sulfates	-100%	-20%
PAH (Polycyclic Aromatic Hydrocarbons)	-80%	-13%
nPah (nitrated PAH)	-90%	-50%
Ozone Potential of speciated HC	-50%	-10%
Mutagenicity	-80%-90%	-20%

Biodiesel is the first and only alternative fuel to have a complete evaluation of emissions results and potential health effects submitted to the US EPA under the Clean Air Act 211 (b) Both Tier I and Tier II have been completed as per the attached package.

The environment is critical...

...but the focus is shifting!



Yale University Study

Children who ride diesel buses exposed to far more particulates

CARB

Particulates “probable carcinogen”

American Heart

Particulates can disrupt normal heart function

American Lung

Diesel exhaust can exacerbate existing Asthma conditions

They outlawed smoking in restaurants for the same reasons!

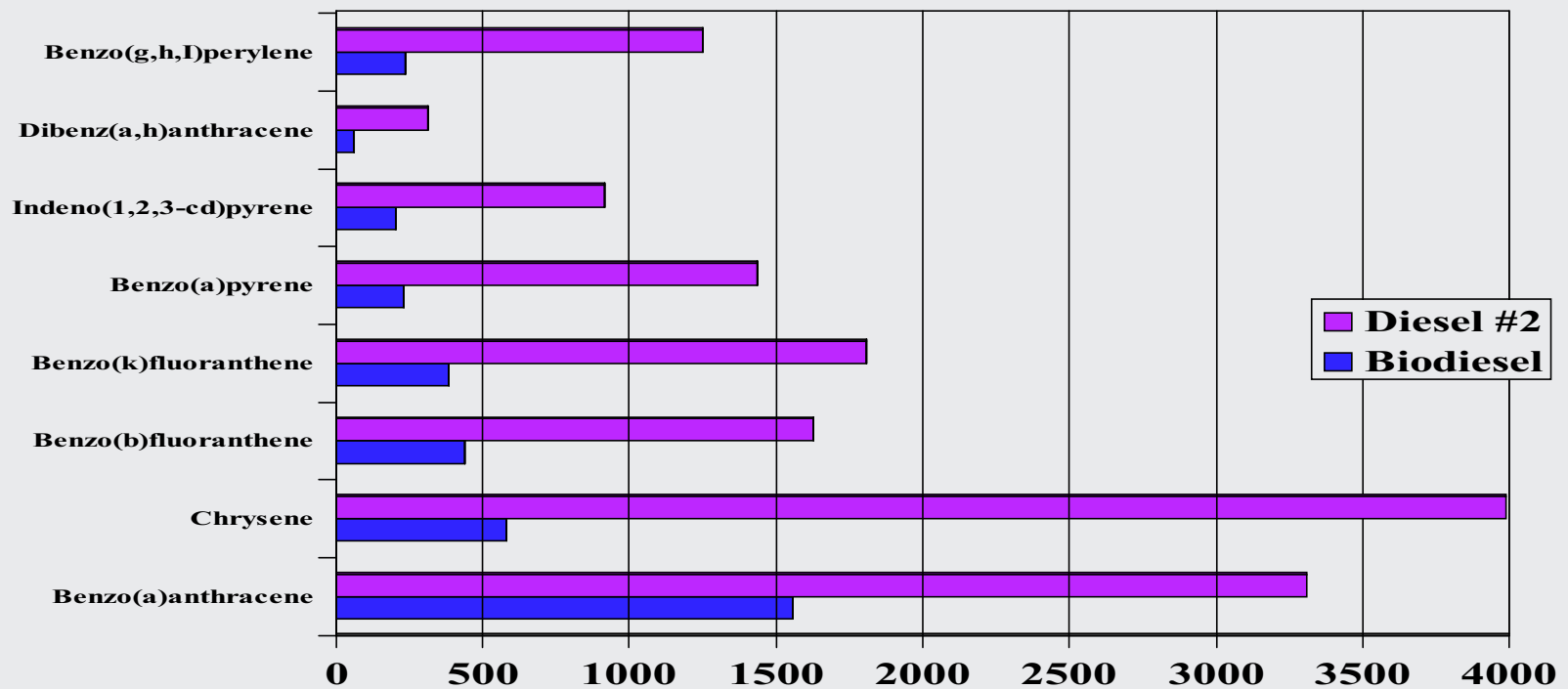
The Lovelace Respiratory Institute Confirmed

NO pronounced toxicity at any level
NO mortality or clinical abnormality
NO neurotoxic or internal pathologic response
NO adverse effect on fertility and reproductive systems
Corroboration of Tier I findings concerning decreased mutagenicity activity in living organisms

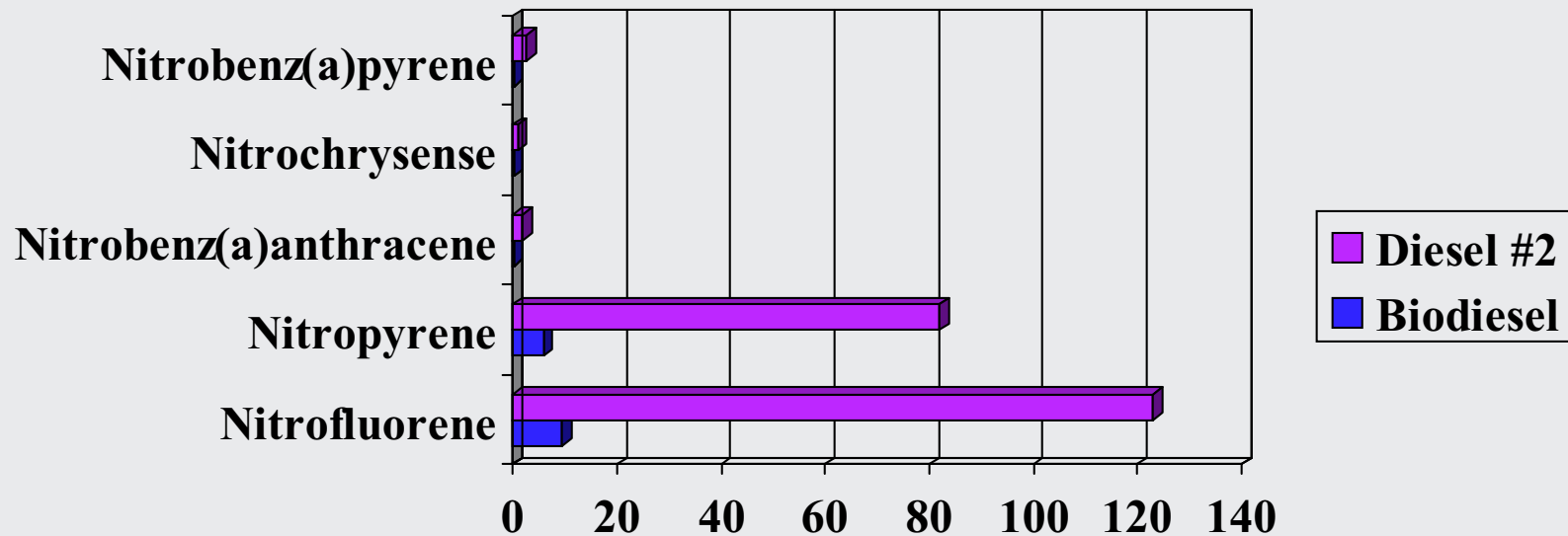
Taking Action Today will positively impact both the environment and the overall health of your community!



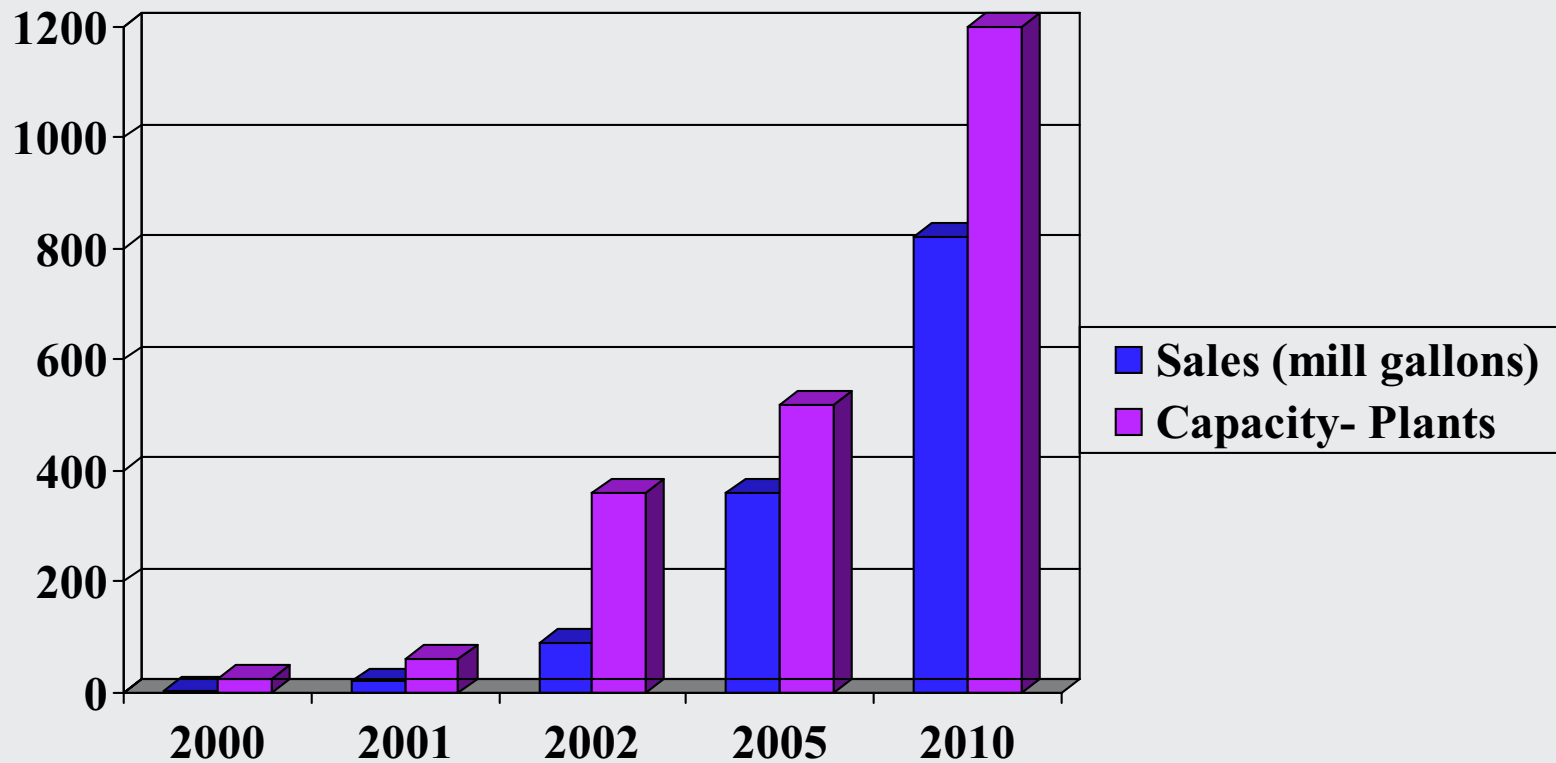
What reductions did Southwest Research Institute find in PAH emissions from biodiesel? (in ng/hp-hr.)



What did Southwest Research Institute Find RE: nPAH emissions? (ng/hp-hr nPAH)



How Quickly Can Biodiesel Reduce Petroleum Usage?



What Strategies will aid Biodiesel Growth?

Favorable tax treatment (Texas, Hawaii).

Integration into CMAQ and SEP programs

EPACT type program (w/fuel use mandatory)

Offset funding for incremental fuel cost based on petroleum, HC, PM, toxicity and CO2 reductions.

Support for research and development of potential feedstocks.

Federal Energy Bill (S 517)

Low Blend initiatives (State of Minnesota)

Immediate opportunity justifies immediate action.

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WWW.WORLDENERGY.NET

Fleet manager references available upon request for winter or summer operation.