

Biodiesel Fuel



Presentation from a
Council Briefing

Curtis Johnson
Iain Macdonald

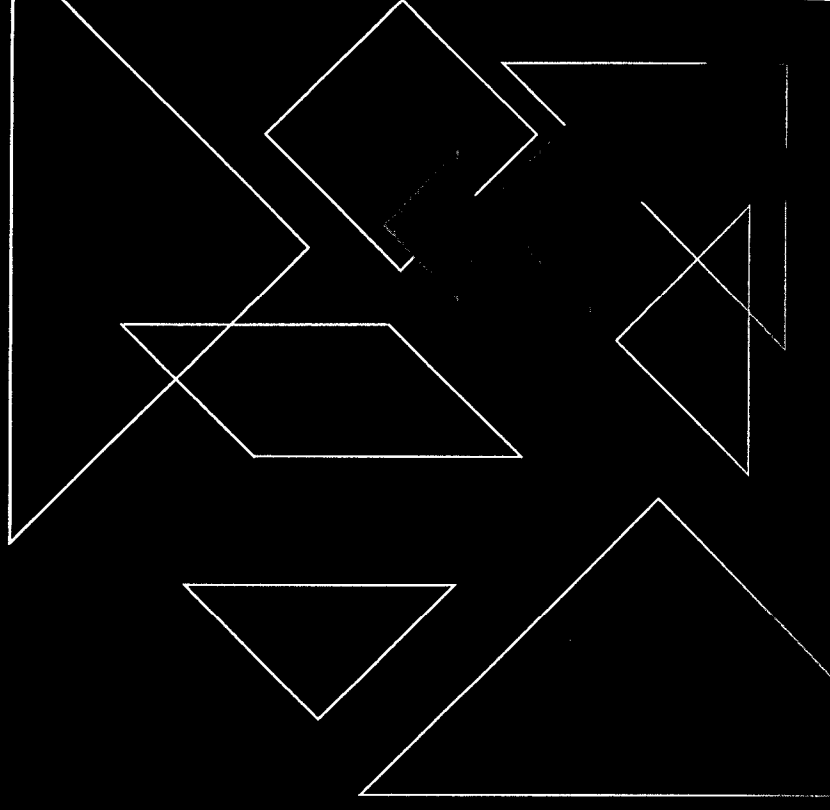
December 2003

Council Brief

Agenda

... bringing *BioDiesel* to British Columbia

- ◆ What is biodiesel?
- ◆ Where does the feedstock come from?
- ◆ How is biodiesel made?
- ◆ Biodiesel benefits?
- ◆ How to handle and use?



Most FAQ

Update & Planning

What is biodiesel?

BioDiesel is a diesel fuel conditioner, additive or alternative

Biodiesel fuel can be made from new or used vegetable oils and animal fats, which are non-toxic, biodegradable, renewable resources. Fats and oils are chemically reacted with an alcohol (methanol is the usual choice) to produce chemical compounds known as **fatty acid methyl esters**. Biodiesel is the name given to these esters when they're intended for use as fuel and fuels as typically blended with petroleum diesel as follows:

< 5% per volume, is considered a diesel fuel conditioner:

A small amount of biodiesel can provide enough lubricity to extend the engine life by reducing parts wear and tear.

< or = 20% per volume, is considered a diesel fuel additive;

The blend ratio of 20% biodiesel with 80% petroleum diesel (B20) is recommended for numerous political and economic reasons.

- 20% per volume, is considered a diesel fuel alternative.

100% pure or neat biodiesel, B100, typical blend recommended when use around people or environmentally sensitive areas,



Where does the feedstock come from?

- ◊ **Vegetable oils**
 - soy, corn, canola, sunflower, safflower, olive, ...
- ◊ **Other Oils**
 - peanut, palm and coconut ...
 - algae, seaweed, etc.
- ◊ **Animal fats**
 - beef tallow, sheep tallow, pork lard, poultry fats, ...
- ◊ **Recycled cooking greases**
 - yellow grease (cooking oil)
 - trap greases
 - brown grease
 - sewage grease

Biodiesel Feedstock

Bio Waste

High

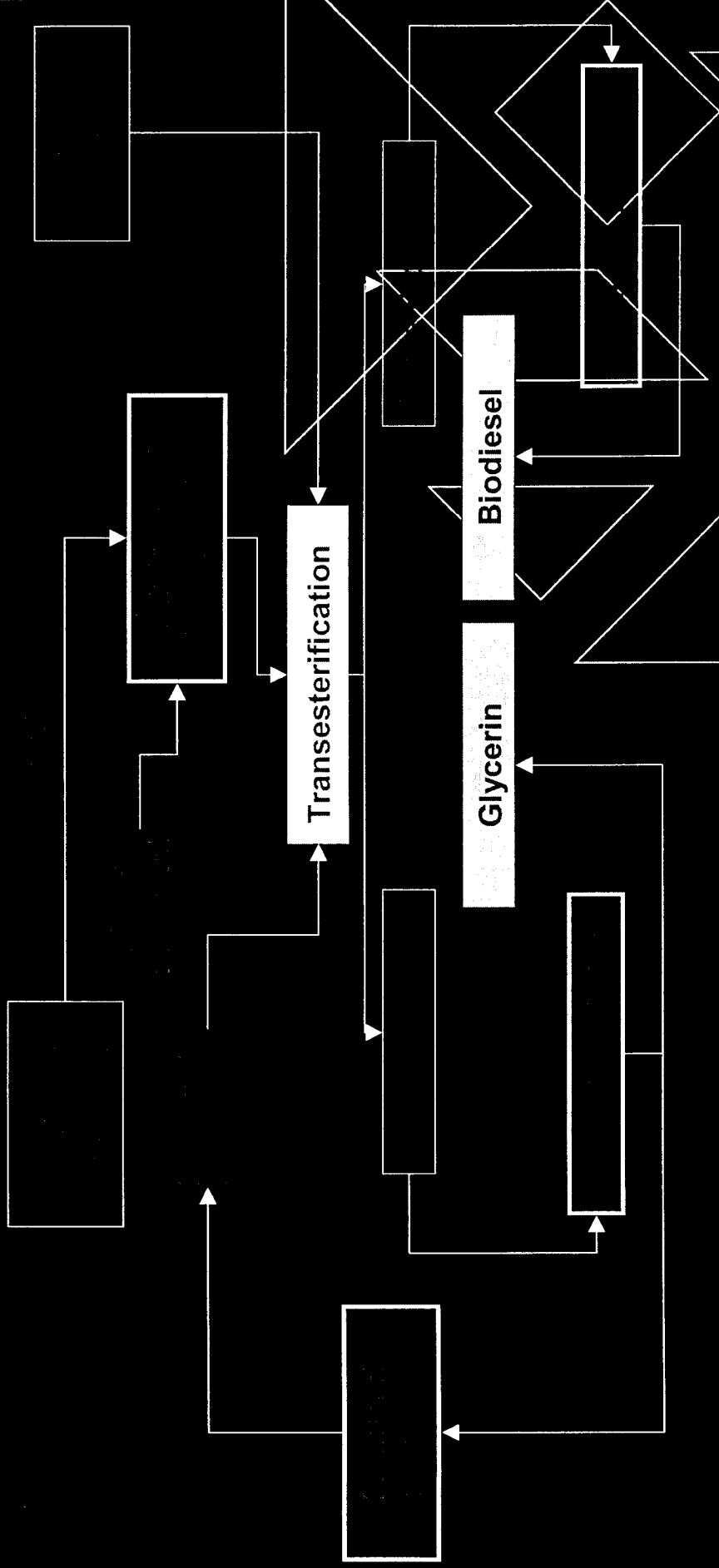
Feedstock Price

Low

In 1895, Rudolf Diesel designed his first "diesel-cycle" engine fuelling it with peanut oil.



How is biodiesel made?



Closed loop: produces no waste

NAFTA friendly, chemical name: fatty acid methyl esters



Biodiesel Benefits?

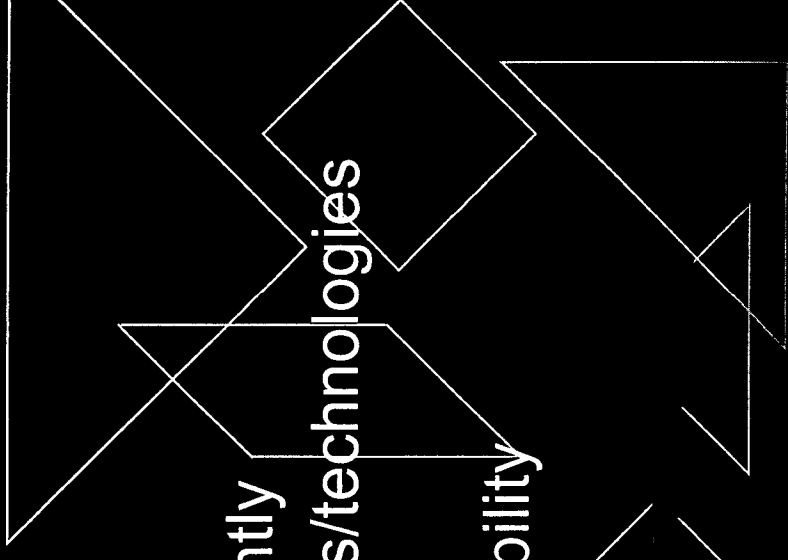
Offers a safer, cleaner alternative to petroleum diesel

Direct Benefits

- ◆ Operates in conventional diesel engines
- ◆ B20 requires few special storage arrangements
- ◆ Provides lubricity benefits as low as 2% blend
- ◆ Exhaust is less offensive
- ◆ Safer to use than petroleum diesel

Indirect Benefits

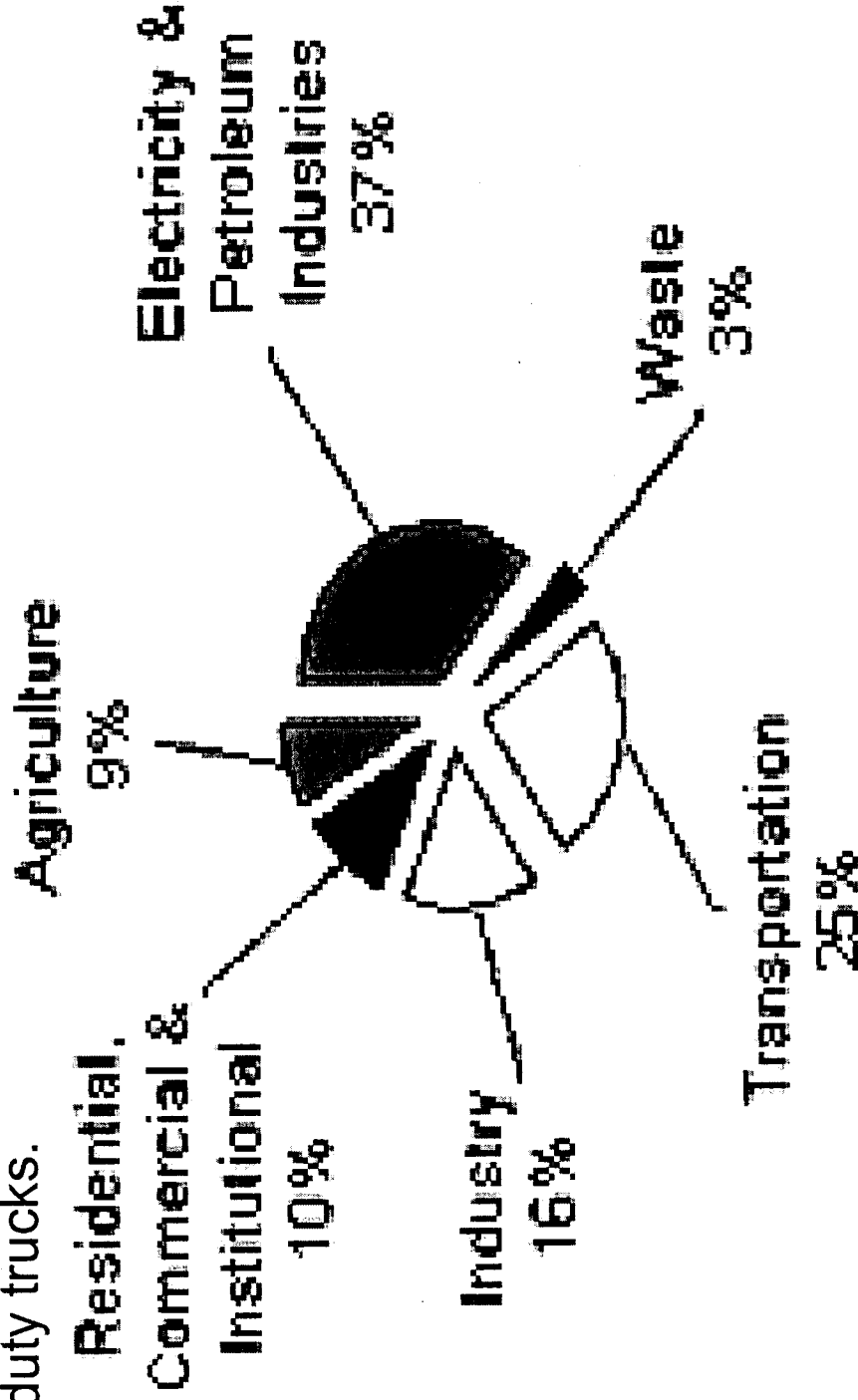
- ◆ Reduces most emissions, some significantly
- ◆ Cost effective solution vis-à-vis other fuels/technologies
- ◆ Renewable fuel
- ◆ Extends non-renewable petroleum availability
- ◆ Reduces air pollution and global warming
- ◆ Fully ASTM compliant



Statement of the Problem

Canada's Greenhouse Gas Emissions By Sector

B.C. contributes about 9% of Canada's total emissions. Within B.C., transportation-based emissions hold the biggest share of the pie — about 41% of B.C.'s emissions are from transportation with 40% of that from automobiles and light duty trucks.

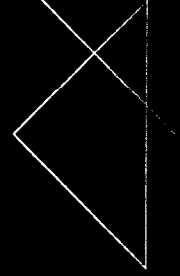


Environmental Benefit

Emission Type	B100	B20
Regulated: EPA concluded: Unburned hydrocarbons	-67%	-20%
Carbon Monoxide	-48%	-12%
Particulate Matter	-47%	-12%
NOx ¹	12%	2%
Carbon Dioxide Lifecycle Emissions	-78.00%	-15.60%

EMISSION Reduction

¹ NOx increase is 2% at B100 with a yellow grease feedstock



Toxic Reduction

Emission Type

B100 B20

Non Regulated

Sulphate

-100% -20%

PAH (Polycyclic Aromatic Hydrocarbons),
cancer causing compounds

-80% -13%

NPAH (nitrated PAH's)

-90% -50%

Ozone potential of specific HC

-50% -10%

Air Quality

The air quality has a direct correlation with medical ailments from PAH related inhalations. The medical system benefits and the voting public benefit from a better quality of life. For example, in Seattle, WA, last year over 1,000 deaths were due to diesel inhalation. What is the real cost to the government?



How to handle and use?

Biodiesel Blends

Typically, the blend is predicated on application use. However, higher blends, even pure biodiesel (100% biodiesel, or B100), can be used in many engines built since 1994 with little or no modification.

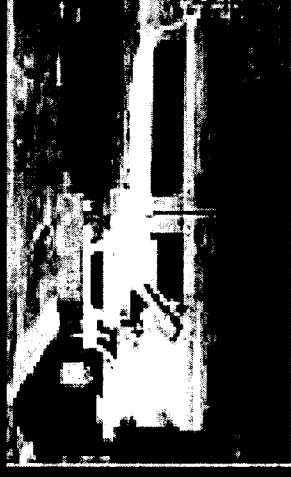
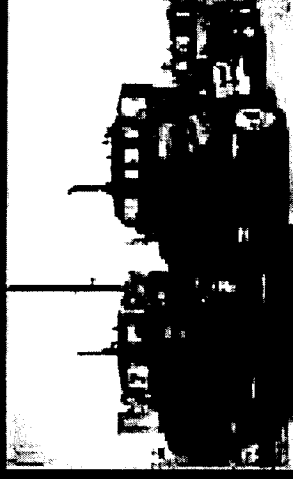
Transportation and storage, however, require special management. Material compatibility and warranty issues haven't been resolved with higher blends.

ASTM D 975 - diesel fuel

ASTM D 6751 biodiesel fuel

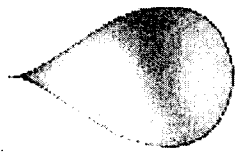
BIODIESEL

Handling and Use Guidelines



Biodiesel Handling and Use Guidelines

About US



**Canadian
Biofuels
Corporation**

<http://www.canadianbiofuels.com>

