

**Biofuels,  
the what, the why, the how, the  
where and the who**

**Colm Ó Gáirbhíth**

- What ? - Introduce Bio-fuels
- Why ? - Explain the reasons for bio-fuels
- How ? - Details of specific bio-fuels  
( bio-diesel / vegetable oil )
  - Details of engine/vehicle modifications needed
  - hands-on experiments
- Where and who ? - The current state of bio-fuels in Ireland

# What ?

Biofuels - liquid/gaseous fuel derived from biomass

Biomass - biodegradable part of products/wastes /residues from agriculture, forestry and industrial/municipal waste

# Why ?

- Geo-political
- Environmental
- Economical

# Geo-political

- Wars over oil
- Unjust regimes propped up by their oil reserves
- Favours rural communities rather than the global oil-industry

# Environmental

- Production and transport of fossil-fuels
- For each litre of diesel replaced, 1.86 kg less CO<sub>2</sub> is released.

# Economical

- Pilot-projects are exempt from excise  
-> cheaper than diesel
- 1 Job for every 1000 tonnes of  
Vegoil produced ( French 1994 )

# Specific Biofuels - Biodiesel

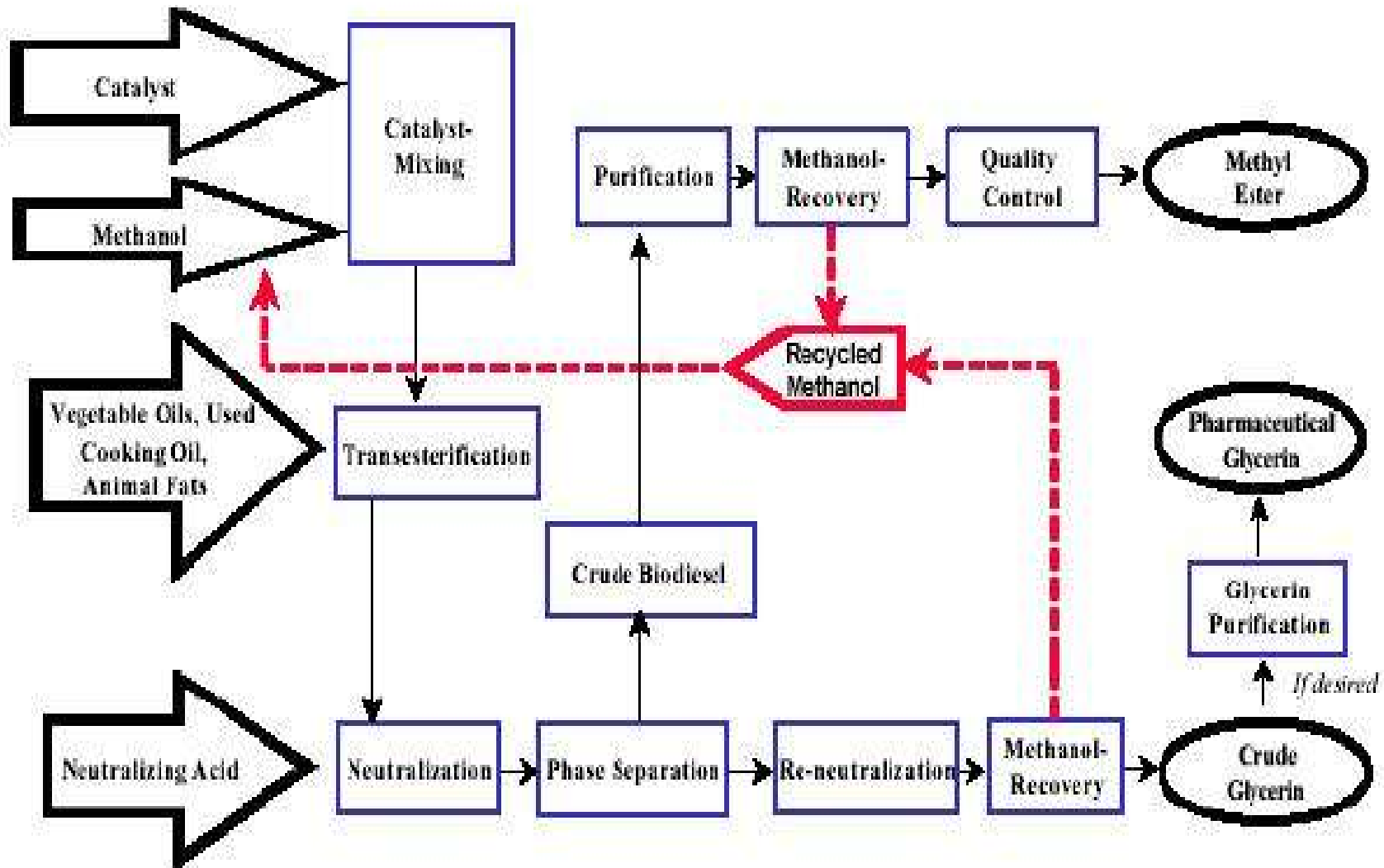
Biodiesel is a fuel made from vegetable oil that runs in any unmodified diesel engine.

Biodiesel can be made from any vegetable oil including oils pressed straight from the seed (virgin oils) such as soy, sunflower, rapeseed, coconut and hemp.

Biodiesel can also be made from recycled cooking oils from fast food restaurants.

Even animal fats like beef tallow and fish oil can be used to make biodiesel fuel.

# Bio-diesel Production Process



# Biodiesel Advantages

Biodiesel runs in any conventional, unmodified diesel engine.

Biodiesel can be stored anywhere that petroleum diesel fuel is stored.

Biodiesel reduces Carbon Dioxide emissions, the primary cause of the Greenhouse Effect, by up to 100%

# Biodiesel Advantages

Biodiesel can be used alone or mixed in any amount with petroleum diesel fuel.

Biodiesel is more lubricating than diesel fuel, it increases the engine life. ( Mention sulfur/France )

Biodiesel is biodegradable and non-toxic.

Micheál Ó Riain

# DO NOT DISPLAY

Biodiesel is cleaner than fossil-fuel diesel.

\* Biodiesel is environmentally friendly: it is renewable, "more biodegradable than sugar and less toxic than table salt" (US National Biodiesel Board)

Current Fuel usage Diesel, 1832277, Petrol 1513741. Total oil usage

180,000 barrels of oil/day ( 42 Gallons / barrel )

61% of total Energy usage from Oil,

21% of electricity from Oil

10,000 tonnes of WVO could be collected, 7,000 currently

60,000 tonnes of tallow each year

\* Biodiesel substantially reduces unburned hydrocarbons, carbon monoxide and particulate matter in exhaust fumes

\* Sulphur dioxide emissions are eliminated (biodiesel con-

# Specific Biofuels - Straight Vegetable Oil ( SVO )



When Dr. Rudolf Diesel showed his new engine at the World Exhibition in Paris in 1900, it was running on 100% peanut oil.

# SVO

The only impediment to using SVO in a modern diesel engine is viscosity.

Viscosity is the resistance to flow of a liquid.

SVO, at room temperature, is 12 times more viscous than diesel, so potential problems for injection pump/injectors.

# SVO

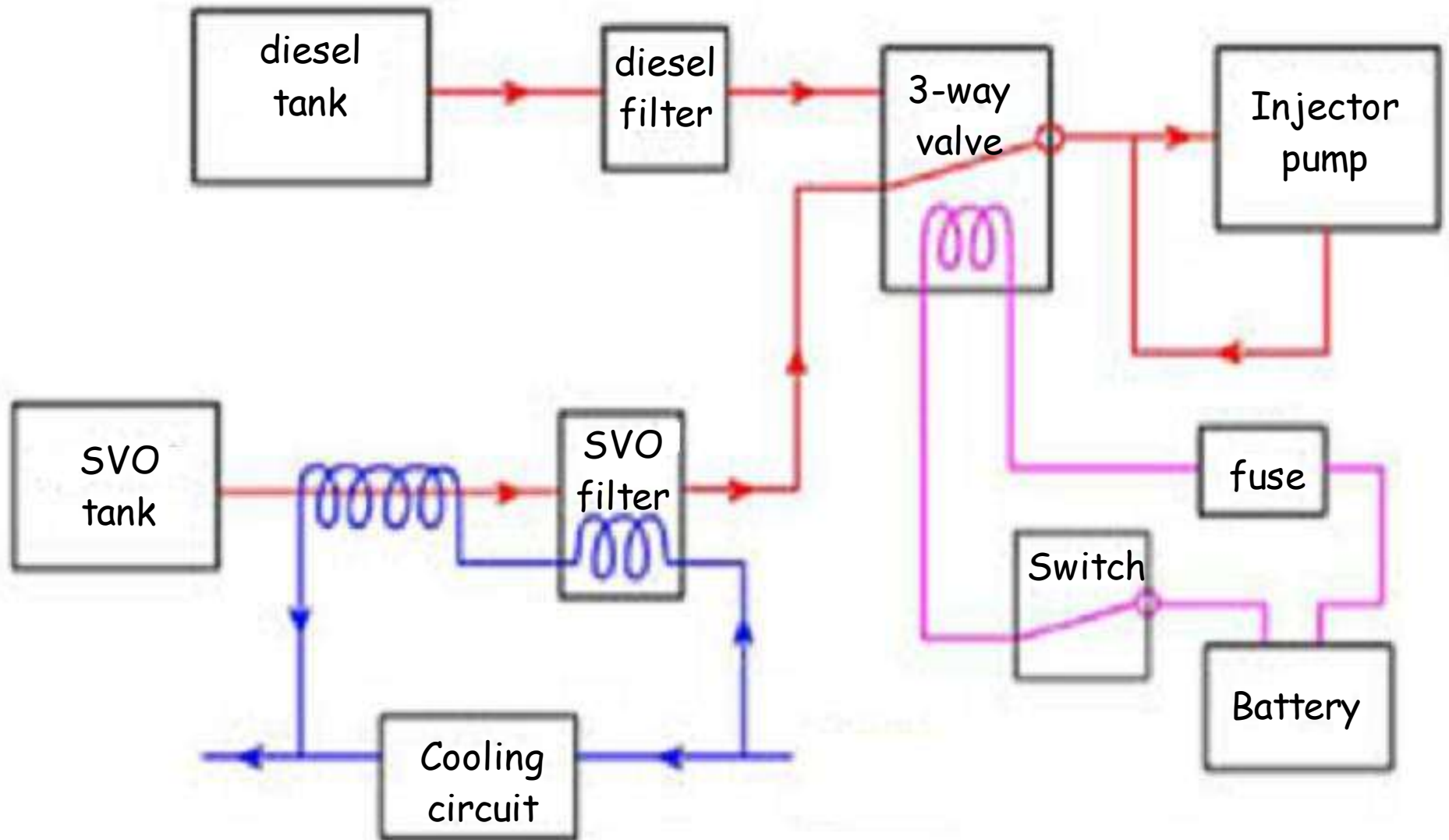
Three solutions to viscosity problem

- Heat the SVO to 80°C
- Modify the engine to accept SVO
- Use small proportion of SVO in diesel, up to 10%

# SVO

A number of solutions exist for heating SVO, all require a 2nd-tank for the SVO

- heated SVO fuel tank
- hose in hose
- heat exchanger
- heated filter
- inline electric heater



# Hose in hose heater



# Engine Modification for SVO use

Only one company, Elsbett from Germany, propose a kit which will allow a vehicle to run only on SVO, i.e. No need for Diesel anymore

# Waste Vegetable Oil ( WVO )

Can and has been used instead of SVO

- needs to be filtered/de-acidified & checked for water
- Main advantage - Cheap, chippers will give it away
- Main disadvantage - No guarantee of fuel quality, no research exists

# SVO / WVO

Final things to note:

- Lucas/CAV injection pumps pose problems.
- Vehicle with Direct Injection are not as straightforward.

Leg stretching to look at my  
installation.

# The Potential for bio-fuels in Ireland ?

## Current annual Fuel consumption

- Diesel 1,832,277 tonnes
- Petrol 1,513,741 tonnes

## Potential Bio-diesel sources

- 10,000 tonnes from WVO
- 40,000 tonnes of tallow
- 30,000 tonnes from SVO from setaside land

Current best-case, 4.4% replacement of diesel

# Current legal status in Ireland

- The use of bio-diesel and SVO/WVO as a fuel is 100% legal
- Excise must be paid - 33c / liter
- Self-assessment, each month you send a form, with a cheque, to C&E ( Charlie O'Connell C&E Limerick, 061-212848 or get forms from Tom Fitzgerald, C&E Ennis 065-6849000 )

# Current European Examples

At present, the excise duty rates on liquid biofuels in some member states are as follows:

Austria: No excise duty on biodiesel, ethanol or ETBE.

Belgium: Remission of 100% excise duty possible for experimental projects.

France: Reduction of €0.35/litre on biodiesel and €0.23/litre on ETBE (on annual production up to 320,000 tonnes and 219,000 tonnes respectively).

Germany: No excise duty levied on biofuels.

Italy: No excise duty on production of up to 125,000 tonnes of biodiesel.

UK: £0.20stg/litre (€0.31/litre) reduction on biodiesel and bio-ethanol.

In Ireland excise duty rates for mineral diesel and unleaded petrol are €0.33/litre and €40/litre respectively<sup>17</sup>.

# Where & Who

- Where can you buy a conversion kit ?
- Who can supply you with SVO / WVO ?

# Conversion-Kit Suppliers

- Eilis Oils Co. Wicklow, 01-286-3673  
Elsbett kits and Oil
- ATG Germany. +49-90 75 - 86 44  
2-tank kits
- GoatIndustries, +44-1248 671982  
2-tank kits and individual parts
- Biogreen Co. Wexford, 087-2449619.  
Elsbett kits + Oil 66-68c/liter.

# Parts Suppliers for DIY

- Multi-Filter, 021-4355611, supply filters for use with WVO.
- Halpin & Hayward Ltd, 01-2967188 supply filters for use with WVO.
- Miko Metals Ltd, 021-4966907 for aluminium tubing for making heated tanks.
- Jeffrey Fox 021-4365431, [jeffreyfox@iol.ie](mailto:jeffreyfox@iol.ie) for 3 or 6 port valves

Biogreen Co. Wexford, 087-2449619. Elsbet.

VW passat 2001, 1037 Euro, 600 Euro installation.

SEI 100 Cars, 704 Euro to go against total costs.

SEI need remit from Dept of AG, 6 companies looking at biodiesel plants. Mostly winter rape. 66-68 c/liter ( incl vat ) per 1000 liter. Comm marine & Natural Resources.

Waiting for derogation.

1.5 year payback. mineral oils used as fuel.

When ?

Now