

Liquid Bio Fuel



Introduction:

Transport Issues: Transport uses almost 40% of Ireland's total final energy consumption and is the greatest energy-consuming sector in the country. Virtually all transport vehicles in Ireland are powered by fossil fuels (petrol or diesel). The combustion of



fossil fuels in vehicle engines emits greenhouse gases and other air pollutants. Fossil fuels are a finite resource and will not last forever.

Three Types of Liquid Bio Fuel

- ❖ Pure plant oil: vegetable oil (rapeseed, sunflower, palm, soy...) or waste cooking oil
- ❖ Biodiesel processed from vegetable oil, waste cooking oil or Tallow.
- ❖ Bio-ethanol can be made with sugar beet, sugar cane, cereals and wood residues or by waste products of the dairy industry

Pure plant oil from rapeseed:

Rapeseed is the most common form of Bio fuel in Ireland and is grown as a break crop typically once every three years of cereal growth.

The major advantages of natural vegetable / rapeseed oil fuels are

- ✓ High energy density (practically equivalent to mineral diesel)
- ✓ Liquid in form and thus easy to handle
- ✓ Neither harmful toxic to humans, animals, soil nor water
- ✓ Neither flammable nor explosive, and does not release toxic gases
- ✓ It is recyclable form of energy.
- ✓ CO₂ neutral when burning (does not contribute to global warming)
- ✓ Contains no sulphur (does not contribute to acid rain)
- ✓ Emits less soot than diesel when combusted
- ✓ Provides an income source for rural areas and secures local fuel supply

Conversion to run on Pure Plant Oil

Vegetable oil is more viscous than mineral diesel and has a high flash point. Therefore, some modifications maybe required to a diesel engine before it can be fuelled by vegetable oil.

The cost of converting a diesel vehicle to run on bio fuel ranges from €690 to €1,700 depending upon the

make and model of the vehicle and the type of engine. Modified vehicles do not require any additional maintenance or servicing above that of pre-conversion vehicles. Alternatively, bio fuel can be used as a blend with mineral diesel without the requirement to modify certain engines. Blends of up to 50% are possible in Ireland. The pay back period and on going economic benefits of running a vehicle on bio fuel is dependent upon the annual Kilometres travelled of the vehicle. The bio fuel supplier will be able to clarify which vehicles are compatible for the conversion to bio fuel or can operate on a bio fuel mix.



Feasibility of converting vehicles to run on, Bio fuel		
Average travel of private Vehicle	Average diesel consumption of a new vehicle	Comparing Cost of Fuels
20,000 km	0.065 litres/km	-1300/litres of diesel/annum @ a cost of €1,500
20,000 km	0.065 litres/km	-1300/litres for bio fuel/annum @ a cost of € 975
Typical annual cost saving on converting an vehicle to operate on Bio-fuel oil with an average distance travelled of 20, 000 km.		€ 525

The payback period for converting the vehicle would be between 2 and 5 years.

Biodiesel from oil (vegetable or waste cooking)

Vegetable waste cooking oil or tallow can be converted into biodiesel to supply unmodified diesel engine:

- The Rapeseed Methyl Ester (RME)
- The Tallow Methyl Ester (TME)
- The Fat Acid Methyl Ester (FAME).

Usually, the feedstock (oil or tallow) is mixed with methanol for reaction, and then the products of reaction are glycerol and biodiesel (RME, TME or FAME). At the end of the process, the biodiesel may comply with the European standards for biodiesel EN 14214 and mixes with mineral diesel standards EN 590 in order to allow blending between the two fuels. The biodiesel price is approximately 0.87 (€) per litre of pure biodiesel depending on the source to make it. There are actually three different blend rates of use for the biodiesel without engine modifications: (Manufacturer agreement is required for these)

Biodiesel Blend	
B05	5 % biodiesel
B30	30 % biodiesel
B100	100 % biodiesel

i.e. B20 means 20% biodiesel and 80% petroleum based diesel

In some cases you can start using biodiesel immediately without any modification. However it is recommended to clarify this item with the vehicle manufacturer. The running on biodiesel involves some problems according to the type of vehicle;

- Accumulation of ester in the lubricating oil that can corrode any natural rubber parts in the fuel lines.
- Inadequate low temperature properties lead to starting difficulties and fuel filter blockages during winter.

It is therefore recommend that you replace your fuel filter after your first tank of biodiesel, since biodiesel is a very good solvent and will scrub out all the tars, varnishes and gums left by fossil diesel in your fuel system. In order to limit these problems, the biodiesel should be filtered after esterification and before use; you should also check often the fuel filters of the vehicle and change them when needed.

Bio Ethanol

Bioethanol is made when biomass is converted to sugars, which are then fermented into ethanol. The process of hydrolysis separates most of the water from ethanol, leaving an end product that is generally about 95% ethanol and 5% water.

Ethanol can be also used in petrol engine in two different ways:

- Petrol and ethanol blend (5% ethanol + 95% petrol) called E-5. This blend can supply unmodified petrol engine.
- Ethanol and petrol blend (85% ethanol + 15% petrol) called E-85. This high ethanol content blend requires an engine conversion.

Note: the E-85 is available in some filling station in Ireland, and the price is envisaged to be approximately 15-20 cent per litre cheaper than unleaded 95.

Moreover, the conversion kit to run on E-85 costs around € 660 to € 840 depending on the engine technology / size. A number of vehicles manufacturers sell cars that can directly run on E-85 (bio-ethanol) which include Sabbs, Volvos and some models of Ford Focus.

Licenses for bio-fuel generation plants for Motor Oil.

Tax relief were issued within four distinct bio-fuels categories and have a minimum production capacity as follows:

- Bio-fuel blend complying with EN590 (European Diesel Standards): the minimum project size is 10

millions litres per year and the MOT relief was granted on five-year basis.

- Bio-ethanol: the minimum project size of 10 millions litres per year.
- Pure Plant Oil: the minimum project size of 50 thousands litres per year and the MOT relief was granted on a four-years basis.
- Bio-fuel used in identified Captive Fleet: the minimum project size of 100 thousands litres per year.

Companies that are licensed to produce liquid Bio-fuel

Category	Company	Volume Awarded for period 2006 - 2010
Bio-ethanol	Cooley-Clearpower 162 Clontarf Road, Dublin 3	54.38 m litres
	Maxol Ltd 3 Custom House Plaza, IFSC, Dublin 1	42.15 m litres
	One Fifty One Ltd 151 Thomas Street, Dublin 8	176.07 m litres
	Topaz Energy Ltd Topaz House, Beechill Office Campus, Clonskeagh, Dublin 4	33.4 m litres
Biodiesel - EN590	Conoco Philipps Whitegate Refinery Ltd Whitegate, Midleton, Co Cork	93 m litres
	Biodiesel Production Ireland/ Topaz Energy Limited Beech Hill Office Park, Clonskeagh, Dublin 4	68 m litres
	Green Biofuels Ireland Ltd Blackstoops, Enniscorthy, Co Wexford	32 m litres
	Irish food processors Ltd 14 Castle Street, Ardee, Co Louth	97 m litres
Pure Plant Oil	Biogreen Energy products Ltd The Leap, Adamstown, Co Westford	7 m litres
	Eilish Oils Ltd Kilmurry, Newtonmount Kennedy, Co Wicklow	7 m litres
	Goldstar Oils Ltd Oldcourt, Inistioge, Co Kilkenny	7 m litres
Captive Fleets	Greyhound Recycling and Recovery Ltd Knockmitten Lane, Western Industrial Estate, Dublin 12	21.68 m litres
	Emo Oil Ltd Clonminam Industrial Estate, Portlaoise, Co Laoise	9.65 m litres
	EcoOla Innovation in Business Centre, Galway Mayo Institute of Technology, Dublin Road, Galway	9.3 m litres
	Eco Fuels Ltd Crohane, Fossa, Killarney, Co Kerry	6.4 m litres
	Bord na Mona Plc Main Street, Newbridge, Co Kildare	0.58 m litres

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Waterford Energy Bureau,

Civic Offices, Tankfield, Tramore, Co. Waterford
 Phone No: 051-395530/395531 Fax No: 051-395520
www.waterfordenergy.ie info@waterfordenergy.ie