

Factors Influencing PPO Uptake

✍ Darren Hill

- ✍ Independent PPO research since 2000
- ✍ Developed www.vegburner.co.uk as a PPO information service
- ✍ Member of Blooming Futures Ltd since 2003
- ✍ Vice president European Pure Plant Oil Association



Blooming Futures

Unit 2-4, Old Shoreham Cement Works, Shoreham Rd, Upper Beeding, bn44 3tx
Office Number: 01273 462197 Workshop Number: 01273 462506

- **Founded in 1999 and incorporated in May 2001**
- **Not-for-profit independent research group**
- **Co-operative of mechanics and environmentalists**
- **Qualified installers of high and low pressure gas fuelling systems**
- **Biodiesel and PPO researchers**
- **Biodiesel production started in 2002**
- **Started researching Pure plant oil (PPO) and engine conversions in 2003**
- **Funded by the Department for Environment, Food and Rural Affairs (DEFRA) in 2005 to develop and deliver the Bio-Fleet project**

WHAT IS THE BIO-FLEET PROJECT?

- ✍ Our research identified a simple problem which was holding back the growth of PPO fuel
- ✍ Without a coherent market for PPO there is too much financial risk in starting a fuel production and delivery business.
- ✍ Without a fuel supply in place it was undesirable to pay for conversion of vehicles to PPO.
- ✍ The DEFRA funding will help cover the cost of conversion for approximately 50 vehicles to run on PPO, creating a demand for cold pressed rape seed oil fuel.
- ✍ Once there is a developed local supply it is possible for more people to convert vehicles and tap into the supply.
- ✍ Once a working model is in place it becomes viable for repetition.

Barriers to Uptake

- ✍ Fuel Issues - taxation of fuel, legality of fuel, quality of fuel, fuel standards.
- ✍ Engine Issues – quality of conversion, legality of conversions, engine warranty, PPO engines in production.
- ✍ Perception – Confused public perception, little representation at government level
- ✍ Economics – Fluctuations in oilseed and diesel fuel price, tax incentives.

Fuel Issues

✍ Taxation of Fuel

- ✍ Rate of taxation varies
- ✍ Germany charges no tax
- ✍ Ireland and Holland grant licences for a given quantity tax free
- ✍ UK have an unclear tax reduction of 30 Euro cents
- ✍ Other countries pay full road fuel duty rate

✍ Legality of Fuel

- ✍ It is not legal to use PPO as a road fuel in some countries. France?

✍ Quality of Fuel

- ✍ Oilseed quality
- ✍ Handling and storage of seed
- ✍ Oilseed press operation
- ✍ Filtration and sedimentation
- ✍ Handling and storage of oil

✍ Fuel Standards

- ✍ German E DIN 51 605 standard for rapeseed oil fuel
- ✍ Standards provide a basis to test equipment for reliability and a level of confidence for consumers
- ✍ German standard was initially developed by a partnership of academia, oil mills and conversion companies



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 LTV-Work-Session on Decentral Vegetable Oil Production, Weihenstephan Quality Standard for Rapeseed Oil as a Fuel (RK-Qualitätsstandard) 05/2000	in Cooperation with:			
	 			
Properties / Contents	Unit	Limiting Value min. max.		Testing Method
<i>characteristic properties for Rapeseed Oil</i>				
Density (15 °C)	kg/m ³	900	930	DIN EN ISO 3675 DIN EN ISO 12185
Flash Point by P.-M.	°C	220		DIN EN 22719
Calorific Value	kJ/kg	35000		DIN 51900-3
Kinematic Viscosity (40 °C)	mm ² /s		38	DIN EN ISO 3104
Low Temperature Behaviour				Rotational Viscometer (testing conditions will be developed)
Cetane Number				Testing method will be reviewed
Carbon Residue	Mass-%		0.40	DIN EN ISO 10370
Iodine Number	g/100 g	100	120	DIN 53241-1
Sulphur Content	mg/kg		20	ASTM D5453-93
<i>variable properties</i>				
Contamination	mg/kg		25	DIN EN 12662
Acid Value	mg KOH/g		2.0	DIN EN ISO 660
Oxidation Stability (110 °C)	h	5.0		ISO 6886
Phosphorus Content	mg/kg		15	ASTM D3231-99
Ash Content	Mass-%		0.01	DIN EN ISO 6245
Water Content	Mass-%		0.075	pr EN ISO 12937

The Weihenstephan Rapeseed Oil Fuel Standard - adopted by the German PPO industry in 2000 and later used by DIN as the foundation for DIN 51605



Engine Issues



✍ Quality of Conversion –

- ✍ Technology is reaching a good level of maturity.
- ✍ Some equipment/conversions have been marketed which were not suitably developed which caused reliability issues.
- ✍ Latest technology developed in Germany offers good reliability and has been tested against the current Euro4 exhaust emissions standard

✍ Legality of Conversion –

- ✍ Laws in some countries restrict or regulate vehicle modifications.

✍ Engine Warranty –

- ✍ Engine and fuel injection equipment manufacturers are unsure of the technology. Lack of fuel standards, insufficient market to justify expense of testing.

✍ PPO Engine Production –

- ✍ Deutz offers approval in some tractors
- ✍ MAN B&W Diesel offer large stationary engines
- ✍ Lack of visible demand has stopped other companies from developing technology or bringing developments to market

Perception of PPO

- ✍ Early research carried out using PPO in unmodified engines gave bad results
- ✍ Media reports warn of damage to engines.
- ✍ PPO generally has no large supporters. Limited resources available to promote the concept to government and media compared with other biofuel lobby groups with large industrial support.

Economics

A combination of factors make the future PPO market unclear

- ✍ Oilseed Price – Huge growth in demand due to the EU Biofuels directive is set to increase the feedstock price.
- ✍ Diesel Fuel Price – Growing world demand and perceived supply infrastructure shortcomings combined with diminishing reserves will see constant increases in fuel prices
- ✍ By Product Price – The market for the seed cake is also somewhat variable, currently most cake is use for animal feed although there is growing use for heating and combined heat and power plants.
- ✍ Fuel Taxation – Germany, with a clear road fuel tax exemption, has seen dramatic uptake due to the huge fuel-cost saving potential. In the UK recent uncertainty with the taxation situation for PPO has caused growth to slow. A clear price advantage for PPO is necessary to encourage investment.

Incentives

- ✎ Legislation – The European Transportation Biofuels Directive has set rolling targets for transportation biofuel uptake which most countries are failing to meet. Some national schemes are being investigated – In the UK a renewable transportation fuel obligation has been proposed which will oblige fuel producers to either sell a proportion of biofuels or to buy certificates from producers
- ✎ Level of Investment – Fuel production equipment investment is relatively small compared to other biofuels which makes small scale plants viable
- ✎ Growing Visibility – There is a growing awareness of PPO
- ✎ Rural Economy – Farmers are looking for alternative income streams and are being encouraged to diversify their businesses
- ✎ Environmental – Green house gas reductions. Exhaust emission improvements.
- ✎ Fuel Security – Increasing instability in traditional fuel supply networks is encouraging support for domestic fuel production

