

Introduction to bio-liquids for home heating & cooking

The introduction of bio-liquids into the home heating and cooking markets creates opportunities for a cleaner, sustainable and renewable future for the liquid fuelled industry.

What is a bio-liquid?

Bio-liquids suitable for use in the home heating market are commonly Fatty Acid Methyl Esters (FAME) derived from either used cooking oil or virgin plant sources such as Rapeseed and Soya, etc. grown specifically for this purpose.

The use of FAME in liquid fuels creates overall carbon reductions in lifecycle analysis of emissions when compared to the use of traditional mineral (fossil) fuels such as kerosene or gas oil. This is as a result of the carbon absorbed by the plant during its lifecycle offsetting carbon emissions from the combustion process.

Producing FAME from used cooking oils gives a higher carbon saving than that of virgin plant stock*.

FAME for heating purposes should meet the requirements of EN 14213 (EN 14214 for automotive use can be considered to be a higher standard but some additional tests requirements from EN 14213 will be required to be satisfied before use) and be produced under strict quality assurance systems to achieve consistent quality and properties of the fuel.

FAME to EN 14213 can either be used as part of a blend with mineral fuels such as kerosene or gas oil or even in its pure form as a 100% bio-liquid fuel with bespoke equipment

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For the production of new bio-liquid compatible equipment such as boilers, burners and oil tanks, as well as the conversion of existing installations and equipment, it is vitally important and necessary that the properties of the fuel to be combusted are not only known but are consistent in supply. To achieve this OFTEC are drafting an industry blend standard PROPS24 – as a result of intensive academic laboratory and industry supported field trial analysis – which is due for publication in 2010. This research and trials are jointly supported with OFTEC and its Members by Carbon Connections, University of East Anglia, ICOM Energy Association and Clean Energy Consultancy

What are the implications of using bio-liquids in current appliances?

The properties of bio-liquids and bio-liquid blends in comparison to mineral fuels such as kerosene are different. This is an important factor to bear in mind as this means that to change from 100% mineral fuel (even to a kerosene or gas oil bio-liquid blend) will require formal conversion and re-commissioning of installations and equipment. Literally speaking the bio-liquid is thicker and heavier and has a different energy content. The properties of bio-liquids being different to mineral fuels, react differently to different materials. Materials such



as rubber – as found in fuel pump and filter seals – which are commonly encountered in mineral fuel installations are not compatible with bio-liquids.

Bio-liquid compatible components should be in place before use of a bio-liquid as a heating fuel and are available from OFTEC Manufacturing Members.

Pressure jet appliances and installations can be converted to run on bio-liquids with relative ease but only where the actual properties of the fuel are known.

Conversion would commonly require at least the replacement of:

- Atomising nozzles
- Fuel pumps
- Flexible oil lines
- Filters and/or filter seals

However, it may be necessary to obtain a bio-liquid compatible burner.

Attention should also be paid to suction line sizing as a correctly sized kerosene suction line may require an increase in size for example from 6mm to 8mm or even to 10mm.

Bio-liquids are hygroscopic (they absorb water) and should never be introduced to oil storage and supply systems which are contaminated. Contaminated systems should be cleaned before application of bio-liquids as the consequences will inevitably result in blocked filters and inoperative systems.

Bio-liquids should never be introduced to existing oil storage installations which do not

have secondary containment as the cleaning effect of the fuel may well find weaknesses in existing tanks which could lead to leaks. It is recommended that wherever possible and practicable new integrally banded oil storage tanks suitable for bio-liquids are installed. To help prevent long term storage stagnation it is recommended that smaller tanks are utilised based upon half yearly usage.

For bespoke installations where a 100% FAME is being considered as the fuel to be used in a specific application then consideration will have to be made to the use of heated and insulated (and possibly agitated) fuel storage tanks as well as trace heated and insulated supply lines.

Vaporising burners and appliance installations should **not** have bio-liquid fuels introduced to them. It has been proven that bio-liquids in kerosene can immediately adversely affect vaporising burner combustion and manifest in the rapid onset of premature carboning in vaporising sleeve burner bases – even within hours. It is recommended that vaporising appliances such as range cookers are converted with appliance manufacturer's (or appliance manufacturer's approved) bio-liquid conversion burners.

Further information

For general conversion advice OFTEC is producing a guide to conversion "Going green" which is due for publication for 2010.

For specific advice on the availability of bio-liquid new and conversion equipment and components please contact appliance, equipment and burner manufacturers directly.

