



FPS BRIEFING NOTE

SMALL-SCALE BIODIESEL PLANT

What is available?

A number of companies are offering to supply 'do-it-yourself' [FAME]¹ production units, based on German or Dutch technology and claimed to be capable of producing up to 1000 litres per day of vehicle fuel grade product. The units generally consist of a chain of heavy-duty plastic, or stainless steel, vessels in which the reaction [transesterification], separation and washing stages take place sequentially as a batch process.

With carefully controlled use and reliable, good quality, raw materials these units are certainly capable of producing an acceptable vehicle fuel quality product, but a number of factors need to be considered before investing several thousand pounds in a unit of this type.

Factors for consideration

- The intended end market(s) for the product [own use &/or sell on] *and* for the major by-product of the process [glycerol].
- The capital costs of the unit and for its siting/installation [for which planning permission may be required].
- The sourcing, quality, continuity and cost stability of the raw materials [vegetable oils, including used cooking oil, are rising steadily in price as a demand for these increases].
- Processing costs, e.g. power, water and, particularly, the disposal of contaminated effluent and waste materials [licences and/or permits will have to be obtained for this].
- The safe handling and storage of the caustic, toxic, volatile and highly polluting raw materials [Health & Safety at Work, COSHH, Fire, and Oil Storage, Regulations will all apply to some aspects of this].
- The requirement to register with HM Revenue & Customs² as a 'Biodiesel Producer' and, if the product is produced for commercial purposes, with the Environment Agency³ as a 'Chemical Activity' regulated under the Pollution Prevention & Control Regulations.
- The possible need to be registered for VAT [HMR&C National Advice Service, telephone number 0845 010 9000, can provide advice on this, and on other tax related issues].
- The requirement to keep accurate records of quantities produced and their intended uses for duty payment purposes.
- Product testing/analysis charges [especially if these are necessary to justify a claim for duty relief or to investigate customer complaints].
- The period needed for a return on the investment.

Return on investment factors

If sold on, the product must be competitively priced [currently, at less than around £1/litre], including the duty to be paid for its use as a road fuel. Realistic calculation of production costs should include provision for a period of gaining experience with the process &/or failure situations, such as poor yields, spoiled batches [eg from emulsion formation] and unusable end product, including the safe and lawful disposal of any waste from these.

Registration and licence fees will have to be paid to the regulatory authorities and some of these may be ongoing. Liability insurance cover may be required for potential damage to third-party vehicles, or equipment, from an unsatisfactory batch of product and routine testing/analysis of the product will be necessary to justify any claims made of fitness for purpose or to obtain duty relief. The forthcoming Renewable Transport Fuels Obligation may significantly affect the automotive market for biodiesel, particularly if the oil majors take up the obligation fully &/or decide to produce their own biodiesel.

Taxation

HM Revenue & Customs³ must be informed of the activity, and the facility registered; if the product can be demonstrated to meet the HMRC requirements for reduced duty [not less than 96.5% ester and not more than 0.005% sulphur] then 28.35p duty [currently] will have to be paid for every litre produced. If the product cannot meet the HMRC specification, then it will be regarded as a 'fuel substitute' and the full duty rate for automotive diesel levied. Accurate records of the quantities produced must be kept and the duty payment for these made to HMRC each month.

Quality and use

Product quality will be dependent upon the type and purity of the oil(s) used and on the correct balance and control of the reaction materials; it will be adversely affected by using heavily degraded cooking oil, too much or too little of one ingredient or by inadequate washing and/or drying of the finished product. Excess alkali can lead to soap formation and an emulsified reaction mixture or difficulty in washing up the product to neutrality; inadequate alkali will inhibit complete processing of the oil, leaving undesirable unreacted, or only partially reacted, materials in the product. Insufficient washing of the product may leave it unacceptably alkaline and/or contaminated with glycerol or even methanol [depressing the flashpoint of the product to 'dangerous goods' level].

Residual water from inadequate drying can cause catastrophic damage to a modern common-rail/fuel-injected diesel engine fuelled with a wet blend. In older, less sophisticated vehicles, the detergent and paint-stripping properties of FAME can cause filter blockage in the early stages of its use and/or degradation of rubber, plastic and painted components.

The quality of FAME for diesel engines is given in a European Standard [EN 14214], which specifies values for the critical parameters that determine its suitability for use at 100% and as a blending component in ULSD. ***It is essential that only FAME complying with EN 14214 is supplied as '100%' and/or for blending into ULSD if vehicle warranties are to be upheld.***

1 FPS Briefing Note 3 'Biodiesel'

2 Environment Agency website:

www.environment-agency.gov.uk/yourenv/857406/1173616/?version=1&lang=e

3 HM Revenue & Customs website:

http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?nfpb=true&pageLabel=pageOnlineServices_ShowContent&id=HMCE_PROD1_024771&propertyType=documentT