

## THE MARKET FOR BIODIESEL

### INTRODUCTION

In 2009, Australia produced around 10 billion litres of diesel and consumed around 19 billion litres of this fuel<sup>1</sup>; the 9 billion litre difference between domestic production and consumption was imported. To address the cost and security of supply risks associated with importing fuel, a growing number of Australian businesses, particularly in the transport and mining sectors, are turning to locally produced biodiesel blends.

Biodiesel is produced from renewable plant or animal feedstocks which contain fatty acids. It is typically used in blends with mineral (or petroleum) diesel as a transportation fuel or as stationary fuel for fixed plant items. In Australia, the main feedstocks for biodiesel are tallow, canola oil and used cooking oils and greases; however there can be a wide variety of feedstocks, including recycled vegetable oil (yellow grease), poppy seed oil, chicken fat, lard, soybean oil, rapeseed oil and peanut oil.

As the waste stream and by-products of the red meat manufacturing process can be used as feedstocks for biodiesel, businesses in the meat processing industry can benefit from biodiesel production. This factsheet provides information on the market potential for biodiesel blends in Australia and how meat processing facilities can benefit from this market.

### WHAT ARE BIODIESEL BLENDS?

Biodiesel can be added to mineral diesel in any number of different concentrations. When we talk of blended biodiesel, we normally quote a number beside this which indicates the concentration of biodiesel in the blend. Some examples of are B100, which is pure biodiesel; B85, which is 85% biodiesel; and B5, which is 5% biodiesel. Worldwide it is generally accepted that blends of B20 or less can be used in normal diesel engines without any adverse effects; however some engine manufacturers do not extend warranties for engines running biodiesel blends.

In Australia, B5 or lower can be used in any engine, but only a small number of engine manufacturers warrant the use of blends with higher biodiesel content. Some individual fleets have up to B100 in regular use; although these generally have specialist engine maintenance and the fleet operator assumes legal responsibility for the use of these fuels.

<sup>1</sup> <http://www.biofuelsassociation.com.au/biodiesel-in-australia>

There have been recent developments in the use of biofuels produced from the same feedstocks as biodiesel as an aviation fuel; a number of Australian airlines have successfully trialled the use of 50% biofuel blends on commercial airline flights. Developments in this area are likely to continue as organisations such as Qantas and CSIRO are pushing for a move towards Sustainable Aviation Fuel.<sup>2</sup>

### **BIODIESEL PRODUCTION**

The biodiesel feedstock goes through a process of transesterification; the fatty acid-rich feedstock is reacted with alcohol to form ethyl esters of fatty acids (biodiesel) and glycerol. Energy or catalysts are used to drive the reaction and to increase the amount of output. The following processes can be used to drive the reaction:  
Common batch process: a catalyst and heat is used.

Supercritical processes: This does not require a catalyst; instead high temperature and pressure is used.

Ultrasonic methods: Ultrasonic sound waves cause the mixture of reactants to produce bubbles which collapse, producing both a heating and mixing effect; this negates the need for catalysts.

Microwave methods: Microwaves are used to heat and mix the reactants, negating the need for catalysts.

Lipase catalysed methods: Lipase enzymes are used as a catalyst to the reaction process.

### **RECENT DEVELOPMENTS AND EMERGING TECHNOLOGIES**

The major challenge facing the biodiesel industry is securing the supply of suitable feedstocks for the production of biodiesel, with the controversial diversion of agricultural production from feed to fuel. Therefore, there is continual research into the use of alternative or lower grade feedstocks including marine algae, coffee grounds, and pongam oiltree.

There are also recent innovations into packaged biodiesel production units, whereby this seemingly complex process is simplified to such an extent that feedstock is added in at one end and biodiesel comes out of the other end. For example, there is a biodiesel production unit contained in a shipping container that can produce biodiesel from appropriate feedstock in the location here these feedstock is produced. This system does not require an external source of energy; it uses the biodiesel it produces to generate its own power. Such a system could be used at a meat processing facility to produce biodiesel on site.

Research into biodiesel production is focussed on waste products which have higher free fatty acid levels (FFA). Generally biodiesel quality feedstock should be below 2% FFA. If biodiesel production methods were developed so that higher FFA levels were acceptable, there would be potential for more meat waste products that have higher FFA to be used in biodiesel production. Current biodiesel research is also focused on developing the most efficient methods of obtaining fatty acids from the anaerobic digestion of organic waste streams, such as domestic and animal waste.

### **APPLICABLE REGULATIONS**

All biodiesel produced in Australia must conform to the FQS (Fuel Quality Standards Act 2000). Biodiesel fuel standards are contained in the Fuel Standard (Biodiesel) Determination 2003.<sup>3</sup> These fuel standards outline limits on biodiesel chemical composition (e.g. it cannot contain more than 0.02% by mass of sulphur ash), properties of biodiesel (e.g. the density at 15°C must be between 860 to 890 kg/m<sup>3</sup>) and the requirements of the test methods for each of the properties/composition.

In order to qualify for the cleaner fuels grants scheme (described below), biodiesel must be shown to comply with the FQS. This is a very arduous and expensive process; as a result it is not economic to have smaller biodiesel manufacturers, leaving only larger manufacturers in business in Australia.

<sup>2</sup> <http://www.qantas.com.au/infodetail/about/environment/aviation-biofuel-report.pdf>

<sup>3</sup> <http://www.comlaw.gov.au/Details/F2009C00146>

Any entity manufacturing, storing, blending, distributing or retailing biodiesel must have an appropriate excise licence from the Australian Taxation Office (ATO). The licence required depends on the operations undertaken at a site; these include manufacturing licences, storing licences, or movement permission. Fuel excise tax must be paid on biodiesel produced by licence holders, although rebates can be claimed via fuel tax credit scheme and the cleaner fuels grant scheme described below.

### GOVERNMENT POLICY INCENTIVES

In tax law, any liquid fuel is taxable. This includes mineral diesel and other combustible fossil fuels. The Cleaner Fuels Grants Scheme allows an effective tax rebate of 38.143 cents per litre of biodiesel for producers or importers of biodiesel. This is applicable only if the fuel meets with the Fuel Quality Standards (FQS) and these rates can only be claimed by an ATO licensed person (see earlier section on Excise within the “applicable regulations” section above).

Specific operators are eligible for fuel tax credits based on the fuel type and nature of vehicle/plant operation. The following table shows a small sample of fuel tax credits available for mineral diesel and biodiesel blends.

Business Use <sup>4</sup>	Eligible Fuel	Tax Credit Rate from July 2013 – cents/litre
Heavy vehicle travelling on a public road	Petrodiesel	12.003
	B5 biodiesel blend	12.003
	B20 biodiesel blend	12.003
Off road activities - construction	Petrodiesel	31.622
	B5 biodiesel blend	31.948
	B20 biodiesel blend	32.926

The Federal Government has announced, as part of its 2014 budget, that there will be modifications to the taxation treatment. It will reduce grants made under the Cleaner Fuels Grant Scheme to zero and reduce the excise on biodiesel to zero from 1 July 2015. From 1 July 2016, the excise rate for biodiesel will be increased for five years until it reaches 50 per cent of the energy content equivalent tax rate. The excise equivalent customs duty for imported biodiesel will continue to be taxed at the full energy content equivalent tax rate.

The New South Wales state government mandated B2 in 2010 and has a further mandate of B5 when enough biodiesel becomes available (the B5 has not yet been implemented). Victoria and WA have a target of 5% biofuel (includes ethanol as well as biodiesel), but there is no mandate on this.

In addition, there are a number of large fuel using organisations who have mandated minimum levels of biodiesel in fuel that they use in their fleets; for example there are many councils across Australia that use B20, and even some private organisations which use B100. For example, Sydney, Newcastle, Adelaide and Townsville councils all use B20 biodiesel. All metro trains and most buses in Adelaide use B5 and are progressing toward using B20<sup>5</sup>.

### TRENDS IN DEMAND

Overall demand for biofuels appears to have decreased in recent years, driven by a reduction in the demand for ethanol.

At only 0.5% of the market, biodiesel is seen as a niche market. However demand increased by 40% to 114 ML in 2012-13,<sup>6</sup> or 0.5% of total Australian diesel demand, driven by the mandate for a minimum of 2% biodiesel blends in New South Wales.

<sup>4</sup> For a full list see <https://www.ato.gov.au/Business/Fuel-schemes/In-detail/Fuel-tax-credits---for-GST-registered-businesses/Calculating-and-record-keeping/Fuel-tax-credit-rates-and-eligible-fuels/>

<sup>5</sup> [http://www.lowemissionvehicles.sa.gov.au/\\_\\_data/assets/pdf\\_file/0008/114677/7836025.pdf](http://www.lowemissionvehicles.sa.gov.au/__data/assets/pdf_file/0008/114677/7836025.pdf)

<sup>6</sup> <http://www.spenewsaustralasia.org/article.aspx?p=1&id=2422>

## WHO IS PRODUCING BIODIESEL?

The main biodiesel plants currently in operation are shown in the table below. A number of these producers uses tallow as a feedstock; these producers are the most likely to purchase the waste streams from meat processing facilities.

Biodiesel Plant	Location	Installed capacity (ML)	Feedstock
ARfuels Barnawartha	Barnawartha, VIC	60	Tallow, Used cooking oil
ARfuels Largs Bay	Largs Bay, SA	45	Tallow, Used cooking oil
ARfuels Picton	Picton, WA	45	Tallow, Used cooking oil
ASHOIL	Tom Price, WA	Unknown	Used cooking oil
Biodiesel Industries	Rutherford, NSW	20	Used cooking oil, Vegetable oil
Ecofuels Australia	Echuca, VIC	1.5	Canola oil
EcoTech BioDiesel	Narangba, QLD	30	Tallow, Used cooking oil
Macquarie Oil	Cressy, TAS	15	Poppy Seed Oil & Waste Vegetable Oil
Neutral Fuels	Dandenong, VIC	Unknown	Used cooking oil
Territory Biofuels	Darwin, NT	140	Palm Oil, Tallow, Used Cooking Oil
<b>Total capacity</b>		<b>356.5</b>	

Table 2 – Biodiesel producers in Australia