

# Ethanol Review

Volume 2: August 2006,  
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## TWO OR THREE ETHANOL PLANTS ON THE DOWNS ?

Last week a farmer consortium announced they planned to build an 80 million litre ethanol plant near Dalby and to double the size soon after finishing the first plant.

A month ago, BP announced they were going to support a grain to ethanol plant of a similar size in Queensland. This may coincide with the plan to build at Lemontree near Milmerran.

There is still a possible third plant to be built at Dalby.

The major hurdles for ethanol have been the variable price of grain and the end product – fuel. Bankers are reluctant to finance a project where these variables cannot be fixed. Fuel companies have not committed to taking ethanol.

The farmer consortium plans to raise equity investment capital to fund the first stage without needing finance.

The other plants may need a large investor or company to take the lead role. CSR is one possible company.

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## BOOMING ETHANOL INDUSTRY IN THE USA

The U.S. fuel ethanol industry has exploded over the last few years, with the opening of an ethanol plant every 12 days.

In the USA there are 88 ethanol plants in operation, with a total capacity of 17,000 million litres per year. This capacity will increase to 25,000 mil.l. per year over the next 12 months as 33 new facilities are built and 7 plants extend their capacity.

The US will soon take over from Brazil in the position of the world's largest ethanol producer. Both countries will produce around 20,000 mil.l./year, while China is the third largest producer with 4,000 mil.l./year. India is now producing around 2000 mil.l./yr. Other countries are minor producers.

The grain use in the US is close to 50 million tones and will increase to 60 mil.t. in 2007. USDA says

this will cause a shortfall in world coarse grains of 40 mil.t. this year, assuming there is an average corn crop in the USA.

Due to the banning of fuel additive MTBE\*, ethanol demand has outpaced production and ethanol is currently being imported into the USA from Brazil. Brazil is also exporting ethanol to Sweden, India and several other countries. This demand and the increase in price for ethanol has pushed up the price of sugar

For more information see: Renewable Fuels Association, [www.ethanolrfa.org/index.shtml](http://www.ethanolrfa.org/index.shtml)

\* Methyl Tertiary Butyl Ether (MTBE) is a fuel additive used to boost octane ratings. It is now banned in 25 US states and will largely be phased out by 2009.

## Costs of production of Ethanol

		USA survey 2002#	USA Estimate 2006	Australian sorghum 2006	Sorghum petrol parity
Sorghum price (farm)	\$/t.	83	94	165	360
Grain costs*	c/litre	20	25	44	90
Price of Byproduct	\$/t	61	65	165	345
By-product sales*	c/litre	6	6.4	18	37
Production costs	c/litre	10	14	20	20
Depreciation costs	c/litre	7	12	17	17
Loan or ROC	c/litre	5	7.5	12	12
Total Ethanol costs	c/litre	36	52	75	102
Bowser cost**	\$/litre	55	72	110	140

\* 372 l/t for corn, 400l/t for sorghum, 430kg of dry byproduct per tonne

# USDA survey of 21 ethanol plants in 2002 in \$US c/litre in \$US

\*\* US Govt tax is 5c/l, but subsidises ethanol 13.5c/l. State tax average 6c/l. Australian costs incl. GST, excise 12.5c/l (2015), freight & retail margin of 12.5c/l

*The production cost of ethanol is around \$0.75/litre, for a grain price of \$165 and a similar return from distillers grain.*

*Grain is cheap relative to the price of petrol and ethanol does not need subsidies to be economically produced.*

The major cost of producing ethanol is the cost of grain. The cost needs to include freight, storage and handling costs, which are likely to be a minimum of \$20 per tonne on the farmgate price.

In the first example above, a farmer delivering against a 12 month contract with a price of \$185/t delivered to the ethanol plant, would find the price comparable to \$165/t at harvest time.

In the last column, the break-even price of grain (Sorghum \$360/t) is calculated for an oil price of \$US70/bbl.

Sorghum is not likely to reach such a break-even price, but is likely to increase with the demand for grain.



*Agri-Energy Ethanol Plant Minnesota*

*Construction costs have escalated and are around \$1.20/litre capacity vs \$A0.60 in the US, two years ago*



## What is the byproduct worth ?

In the USA, the price of distillers grains (DDGS) is higher than the price of corn, on a dry weight basis adjusted for freight – by around \$2 to \$5 per ton

When fed at 15 to 25% of diet, there is a bonus from better feed conversion and less dust. The mixture reduces subacute acidosis in cattle fed a low roughage diet.

The DDGS has the same energy value equal to corn (due to the oil and fat concentrated to around 9% and the conversion of protein to energy).

DDGS is a high protein (27-35%) feed and could be worth more than sorghum for inclusion in feed rations of pigs and poultry. Dairy cattle also need high protein. This could add an extra 6c/litre to the byproduct credits.

Soybean meal is the main protein meal imported into Australia. If this meal with around 45% protein costs \$350, then the value of distillers grain should be around \$220/t.

## What is Ethanol worth?



*E10 is a blend of 10% ethanol with petrol. It improves 91 octane petrol to 95 octane.*

<b>Brisbane</b> Unleaded petrol Bowser price <b>\$1.25</b>
Freight and retail margin <b>13 cpl</b>
GST <b>12 cpl</b>
Net Excise <b>30 cpl</b>
Price ex refinery <b>70 cpl</b>
Crude oil Singapore <b>\$US70/barrel</b>

If the cost of freight and blending from a Dalby ethanol plant was 4 cpl, then full value for ethanol is 17 cpl less than the bowser price when a freight and retailer margin on petrol of 13 cpl, is used.

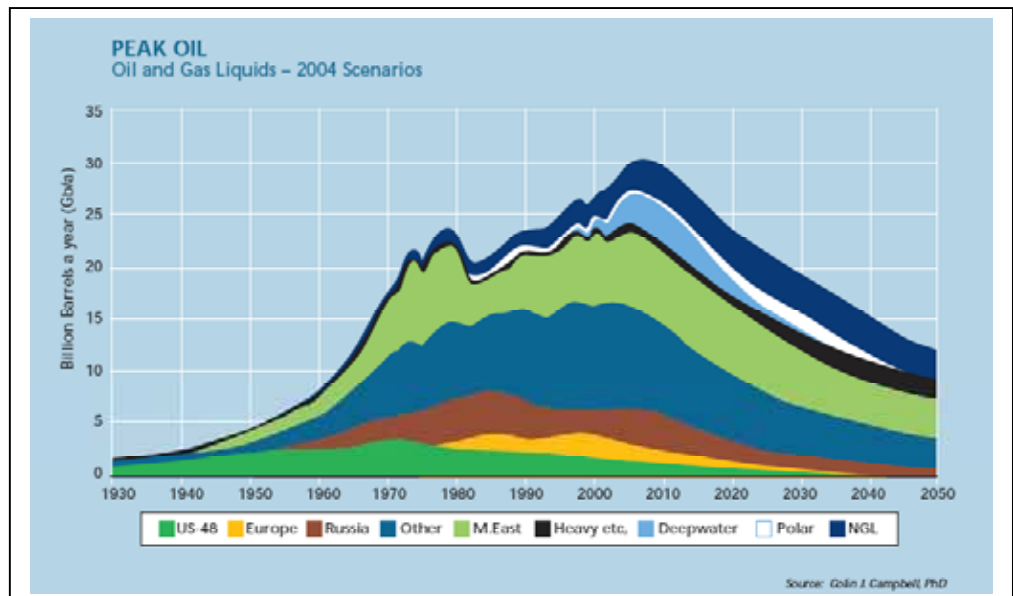
For an oil price of \$US70/barrel, the Queensland bowser price is around \$1.25 per litre, suggesting an ethanol value of \$1.08cpl.

The full value may not be relied in the short term, even though 10% ethanol improves the octane and does not reduce fuel consumption. Discounting may be needed to encourage a switch. However, an E10 mixture with an octane rating of 95, is already good value for motorists with cars requiring premium unleaded petrol costing 5-10 cpl more than 91 octane unleaded petrol.

Government excise on ethanol will be applied at 2.5c/l in 2011, rising to 12.5 cents in 2015.

## Where to for oil prices?

*Australia's oil supply has already peaked and is on a decline. By 2015, Australia will have to import 1 million barrels of oil per day unless a switch is made to alternative fuels.*



*Peak oil – the maximum supply of oil – will occur over the next few years. After this, increasing demand and reducing supply will drive up oil prices*



## Some facts about Ethanol production



Sorghum is one of the most useful grains for producing ethanol with a higher starch content compared to other grains of:

	Starch % db	Starch 14%	Ethanol l/t.
Sorghum	74	64	400
Corn	70	60	385
Wheat	65	56	350
Barley	60	52	321

Distillers grain is produced at roughly 0.4 tonnes per tonne of grain.

### Nutrient content - sorghum distillers grain

Protein	35%	dry basis
Total digestible nutrients	81%	dry basis
Metabolisable energy	11%	dry basis
Fat	10%	dry basis

As indicated on page 3, this product is more valuable than the sorghum being used.

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### *Adding value to petrol*

Ethanol has a high octane rating compared to petrol, and is an oxygenating agent, which helps the engine burn the fuel mixture more thoroughly. Adding ethanol to petrol improves its value without any significant difference in fuel consumption for a 10% blend. Because the energy content is less than petrol, blends with more than 10% ethanol will have a lower fuel consumption.

The addition of 10% ethanol to fuel increases the research octane number (RON) from 91 to 95. This is up to the standard of Premium Unleaded (PULP), but the Motor Octane Number (MON which increases to 84 (up 2 points) is just below PULP standards of 85.

The RON indicates the probability of uncontrolled detonation (known as 'knock') under low speed, high load conditions such as acceleration. MON refers to the probability of knock under high temperature, low load conditions such as cruise.

It costs more to produce high octane petrol and a 10% blend of ethanol offers both the petrol refiners and/or the motorists the opportunity to save money on higher octane fuel.

(Source: Report of the Australian Government Biofuels Taskforce, June 2005  
[www.dpmmc.gov.au/biofuels/report/chapter\\_8.doc](http://www.dpmmc.gov.au/biofuels/report/chapter_8.doc))

Many new cars are being produced with higher compression motors to meet Euro 4 emission standards and require PULP.

However, most of these car manufacturers, specify only the use of fuel with 95 RON and have endorsed the use of E10, as long as it is 95 Octane.

### *Comparative fuel Economy*

Results from a study commissioned by the American Coalition for ethanol – average of 3 vehicles: Toyota Camry, Ford Taurus and Chevrolet Impala )

