

# Revenue Balance for Fuel Ethanol

Companion Document to the PowerPoint Presentation

“Revenue Benefits of Ethanol Industry”

350ML by 2010

Issued: 31<sup>st</sup> July 2003



## Revenue Balance for Fuel Ethanol

The *Australian Renewables Group*<sup>1</sup>

- Wishes to re-affirm its support for the Government Bio-fuels Policy;
- Recognises that while the Policy focus had been appropriate, opponents of the ethanol industry continue to undermine public confidence in ethanol as a proven, safe, reliable and environmentally friendly transport fuel, and this impacts on Government resolve;
- Seeks to correct invalid assumptions concerning the cost of financial incentives to the ethanol industry;
- Seeks to reinforce Government Policy with factual information on the benefits of the ethanol industry to the Australian economy.

In the following statements the Group highlights the advantages listed in the Government Bio-fuels Policy by providing assessments of Policy statements.

1. ***Domestic production of bio-fuels will provide multiple regional benefits. These include increased employment, more efficient use of, and adding value to agricultural and forestry residues – thus creating an income stream to provide a buffer against shifting commodity prices;***

The on-going economic value of the industry operating at 350 ML capacity includes establishment of at least 1100 new permanent jobs in rural areas<sup>2</sup>. The combined direct public benefits (in the form of both personal and company tax, and reduction in unemployment benefits) equates to \$49.4 million<sup>3</sup>.

The indirect economic returns for the full 350 ML production equates to \$9.4 million additional tax payable<sup>4</sup>.

Experience in the US indicates that most of this income would be spent within a 200 km radius of the ethanol plant, resulting in measurably stronger local economies and higher standards of infrastructure maintenance<sup>5</sup>. In the order of 80% of derived income will be spent in the region.

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<sup>1</sup> The Australian Renewables Group represents a coalition of existing bio-fuels producers and proponents.

<sup>2</sup> Federal Coalition Policy: Bio-fuels for Cleaner Transport, 2001.

<sup>3</sup> Direct employment based on Ernst and Young, 2002, *The Balance of Revenues associated with Fuel Excise and Ethanol*. 36 full-time employees will have work in each of the five new ethanol plants.

<sup>4</sup> Indirect employment for new 300ML based on multiplier of 5 = 920 jobs x \$889 (average wage) x 52; Tax payable = \$9.4 million. This excludes all employee on-costs

<sup>5</sup> Impacts on Regional Development and Employment – 58 million litres of ethanol would add about \$7.7 million to household income throughout the region where it is constructed.

The emergence of an ethanol industry could see a switch from crops with a high water demand (cotton and rice) to grain with a much lower water demand. This would enable redistribution of available savings to higher value production or environmental enhancement.

2,300 new construction jobs will be created in rural regions over a 5-year development period<sup>6</sup>. Additional tax revenue will accrue for each of the 5-years during development of the industry achieves a 350ML production capacity. These benefits have been incorporated as an offset of capital grants.

Other benefits relate to opportunities for a more diverse industry base through value adding to primary production and through supporting industry developments that could leverage from ethanol production streams (including engineering services and enzyme production).

**2. *Being renewable, bio-fuels have an advantage over other alternative fuels being examined for increased transport fuel use, such as Compressed Natural Gas (CNG), Liquefied Natural Gas (LNG) and Liquefied Petroleum Gas (LPG).***

Bio-fuels represent sustainable energy production, whereas fossil fuel represents net energy depletion. Unlike fossil resources such as natural gas and petroleum-sourced LPG, Australia's capacity to produce ethanol is not limited, nor is it short term.

A litre of ethanol contains 35% more energy<sup>7</sup> than is used to make it under current best practice and is expected to improve over time. Only 74 units of energy are required to produce 100 units of energy at the pump. This is in contrast to refining of fossil fuels where energy is destroyed in creating petrol. Petrol production has an energy efficiency of approximately 85%.

When petrol is refined energy is destroyed. A litre of petrol requires the input of 117 units of energy to make 100 units available at the pump.

Ethanol is renewable energy and it is able to add to the total energy available to Australia through the conversion of solar energy into carbohydrates by plants.

**3. *Bio-fuels have the significant advantage of being able to be used as a “drop in” fuel. That is, they can be blended with petrol or diesel up to certain levels with little or no modification to distribution infrastructure and no alteration to the general vehicle fleet. Other alternative fuels, such as CNG, LNG and LPG, do not blend with petrol or diesel and require relatively extensive additional infrastructure modification and transport fleet change. Bio-fuel production is not technically difficult. To date, demand and distribution have limited its development.***

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<sup>6</sup> Federal Coalition Policy: Bio-fuels for Cleaner Transport, 2001

<sup>7</sup> Ref 1; US Department of Agriculture, Office of Energy Policy and New Uses: “The Energy Balance of Corn Ethanol: An Update” H. Shapouri *et al.*, July 2002.

Ethanol provides three significant benefits to the fuel market:

▫ **Drop-in fuels**

Ethanol can be introduced to the petrol supply stream with minimal infrastructure costs and no impact on the existing fleet. A 10% ethanol blend can be used in any engine that uses unleaded petrol.

▫ **Octane Enhancement**

As a "drop-in" fuel, ethanol will assist the petroleum industry to meet its obligations to comply with new cleaner "Euro" fuel standards over the next 10 years. Savings to the petroleum industry will equal \$140 million with ethanol yielding free octane valued at 4 cents per litre. Company tax payable on increased profitability would equal \$42 million pa.<sup>8</sup>

▫ **Enhanced fuel market competition**

By increasing the number of fuel sources and distribution methods through the introduction of resources other than oil, competition will assist the consumer. US assessment of this impact indicates "Blending with gasoline at a 10% level will reduce the retail price of conventional regular gasoline by five percent, or 6.6 cents per gallon based on national average 2002 prices."<sup>9</sup>

The above assessment is mirrored in Section D of the Biofuels Policy – "Industry experience is that there is no price premium for biofuels".<sup>10</sup>

The value of increased competition in Australia is likely to be in excess of 1 cent per litre. (This has not been included in the revenue balance).

4. ***Bio-fuels deliver environment benefits such as improved air quality and reductions in greenhouse gas emissions. The Life-Cycle Analysis of Alternative Fuels for Heavy Vehicles commissioned by Australian Greenhouse Office (AGO) and conducted by a CSIRO-led consortium indicates that pure ethanol from waste or by-product feedstocks delivers substantial greenhouse emission reductions and air quality improvement in comparison to petrol and diesel. Greenhouse-friendly production processes will be encouraged through initiatives under the Coalitions plan to deliver greater greenhouse benefits. Greenhouse emissions from pure bio-diesel are generally 50% lower than low sulphur diesel, while emissions affecting urban air quality are similar. Bio-fuels are also less toxic than conventional fuels and are biodegradable.***

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<sup>8</sup> The increase in "octane value" of 10 % ethanol in a 92 octane fuel = a minimum of \$0.04/litre.

Total value of increased octane = 4 cents x 3.58 billion litres = \$140 million increased revenue. Company tax payable would be 30% = \$42 million pa.

<sup>9</sup> Urbanchuk J M, May 2003. Consumer Impacts of the Renewable Fuel Standard. SLECG Economics

<sup>10</sup> Federal Coalition Policy: Bio-fuels for Cleaner Transport, 2001

Greenhouse gas emissions reduced by E10 fuel equate to \$14 million pa savings in expenditure on greenhouse abatement measures.<sup>11</sup>

Significant savings can also be deduced through reduced air pollution costs (including costs associated with regulation to prevent smog and acid rain, purchase and maintenance of building air filtration and enhanced tourism attraction). US studies indicate that Australia would save something on the order of \$58 million pa.<sup>12</sup>

Health implications are much more significant. Each year, urban air pollution costs around \$7 billion<sup>13</sup> - 65% of which is attributable to motor vehicle exhausts. This pollution causes a variety of health disorders ranging from cancers to asthma. The oxygen in ethanol improves combustion processes, reducing cancer-causing particulates and emission of carcinogens such as benzene. A keystone report by Associate Professor Kearney highlights the significance of improved combustion through use of bio-fuels as a means to reduce the scale of air pollution health costs.<sup>14</sup> E10 ethanol blends can, in fact, reduce aggregate critical emissions by around 25%, leading to a significant reduction in health costs. If we accept the results of US experience and apply it to Australia, this could equate to savings of more than \$1 billion.<sup>15</sup>

### ***5. Increased domestic bio-fuel production and use will reduce Australia's reliance on imported fossil fuels.***

The Department of the Parliamentary Library state that Australia's reserves of crude oil are below 10 years. In fact oil refineries in Australia cannot maintain sufficient product to meet growing demand and Australia will be increasingly reliant on oil and petrol imports for the foreseeable future.

Australia participated in both the First and Second Gulf wars and part of that effort was the protection of Middle East oil supplies.<sup>16</sup> Economic benefits include import substitution (balance of payments) and increased economic activity.

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<sup>11</sup> Greenhouse gas savings assessed by CSIRO, based on MRET scale of \$40 (before tax)/tonne of CO<sub>2</sub>

<sup>12</sup> Source Western Regional Biomass Energy Program, 1994, "cost per Barrel = US\$42.78. This equates to a saving of \$58 million for 350 ML ethanol offset.

<sup>13</sup> Source: Dr Clive Hamilton, Director of the Australia Institute Public statement 24 August 1998

<sup>14</sup> Associate Professor Ray Kearney, University of Sydney, Health Impacts of Traffic Pollution (2003)

<sup>15</sup> Refer American Lung Association, of Metropolitan Chicago studies.

<sup>16</sup> Logar, RG, and Woolsey R J, The New Petroleum; Foreign Affairs, pp 88-102 Jan/Feb 1999

Revenue Balance for Fuel Ethanol

<i>COSTED BENEFITS</i>		<i>POLICY REFERENCE</i>
<b>DIRECT JOBS AND TAXES (Income Tax)</b>	<b>\$58.8M</b>	<b>1</b>
<b>GREENHOUSE GAS ABATEMENT</b>	<b>\$14M</b>	<b>4</b>
<b>CLEANER AIR SAVINGS</b>	<b>\$58M</b>	<b>4</b>
<b>OCTANE VALUE (4cpl) (Company Tax)</b>	<b><u>\$42M</u></b>	<b>3</b>
<b>TOTAL.....</b>	<b><u>\$172.8M</u></b>	
 <b>OTHER BENEFITS – NOT COSTED</b>		
<b>REGIONAL DEVELOPMENT - DIRECT INVESTMENT IN ETHANOL INDUSTRY</b>		<b>1</b>
<b>BALANCE OF PAYMENTS IMPROVED</b>		<b>5</b>
<b>ENERGY SECURITY</b>		<b>1</b>
<b>FARMER STABILITY</b>		<b>1</b>
<b>R&amp;D INITIATIVES</b>		<b>2</b>
<b>INCREASE IN VALUE OF CRUDE</b>		<b>2</b>
<b>HOMELAND SECURITY</b>		<b>5</b>
<b>HEALTH BENEFITS - POSSIBLE \$1200M</b>		<b>4</b>
<b>ETHANOL AND FUEL CELL TECHNOLOGY</b>		<b>2</b>
<b>INCREASED COMPETITION IN FUEL MARKET (1cpl) INDIRECT (FLOW-ON)</b>		<b>2</b>
<b>RENEWABLE FUEL MARKET</b>		<b>2</b>
 <b>NET REVENUE LOSS .....</b>	 <b>\$133M</b>	

## **OTHER BENEFITS – NOT COSTED**

### **REGIONAL DEVELOPMENT -**

#### **Direct Investment in Ethanol Industry**

(1)

*Regional Development and Direct Investment in Ethanol Industry = \$300 million*

- Regional communities will be less exposed to global commodity price fluctuations.
- With such substantial investment, there will be concurrent regional infrastructure maintenance and enhancement outcomes.
- Regional employment (shops, banks, communications, service industries) will be more stable
- Ethanol will bring about more diversity in regional industry base, including new technology-based industries.

### **FARMER STABILITY**

(1)

- Additional on-shore markets more stable than export.
- Domestic market generally a higher value market than export.
- Long-term supply contracts provide bankable security.
- Creating additional domestic grain demand could raise grain prices by around 8% based on experience in the US corn belt.

### **R&D INITIATIVES**

(2)

- Value-adding to crop production requires specialised training and education which in turn stimulates technology opportunities in fermentation and distillation industries.
- Greater attention will be given to pursue opportunities in improving efficiency in current technology.
- Worldwide there is already significant investment in development of "green energy" technologies. Australia is also directly involved in research and development work on the conversion of lignocellulose to ethanol.
- There will be opportunities to develop dedicated energy crops, based on improved strains of drought tolerant crops and new high yield "grass" crops in anticipation of the introduction of cellulose conversion technologies within 10 years.
- Ethanol as a green hydrogen source.

### **INCREASE IN VALUE OF CRUDE**

(2)

- Australian crude provides only 38% of our transport fuels. Ethanol provides opportunities to make better use of these high paraffinic Australian oils.

### **INCREASED COMPETITION**

(2)

- The value of increased competition in Australia has not been formally assessed, although it is likely to be in excess of 1 cent per litre. This is based on formally assessed competition outcomes in the US over a period of more than 20 years.

### **HOMELAND SECURITY**

(5)

- Australia imports proportionately more oil than the US. And 2/3 of the world's known reserves are in the Middle East, and ethanol use will reduce reliance on these imports.
- Dispersed energy infrastructure reduces vulnerability to terrorist attacks, whereas our oil refineries pose much higher risks because they are located within our capital city precincts.
- The US cites defence expenditure as a direct cost in maintaining US access to energy resources.

### **HEALTH BENEFITS**

(4)

- By far the greatest potential benefits may be gained from use of ethanol in transport fuels because the oxygen content in ethanol causes cleaner combustion of the petrol.
- This issue is of such importance that it warrants further expert opinion and critical assessment in terms of the Government's environment and health policies.
- Our preliminary analysis, which shows the savings may be as high as \$1.2 Billion, is based on similar studies undertaken in the US, where ethanol was introduced specifically to improve the combustion of motor fuels in order to reduce the adverse health impacts of smog.

### **ETHANOL AND FUEL CELL TECHNOLOGY**

(2)

- Ethanol is a cost effective, renewable source of hydrogen.
- Ethanol is a hydrogen-rich liquid, which overcomes both the storage and infrastructure challenges of hydrogen for fuel cell applications. There are no technical barriers to the use of ethanol in fuel cells. Because ethanol is far easier to transport and store than hydrogen, fuel reforming (which uses a chemical process to extract hydrogen from fuel) offers a practical solution to the challenge



of providing hydrogen to fuel cells onboard vehicles or for remote or stationary applications.

- Ethanol is easier to reform than petrol, because of its relatively simple molecular structure.
- Ethanol-fuel cell technology already exists and has been demonstrated.

### **RENEWABLE FUEL MARKET**

(2)

- With increasing emphasis on sustainable development comes a market for energy sources that are renewable, for fuels which are biodegradable and transport systems compatible with environmental risk management objectives.
- Ethanol as a component of petroleum-based transport fuels will not fulfil the above market definitions. However, 100% ethanol fuel can be used in much the same way as diesel, but with dramatic reductions in harmful air emissions and very low environmental risk.
- Ethanol can also provide a base for esterification of organic oils to produce 100% biodiesel, again as a replacement for petroleum oil product. While these products may have higher product costs, their significant environmental credentials suit application in environmentally sensitive locations such as National Parks, World Heritage Areas (such as the tourist boats and on-shore installations within the Great Barrier Reef Marine Park) and remote areas where environmental risk management is not easily achieved (such as the Australian research bases in Antarctica).