Australian Institute of Petroleum

Submission to the Australian Government Biofuels Taskforce

by

Australian Institute of Petroleum

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INTRODUCTION

The Australian Institute of Petroleum (AIP) was established in 1976 as a non-profit making industry association. AIP's mission is to promote and assist in the development of a sustainable, internationally competitive petroleum products industry, operating efficiently, economically and safely, and in harmony with the environment and community standards.

This submission has been developed to assist the Biofuels Taskforce in its consideration of the environmental and economic performance of biofuels (particularly ethanol) in the Australian transport fuels market.

AIP is pleased to present this submission on behalf of the following member companies:

BP Australia Pty Ltd
Caltex Australia Ltd
Mobil Oil Australia Pty Ltd
The Shell Company of Australia Ltd.

OVERVIEW

This submission provides an assessment of the environmental and economic issues relating to biofuels (particularly ethanol) in the Australian transport fuels market. The submission reviews material used by the Government in assessing the appropriateness of its 350ML target for biofuels, as well as material not considered in the 350ML study. The submission also comments on more recent assessments about Australia's energy security and considers the role that biofuels may play in enhancing the level of energy security.

AIP Policy on Biofuels

AIP member companies believe that biofuels can play a role in the Australian transport fuel market and are committed to exploring options for the use of biofuels. AIP member companies acknowledge that the Government has identified a target for the use of 350 ML of biofuels a year by 2010, and a number of member companies are now marketing ethanol blends and biofuel blends, or soon will be, and considering other biofuels opportunities that will assist in meeting this goal.

Each company has its own strategy for expanding these activities in a commercial environment, but believes biofuels need to be cost competitive and in demand in a normal, competitive and sustainable market. It is expected that this market will generally be driven by the difference between refined product and biofuels prices.

Overall, AIP does not see any significant change in the science and facts about biofuels since the last investigation by the Government. The 2003 ABARE/BTRE/CSIRO study, as updated in 2004, remains the valid basis for Government decisions on the role of biofuels in the Australian fuels market.

Air Quality

In considering the science of biofuels, in particular air quality and greenhouse issues, AIP believes it is essential that development of the biofuels market, including marketing claims about the products, are soundly based. This is essential not only from a legal point of view but also to ensure the environmental performance of the product is not in serious doubt and the rebuilding of consumer confidence is not adversely affected by some future controversy over the science.

Ethanol blend fuels reduce tailpipe emissions of hydrocarbons, fine particulates, carbon monoxide and some air toxics but increase evaporative emissions of hydrocarbons and exhaust emissions of some air toxics, and tend to increase exhaust emissions of nitrogen oxides. Overall, there is no significant effect of ethanol on air quality, particularly when emission changes are considered in the context of current ambient air pollution levels and trends.

Significant air quality improvements will be achieved under the Australian Government's cleaner fuels and vehicle standards program. This will see the reduction in emissions of most pollutants by 60-80% by 2020, with a substantial proportion of the reductions having been achieved by 2010.

It would appear from the available evidence that the emissions improvement from ethanol blends occurs in pollutants which are already well within national standards for these pollutants or are better dealt with by other methods such as vehicle emissions standards. For example, carbon monoxide and particulate levels in Australia are well within NEPM standards. In any event, petrol engines are not a major source of particulates, and particulate traps on diesel engines are likely to be a cost-effective means of further reducing such emissions. With regard to air toxics such as benzene, the ambient levels are well below NEPM investigation levels. Conversely, recent US studies have found that E10 blends will increase the potential for occurrences of photochemical smog. US studies have also concluded that the use of oxygenates such as ethanol and MTBE in reformulated gasoline had little impact on air quality.

Greenhouse Gas Emissions

Ethanol blends can reduce life-cycle greenhouse gas emissions, although this varies significantly with the way ethanol is produced. However, the aggregate reduction in greenhouse gas emissions through use of ethanol will be modest. The majority of the studies highlight the high cost of abatement which is at best A$ 150 per tonne of CO_2 equivalent. Compared to other greenhouse gas emission reduction options, the use of bioethanol in motor vehicles is not a cost-effective greenhouse gas emissions reduction strategy. An appropriate Australian reference should be the performance of the Greenhouse Gas Abatement Program (GGAP) which achieved an average abatement cost of under A$10 per tonne. There are also a range of other emission abatement options available in the A$10-30 per tonne range.

Economic Performance

The economics modelled for the 2003 ABARE/CSIRO/BTRE report (as updated by ABARE in 2004) were based on assumptions that may have changed substantially since 2003, for instance, the oil price outlook and feedstock costs. The majority of the economic studies conducted on ethanol production, including the recent LECG study for the Queensland Government, concentrate solely on the benefits of the proposals and either ignore or downplay costs to the wider economy through re-allocation of resources and higher taxation resulting from biofuels tax concessions and grants. These economy-wide impacts should be assessed by ABARE in its general equilibrium economic model analysis, which should include a range of scenarios covering current, medium and longer term oil prices.

Energy Security

There also appear to be conflicting claims about energy security and the role that biofuels can play. The Government's Energy White Paper found that there was no case for intervening in energy markets to address any perceived energy security problem. AIP member companies support this view

Decisions by other Countries to Support Biofuels for transport

These decisions have been rationalized in terms of agricultural, regional development, employment, greenhouse and energy security policies in the countries concerned. It is AIP's view that many of the reasons stated are post-hoc rationalizations of less obvious strategic and political motivations that the Taskforce should seek to clearly understand.

AIP POLICY POSITION ON BIOFUELS

AIP member companies believe that biofuels can play a role in the Australian transport fuel market. AIP member companies acknowledge that the Government has identified a target for the use of 350 megalitres of biofuels a year by 2010, and a number of member companies are now marketing ethanol blends and considering other biofuels opportunities that will assist in meeting this goal.

It is AIP's view that there should be no guaranteed role for any particular fuel in the market, whether conventional or alternative fuels. Each fuel must establish and maintain itself in the market by being

- Cost competitive
- Readily available on a reliable basis
- Of consistent high quality and complying with fuel quality and other environmental standards
- Acceptable to the customer.

AIP notes that the Australian Government has established a policy framework for transport fuels in which the role of each fuel – conventional and alternative - will be determined by its cost competitiveness and market forces over the longer term. Therefore, the role that biofuels and other alternative fuels will play will largely depend on their competitiveness as fuels and on consumer demand.

AIP member companies believe biofuels can meet these requirements:

- With the excise concessions and other fiscal support now in place, biofuels can be cost competitive, although significant R,D & D is still needed to bring the production costs down, particularly for ethanol, before the concessions are reduced
- Increasing volumes of biofuels are expected to become available as new plants, assisted by government grants, come on stream; while current high oil prices may make these ventures more attractive, a key factor will be perceptions of longer term oil prices. Seasonal aspects of biofuels production still remain to be addressed so as to ensure consistency and reliability of supply
- Potential fuel quality and handling concerns are being addressed through government determined fuel quality standards for ethanol, and possibly diesohol, and AIP's comprehensive fuel handling guidelines.

When judged against these factors, AIP member companies can see a role for biofuels replacing some fuel imports and helping to meet the growth in overall fuel demand.

Due to its high octane, AIP member companies can also see a potential role for ethanol as one of the options for some refiners meet the growing demand for higher octane fuels.

AIP member companies believe it is essential that all biofuels policy should be strongly based on sound science and practice, to ensure that the development of the biofuels industry is sustainable well into the future.

A critical factor remains the acceptability of biofuels to customers (see section on *ECONOMIC ANALYSIS AND ASSESSMENT —THE FUEL MARKET DIMENSIONS* for detailed views).

MATERIALS AND REPORTS USED IN THE PREPARATION OF SUBMISSION

AIP has drawn on a range of reports and papers in the preparation of this submission including new information and reports related to the issues that the Taskforce has been asked to consider. Details of the various documents are set out below.

Source Studies

Coffey Geosciences Pty Ltd, *Fuel Quality and Vehicle Emissions Standards Cost Benefit Analysis*, October 2003
BTRE, *Urban Pollutant Emissions from Motor Vehicles; Australian Trends to 2020,* June 2003
CSIRO, BTRE, ABARE, *The Appropriateness of a 350 million litre Biofuels Target, December* 2003
ABARE, *Revised Assessment of Biofuels industry Viability*, April 2004
Coffey et al., *Fuel Quality and Vehicle Emissions Standards Cost Benefit Analysis,* 2003

Air Quality and Greenhouse Gas Emissions

IEA, *Biofuels for Transport: An International Perspective*, 2005
CONCAWE/EUCAR/European Commissions Joint research Centre, *Well to Wheels Analysis of Future Automotive Fuels and Powertrains in the European Context*, 22 January 2004
DEH, *Transport Sector Greenhouse Gas Emissions Projections 2004,* DEH website
National Research Council, *Ozone-Forming Potential of Reformulated Gasoline* (published by the National Academy of Sciences) 1999
Air Resources Board and Coordinating Research Council Inc, *Fuel Permeation from Automotive Systems. Final Report. CRC Project No E-65,* (Prepared for the Californian Environment Protection Agency.) September 2004:
MathPro for API, *Effects of an RFS on U.S. Energy Savings, National Costs of Gasoline Production, and the Regional Pattern of Ethanol Use*, May 2005
CSIRO *Summary of Study on Primary Energy Gunnedah Project*, June 2005
CSIRO, *Review of Air Quality and Ethanol in Gasoline by Gary Whitten*, June 2005
Argonne National Laboratories Centre for Transport Research, *Ethanol: the Complete Energy Life Cycle Picture*, brochure on US Department of Energy website; 2004
Gary Z Whitten, Air Quality and Ethanol Gasoline, 2004.
Gary Z Whitten, Ethanol and Air Quality presentation, proceedings of the International Ethanol Conference, Brisbane 2005

Economic Analysis and Assessments

CSIRO, BTRE, ABARE December 2003 (see source studies)
ABARE, *Revised Assessment of Biofuels industry Viability*, April 2004
IEA, *Biofuels for Transport: An International Perspective*, 2005
LECG *Economics of a Queensland Ethanol Industry* 8 May 2005
MathPro for API, *Effects of an RFS on U.S. Energy Savings, National Costs of Gasoline Production, and the Regional Pattern of Ethanol Use*, May 2005
Global Insight for API, *Winners and Losers of Ethanol Mandates*, 2005

Energy Security

Australian Government, *Energy White Paper – Securing Australia's Energy Future*, June 2004
IEA, *Biofuels for Transport: An International Perspective*, 2005
MathPro for API, *Effects of an RFS on U.S. Energy Savings, National Costs of Gasoline Production, and the Regional Pattern of Ethanol Use*, May 2005
Global Insight for API, *Winners and Losers of Ethanol Mandates*, 2005
ACIL Tasman *Review of the Liquid Fuel Emergency Act 1984*, December 2004
BTRE, *Is Australia Running Out of Oil?,* DoTARS website, 2005

International Biofuels Policy

IEA, *Biofuels for Transport: An International Perspective*, 2005
IPIECA *, Various Presentations at Buenos Aires Workshop on Biofuels,* April 2005

AIR QUALITY

AIP believes that the assessment of the air quality benefits flowing from the introduction of biofuels need to be considered in the context of ambient air quality and legislated future changes in fuel and vehicle standards ie how emission changes will impact on actual levels of pollutants in urban areas and how air quality compares with established air quality NEPM standards.

For this purpose, appropriate recognition needs to be given to fuel standards legislated for 1 January 2006 and beyond, and the related vehicle emission standards that apply to the current and future fleet. This data is presented in the 2003 Coffey Report. These reference case emissions data are further augmented by legislated future emissions reductions flowing from introduction of Euro 4 equivalent standards for petrol and petrol vehicles, and Euro 5 diesel and diesel vehicles. Studies in the literature often refer to vehicle technologies that are already old in the Australian fleet and care must be taken to give weight to more recent studies that take into account the dramatic emission reductions in recent vehicles and projected over the next few years.

A number of claims have been made about the effects of ethanol in reducing the emissions of the pollutants discussed in this section of the submission. These claims are well known to the Taskforce and we understand are being evaluated by CSIRO to fully understand the scientific basis of the claims and their applicability and relevance to the Australian situation. This submission does not attempt to replicate this work by CSIRO.

Carbon Monoxide (CO)

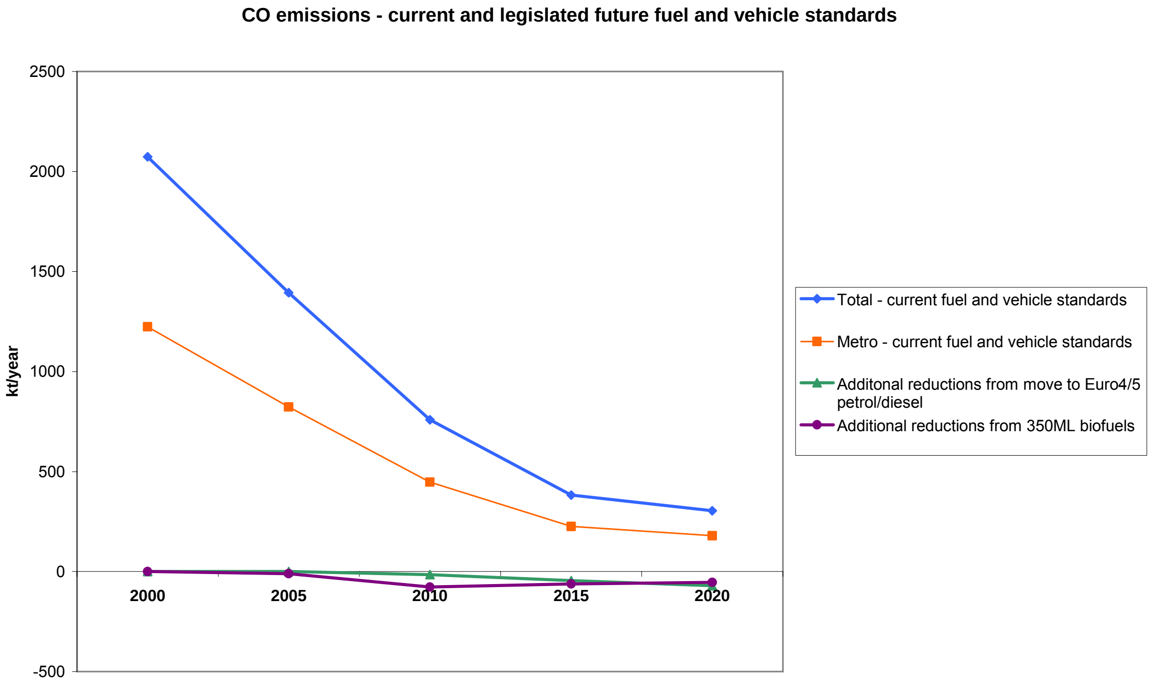
CO is one of the criteria air pollutants, and a CO standard is prescribed under the Ambient Air Quality NEPM. The standard is 9.0 ppm (8 hours).

CO emissions have not been a major concern in Australian cities for some years, with no exceedances of the standard recorded since 1998. The actual decline in CO levels has been proceeding at a steady pace of about an 8% reduction per year since 1990. Data provided in the Coffey Report, 2003 indicated that there has been a declining trend in the carbon monoxide concentrations in Australian capital cities from 1990 to 2001, with all Australian capital cities well within the NEPM. The 2003 figures reinforce the trend:

Carbon Monoxide (24 hour) Concentration (ppm) Australian Cities 2003

Brisbane	2.7
Sydney	4.7
Canberra	3.7
Melbourne	4.9
Adelaide	6.0
Hobart	2.4
Perth	4.1

CO emissions are projected to decline significantly by 2020 as a result of the introduction of new vehicle technology combined with the introduction of cleaner conventional fuels and the retirement of older vehicles from the fleet, particularly pre-catalyst vehicles. In urban areas, CO emissions are expected to reduce by some 63% on average by 2010. The results will mean that CO levels will remain well within the NEPM standard.



Sources: *Coffey (2003)* - base, metro, Euro4/5 trends
ABARE, BTRE, CSIRO (2003) - E10 trends

The addition of 350ML to the fuel mix by 2010 would have no significant impact on urban CO emissions, given the level of actual emissions relative to the air quality NEPM.

In summary, CO levels are currently well within NEPM air quality standards, and are forecast to further reduce markedly with the increasing effect of new fuel standards and vehicle ADRs. Ethanol addition would see a minor reduction in CO emissions but is not necessary to achieve NEPM compliance, unlike the US where a winter oxygenate program was introduced in 1992 in severe CO non-attainment areas. There is no justification for bringing biofuel levels in the fuel mix to 350ML in 2010 on the basis of the impact on carbon monoxide emissions.

Oxides of Nitrogen (NOx)

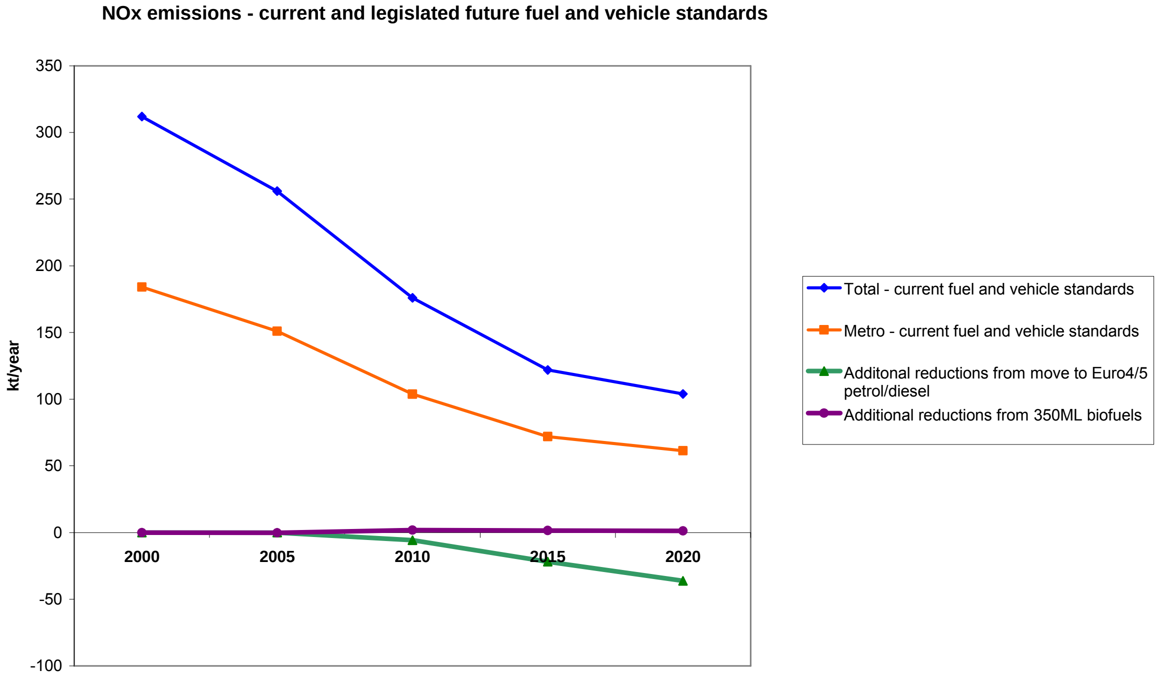
NOx is one of the criteria air pollutants. Accordingly, there are standards for NOx levels in ambient air, established in the Ambient Air Quality NEPM. These standards are: 0.12 ppm (1 hour) and 0.03 ppm (1 year).

NOx is one of the key precursors for urban photochemical smog (see section on photochemical smog/ozone). There were no exceedances of the NOx standards in the last reporting year. However, there were exceedances of the ozone standard, notably in the Sydney metropolitan airshed. Thus NOx emissions remain a priority issue for management.

There are a number of sources of NOx emissions – the two key ones being stationary sources such as power stations, and motor vehicles. Motor vehicles account for the majority of NOx emissions in urban areas – typically around 70%.

Reduction of NOx motor vehicle tailpipe emissions requires sophisticated emission control systems, complemented by cleaner fuel quality – particularly reductions in sulphur content. In 2006, the maximum allowable NOx tailpipe emissions under the vehicle Australian Design Rules (ADRs) will be 0.15 g/km. This will further reduce to 0.08 g/km in 2008.

The combined effects of the changes in the ADRs and fuel quality were modelled in the 2003 Coffey Report. The modelling showed that NOx emissions from motor vehicles, compared to the levels in 2000, would decline by 40% by the year 2010, and by 60% by the year 2020.



Sources: *Coffey (2003)* - base, metro, Euro4/5 trends
ABARE, BTRE, CSIRO (2003) - E10 trends

The effect of E10 blend petrol on NOx emissions is very dependent on vehicle technology. However, the general effect of E10 is zero to a small increase in NOx emissions. In Australia, the Orbital study found that, for ethanol blends under 12 %, NOx emissions were virtually unchanged from those of the base petrol. The APACE 1998 study found an average 1% increase in NOx.

In summary, introduction of an E10 blend petrol would not be expected to have a significant effect on motor vehicle NOx tailpipe emissions. The overall levels of motor vehicle NOx tailpipe emissions are modelled to further reduce from the levels applying in 2000, by 40% by 2010, and by 60% by 2020 as a result of the introduction of tighter fuel standards and vehicle ADRs.

Hydrocarbons (HC) / Volatile Organic Compounds (VOC)
There are no ambient air quality standards for HC, usually measured in air as VOCs. However, VOCs are one of the key precursors of urban photochemical smog (see section on photochemical smog/ozone).

Motor vehicles are a major source of VOC emissions, primarily petrol vehicles. In Sydney, motor vehicles accounted for 39% of anthropogenic VOC emissions, and about 20% of total VOC emissions. Similar proportions have been recorded in other major Australian urban areas.

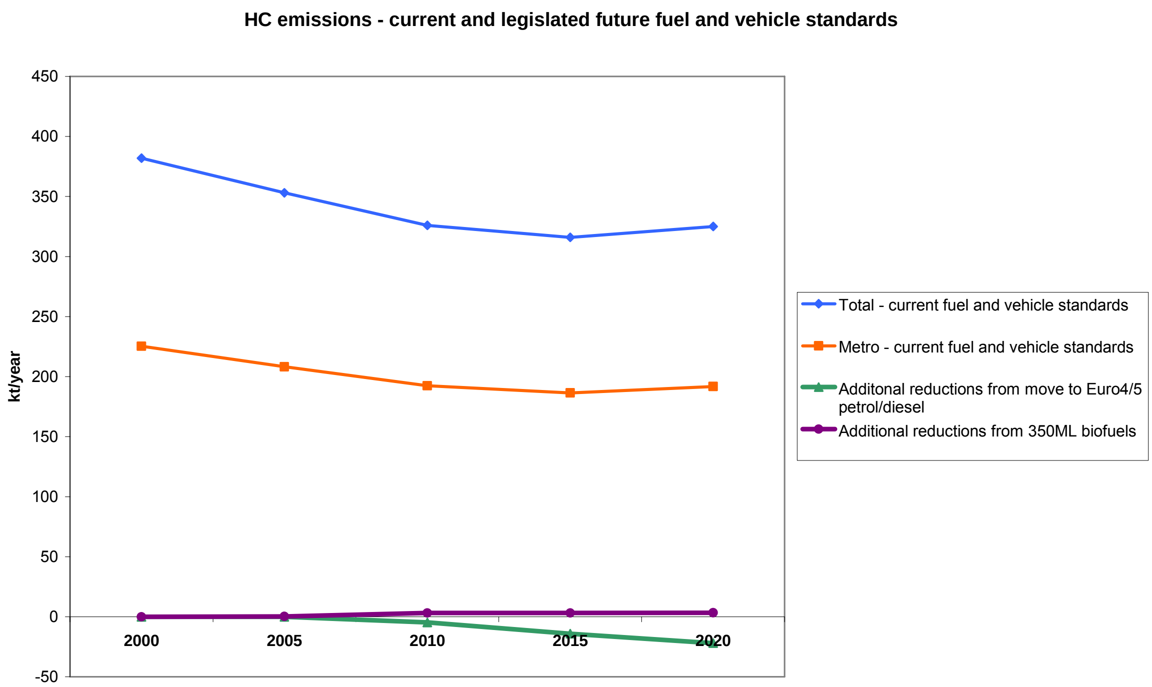
There are two sources of motor vehicle emissions of VOCs: exhaust tailpipe emissions; and evaporative emissions. In 2000, exhaust emissions accounted for 56% of vehicle VOC emissions.

There are standards under the vehicle ADRs for exhaust tailpipe emissions of HC. In 2006, this standard will be 0.2 g/km. In 2008, the standard will reduce further to 0.1 g/km. This reduction will be achieved by complementary developments in vehicle technologies and fuel standards (primarily reductions in the levels of sulfur). The effect of these developments will be:

- A reduction in exhaust tailpipe emissions of HCs by 50% in 2010, and 60% by 2020.
- a reduction in the proportion of overall HC emissions accounted for by exhaust tailpipe emissions; this proportion will fall to 24% by 2020 (DEH Setting for Fuel Quality Standards 2000).

Evaporative emissions from vehicles are a function of vehicle fuel system design and fuel vapour pressure. The primary management focus has been on fuel vapour pressure in the warmer summer months (when the risk of photochemical smog is highest) and vapour recovery. Most States have established maximum summer petrol vapour pressure standards, set at levels consistent with particular urban airshed requirements. Vapour recovery systems for tanker discharge (Stage 1 Vapour Recovery) are now required in most States, and are becoming general practice in almost all areas, which reduces VOC loads into the airshed.

Current fuel and vehicle emissions standards are projected (Coffey report) to result in a reduction in HC emissions of 10% in 2010, and 20% in 2020. This reduction does not take into account the reductions in evaporative emissions due to petrol vapour pressure controls and vapour recovery systems. Thus the overall reduction in HC emissions will be greater than that modelled by Coffey.



Sources: *Coffey (2003)* - base, metro, Euro4/5 trends
ABARE, BTRE, CSIRO (2003) - E10 trends

When ethanol is blended with petrol, there are converse effects on VOC emissions between exhaust tailpipe emissions and evaporative emissions:

- Exhaust tailpipe emissions will be reduced. The effect of ethanol is to 'lean' the fuel mixture in older vehicles (primarily those with carburettors), and so reduce tailpipe VOC emissions. Orbital found reductions of 14% with ethanol blends under 12%. Similar results have been shown in overseas studies; internal testing by BP in Germany on E5 blends showed a reduction of 10%.
- Evaporative emissions will increase, due to two factors, increased vapour pressure of the blend, and increased permeation of elastomers in the fuel systems

- Ethanol has a higher vapour pressure than petrol (typical values are 130 RVP for ethanol compared to 70 RVP for petrol). This increases the potential for fugitive vapours of VOCs.
- Ethanol increases the release of VOC vapours through the permeation of elastomers in fuel systems. A recent US study prepared by the Air Resources Board and Coordinating Research Council for the Californian Environment Protection Agency, *Fuel Permeation from Automotive Systems (CRC-65),* found that ethanol significantly increased evaporative emissions through permeation through elastomers by an average of 45%.

- The composition of the VOC changes. With E10 blends, there is a reduction in the tailpipe emissions of the air toxics toluene and xylene but an increase in the emission of the air toxics acetaldehyde and formaldehyde.
- The overall effect of an E10 blend will be to increase emissions of VOCs. The CRC-65 study found that the increase in evaporative emissions more than offset the slight reduction in tail pipe emissions. Another US study, by the National Research Council, *Ozone-forming Potential of Reformulated Gasoline* also found that 'the increase in evaporative emissions from ethanol containing fuels was significantly larger than the slight benefit obtained from lowering the CO exhaust emissions using ethanol containing fuels.' The report concluded that the use of oxygenates such as ethanol and MTBE in reformulated gasoline had little impact on air quality and some disadvantages.

Overall, emissions of HCs / VOCs are a significant air quality management issue. The level of motor vehicle HC emissions are expected to reduce with the mandated introduction of tighter fuel standards and vehicle ADRs, combined with controls on summer petrol vapour pressure and vapour recovery systems. The introduction of E10 blends has both positive and negative effects on emissions of VOCs, however the overall effect will be to significantly increase emissions of VOCs.

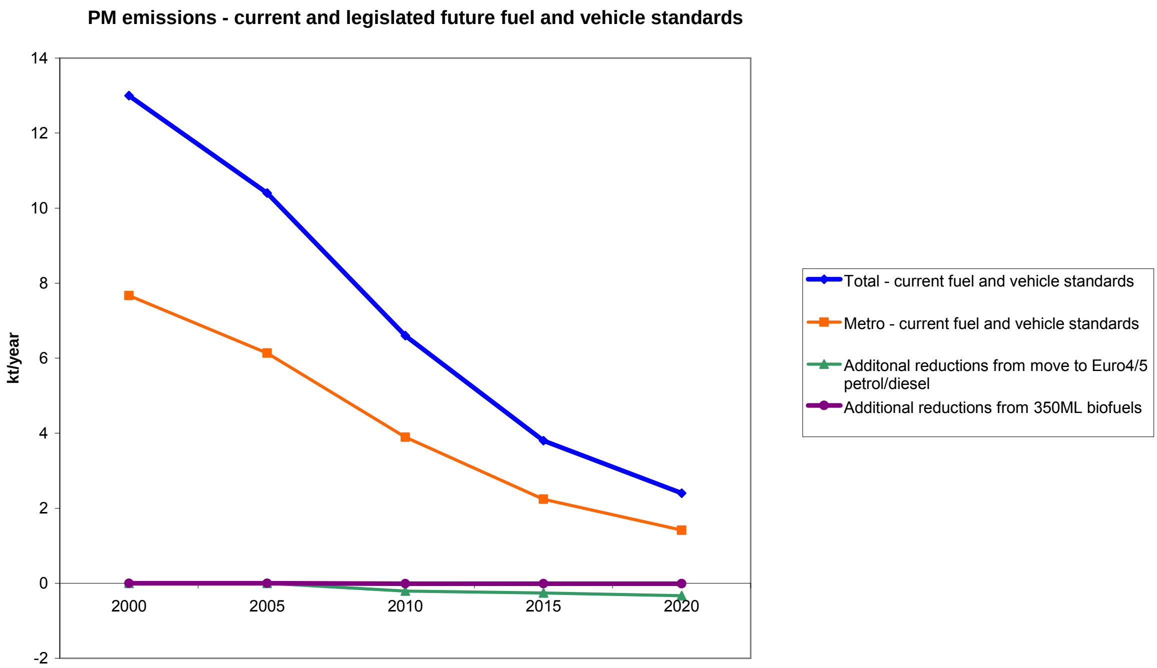
Particulate Matter (PM)

Particulate matter is a criteria air pollutant, and a PM10 standard is prescribed under the Ambient Air Quality NEPM. The PM10 standard is 50 µg/m^3 (daily). There is no standard for PM2.5, though one is under consideration.

There have been a number of studies in recent years of particulate matter from vehicle emissions under different vehicle and petrol standard scenarios throughout the world. The results differ considerably according to local vehicle technology. The effect of vehicle emissions on atmospheric concentrations of PM is also airshed specific.

The estimates modelled by Coffey (2003) (the basis for decisions about the introduction of new vehicle standards and fuel standards in Australia), show very large reductions in PM emissions from vehicles. Emission control standards are in place for diesel vehicles as these have particulate emissions that are orders of magnitude greater than petrol vehicles. There are no emission standards anywhere in the world for PM emissions from petrol vehicles.

The figure below indicates the estimated reduction in PM emissions from the 2000 base case used by Coffey, including the impact of introducing Euro 3/4 fuel standards and vehicle ADRs in 2005/2006. Current fuels and vehicle standards are projected to result in a 50% reduction in particulate emissions from 2000 to 2010. Neither the introduction of future legislated conventional petrol and diesel standards (ie Euro 4/5 fuel standards and vehicle ADRs) in 2008/2009, or the addition of 350ML of ethanol to the 2020 fuel mix) is expected to have a significant impact on PM reduction in Australian urban areas.



Sources: *Coffey (2003)* - base, metro, Euro4/5 trends
ABARE, BTRE, CSIRO (2003) - E10 trends

The key points for consideration are that:

- *there are no particulate emissions standards for petrol engines anywhere in the world, only for diesel engines which are recognised as the major source of particulates.*
- *the Coffey Report (2003) concluded that peak 24 hour concentrations were generally well within the NEPM standard of 50 µg/m^3 although this standard was exceeded in most Australian capital cities at least once a year mainly due to bushfires and dust storms. The NEPM goal allows five occurrences per year in excess of the standard and this goal was met by all Australian capital cities in 2001. A review of both PM standards and performance is expected this year.*
- *vehicle emissions of particulates are forecast to decline markedly with the mandated introduction of tighter vehicle ADRs and cleaner fuels*

In summary, any impact of E10 on fine particulate emissions is not significant in the Australian context.

Photochemical Smog / Ozone
Photochemical smog (ozone) is a criteria air pollutant. Australian air quality standards have been established for ozone under the Ambient Air Quality NEPM. The standards are: 0.10 ppm (1 hour) and 0.08 (4 hours), with an allowed exceedance of 1 day per year.

Photochemical smog is the result of a chemical reaction of oxides of nitrogen (NOx) and reactive Volatile Organic Compounds (VOC) in the presence of sunlight.

Carbon monoxide (CO) can also be a smog precursor, but has much lower effect than VOCs. CO has very low reactivity, compared to VOCs. The Carter Maximum Incremental Reactivity (MIR) scale is used to estimate grams of ozone produced per gram of organic molecule; the MIR for CO is 0.057, compared with 3.35 average for tailpipe exhaust hydrocarbons – ie CO is 59 times less reactive than exhaust hydrocarbons (VOCs).

Given the low and declining levels of CO in Australian air quality (see section on CO), CO is not considered to be a significant factor in ozone formation in Australian airsheds.

While CO is not a significant ozone precursor in Australia, the effects of developments in vehicle ADRs and cleaner fuels will lead to major reductions to motor vehicle emissions of CO (see section on CO). This will further ensure that CO does not have a material impact on ozone formation in Australia.

There have been exceedances above the allowed ozone level in recent years, particularly in the Sydney airshed. NSW DEC has stated that the reduction of ozone is the primary air quality objective for the Sydney metropolitan region. Major programs are in place, at Commonwealth level and in most States, to achieve reductions in ozone levels. These include:

- NOx: reductions in emissions of NOx from motor vehicles (see section on NOx) and from stationary sources such as power stations.
- VOCs: reductions in emissions of VOCs from motor vehicles (see sections on HC/ VOCs) and from woodfires, the other major anthropogenic source.

The potential effect of ethanol/ petrol blends on ozone formation depends on the impact of ethanol on VOC emissions and on any change in the reactivity of VOC emissions from ethanol compared to petrol. As outlined in the section on HC/VOCs, ethanol generally will reduce tailpipe emissions and increase evaporative emissions of VOCs.

Modelling by CSIRO for the NSW (then) EPA in 2003 and by the Queensland EPA found that E10 blends would not increase or decrease ozone formation significantly. However, these studies did not consider a major increase in ethanol usage. Recent comprehensive US studies by the CRC and NRC (see section on HC/VOCs) found that ethanol blend fuels significantly increased emissions of VOCs, one of the two key smog precursors, which more than outweighed the relatively slight benefit from reducing aggregate CO emissions. This would indicate that any significant increase in the use of E10 blends would increase the potential for photochemical smog.

In summary, ozone is a significant air quality issue in Australia. Ethanol blend fuels have both positive and negative effects on emissions of ozone precursors. Modelling in two States has shown that E10 blends would not increase or decrease ozone formation significantly. However, recent US studies have shown that E10 blends will increase the potential for smog occurrences.

Air Toxics

The air toxics usually considered in relation to vehicle emissions are formaldehyde, acetaldehyde, benzene and 1,3 butadiene. Data on annual urban emissions of these substances in 2000 provides a reference for considering how changes in the use of E10 are expected to impact on these aggregate emissions.

	Vehicle tailpipe urban emissions in 2000 (kt/y)	E10 % changes in tailpipe emissions	Air Toxic Index (Cal EPA)
Formaldehyde	2.69	19	0.035
Acetaldehyde	3.06	159	0.016
Benzene	5.36	-13	0.17
1,3 Butadiene	0.53	-6	1
PAH	0.288		

As of 1 January 2006, Australian fuel quality standards require a maximum of 1% benzene in petrol, in line with best practice standards internationally. All refineries have now committed to investment in equipment and processes to achieve this standard.

This reduction in the quantities of benzene in petrol is expected to result in a reduction in benzene emissions from petrol since 2000 of 29% by 2010 (DEH Setting National Fuel Quality Standards, based on USEPA formula for the modelling of the reduction of benzene content from 3% to 1%). This is comprised of a 20% reduction in tailpipe emissions and 67% reduction in evaporative emissions. When combined with the new vehicle emission standards technology, vehicle emissions of benzene are forecast to reduce by 52% in 2010 and by 73% in 2020, compared to emissions in 2000.

However, these reductions in benzene emissions through the use of E10 will have a significantly lesser impact on aggregate emissions given the changes which have been made to the fuel standards

As well as considering the relative levels of benzene emissions from the use of different petrols, an assessment also needs to be made about expected ambient benzene concentrations in metropolitan airsheds in Australia, and whether these are close to or exceed recommended exposure levels identified by health authorities (NEPM Investigation level 0.003ppm). Monitoring data from State EPAs shows that air quality levels are generally well below this, for example, (NSW EPA 2002):

- High traffic areas: 0.0009 ppm - 0.0028 ppm
- Residential areas: 0.0004 ppm – 0.0012 ppm.

Given the modelled reductions in benzene emissions, the 2006 benzene fuel standards will result in maximum benzene concentrations in metropolitan areas continuing to be well below the Investigations Levels in the Air Toxic NEPM.

In the case of formaldehyde and acetaldehyde emissions, there are an increasing number of reports of studies showing increases in the level of emissions of these substances from vehicle using E10, sufficient to warrant closer attention to this aspect of the data.

In summary, current levels of ambient benzene concentrations are below the Air Toxic NEPM Investigation Level. Vehicle benzene emissions are set to decline further with the introduction of a maximum 1% benzene fuel standard in 2006. The introduction of an E10 blend petrol using a base fuel complying with the benzene standards to apply in Australia from 1 January 2006, as part of the 350ML biofuels target would only lead to a marginal further reduction of benzene emission below that already achieved through the introduction of the new fuel and vehicle emission standards.

In the absence of any Australian data to substantiate actual higher concentrations, or a scientifically established need for a lower ambient concentration limit, there is no case for mandatory use of E10 blend petrol to achieve benzene concentration targets for health reasons. The potential for formaldehyde and acetaldehyde emissions to increase as a result of use of E10 warrants further consideration.

GREENHOUSE GASES (GHGs)

The impact on GHGs of adding biofuels to the conventional fuel mix varies according to the feedstock used, the fuels used in the production of the biofuels, transport costs, expected improvements in vehicle technology and the composition of the fleet. This impact should be assessed on full life-cycle, well to wheels basis.

The 2004 IEA publication *Biofuels for Transport* provides a useful summary of various studies into the GHG emission reductions from biofuel production and use as transport fuels

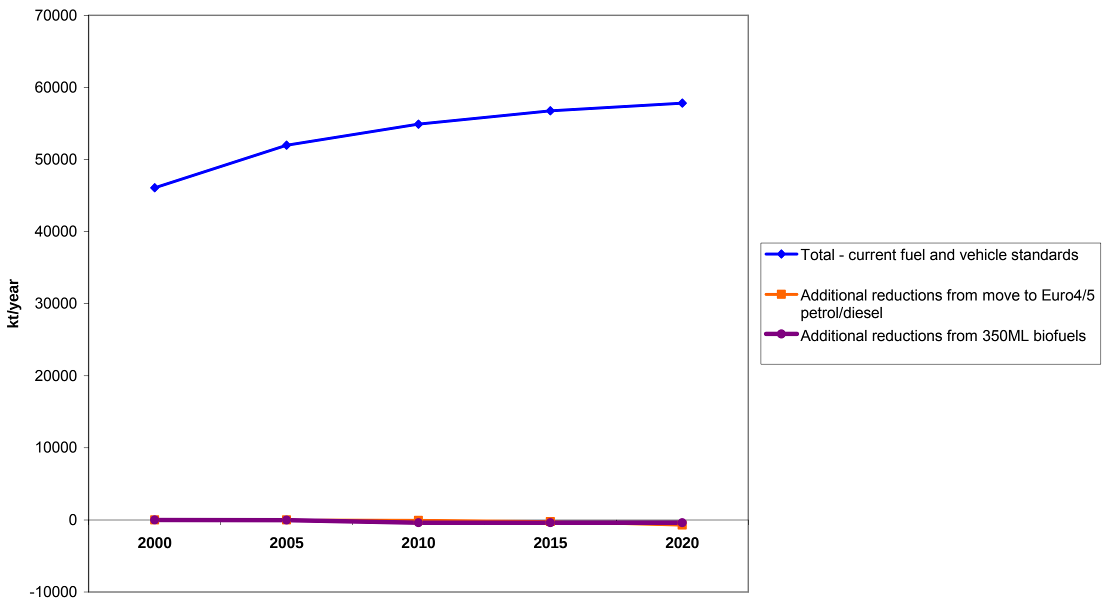
A 1999 study by the US Argonne National Laboratory found that, in the USA, GHGs resulting from the use of ethanol from corn were reduced by 1% (measured against vehicles miles traveled) under current production techniques, with a 2% reduction possible with near future techniques. The use of near future cellulosic source technology would reduce GHG emissions by 6-9%.

The Argonne findings correlate reasonably with estimates from Europe and Australia. In Europe, testing by BP in Germany has found that the use of an E5 blend will reduce GHG emissions by 1.9%. The Concawe well-to-wheels study in 2003 found similar levels of greenhouse gas abatement.

The CSIRO/BTRE/ABARE study reported GHG emission reductions of between 1.7% and 5.1%, depending on the source of the ethanol. The lowest abatement came from wheat-sourced ethanol, the highest from molasses with cogeneration energy.

This report also estimated the expected level of greenhouse gas emissions from the vehicle fleet and the emission reductions expected from the introduction of the 350ML biofuels target. These effects are shown in the table below where the adoption of the 350 ML biofuels target results in a reduction of CO2 emission in 2020 of 0.46% of the base case total emissions from vehicles in 2020. It should be noted that the data in the report has been adjusted to remove the effect of a reduction in refinery emissions, as it would be expected under the current refinery operations in Australia that the ethanol used to create the E10 blend would replace imported petroleum products rather than domestic production.

GHG emissions - current and legislated future fuel and vehicle standards



Sources: *Coffey (2003)* - base, Euro4/5 trends
ABARE, BTRE, CSIRO (2003) - E10 trends

A recent study by CSIRO on GHG emissions impacts from the Primary Energy project at Gunnedah found the GHG abatement from the project consistent with those of the CSIRO/BTRE/ABARE study. The highest savings (ie around the 5% level) were achieved through the use of renewable energy, such as bagasse based cogeneration. Additional greenhouse gas abatement of around 4-5% (compared to ULP) has been identified by CSIRO as arising from the non-ethanol co-products associated with this project. The study also stressed that the findings were very project-specific, and should not be extrapolated more broadly.

The majority of the studies that compare biofuel project costs with greenhouse gas abatement highlight the high cost of this means of abatement. In reaching a view on the greenhouse gas emission abatement cost for biofuels, AIP strongly believes that the Taskforce must compare at least the level of subsidy and concession provided to the industry with the level of abatement achieved, which is at best A$ 150 per tonne. This should be compared with the performance of the Greenhouse Gas Abatement Program (GGAP) which achieved an average abatement cost of under A$10 per tonne. Other emissions abatement options have also been identified in a number of sectors in the range A$10-30 per tonne.

In the light of the available research, the AIP agrees that increasing the proportion of biofuels in the fuel mix does have a positive impact on greenhouse gases, especially to the extent that biofuel production is treated as a sink under the Kyoto protocol, but that such reduction will be modest in terms of the overall level of emissions from the transport sector . In addition, the cost of this abatement is substantially higher than that being achieved under other Government financial incentive programs.

ECONOMIC ANALYSIS AND ASSESSMENT —THE FUEL MARKET DIMENSIONS

The Transport Fuel Market Outlook

In 2003/04, the demand for petroleum based transport fuels was about 42,500 megalitres (730,000 barrels per day). A detailed breakdown of consumption data is contained in *Australian Petroleum Statistics*. Total demand is growing at 1-2% a year, and by 2010 AIP expects demand to have increased to around 50,000 megalitres a year. Within this total, the key product components in 2003/4 were

- Automotive gasoline: 47%
- Automotive diesel: 34%
- Jet fuel: 10%
- LPG – automotive use: 6%
- Others, incl lubes: 3%

Biofuels – ethanol and biodiesel – made up about one-quarter of 1% of the total.

In recent years diesel demand has been growing at around 3% a year (probably reflecting growth in commercial activity) with a much slower growth in demand for automotive gasoline and other products at around 1.2% a year.

The Australian passenger transport fuel market is still dominated by petrol. This is similar to US demand but unlike that of Europe, where diesel now accounts for 43% of fuel sales and where 71% of new car sales are diesel cars.

Fuel efficiency targets and vehicle emission standards for passenger and commercial vehicles will also play a significant role in shaping future fuel demand. The vehicle industry is currently negotiating the fuel efficiency target framework for passenger vehicles. As part of this drive to increase fuel efficiency, there is a growing demand for higher grades of petrol – ie 95 and 98 RON petrol. Premium unleaded fuels accounted for 13% of petrol demand in 2003/04, but as the new car fleet increasingly moves to require 95 RON petrol, this proportion is expected to rise to over 50% early in the next decade.

<u>It is suggested that the Taskforce consult with individual AIP member companies about the details of any projections to be used by the modellers concerning the potential fuel product shares of the fuel market to 2020, particularly the total fuel demand, the split between petrol and diesel, and the split between standard and premium petrols.</u>

To meet the new fuel standards, Australian refineries are making major investments. It is estimated that about $2 billion will be invested over the decade to 2010. However, these investments will not result in any increase in Australian refining capacity. At present about 13% of petrol demand is being imported, 17% of diesel and about 3% of jet fuel. On the basis of projected demand and refinery capacity, it is reasonable to conclude that the overall structural import demand for petroleum products will rise to around 25% or more early in the next decade, and earlier for some products. Again, these details are a matter for discussion with individual AIP member companies.

Supply Chain Costs for Fuel Distributors and Retailers

There are significant costs to the petroleum industry in reliably and safely blending and distributing ethanol blend fuels. In addition there are also significant costs associated with providing appropriate storage and safe handling facilities at retail sites. Special attention is required throughout the supply and distribution chain to ensure that the quality of the ethanol blend fuel is maintained. The costs associated with the introduction of ethanol blend fuels will be company and site specific, so the Taskforce should canvass this issue with individual AIP member companies.

Ethanol suppliers should expect that refiners and fuel distributors will wish to recover these additional costs to their operations as well seek to cover the margin they would have otherwise made on the proportion of fuel being replaced by ethanol.

Octane Demand and Ethanol

The potential role of ethanol as an octane enhancer in petrol is frequently raised as a basis for projecting a significant demand for ethanol. This issue needs to be assessed in terms of the impacts of legislated and potential future vehicle and fuel standards on demand for particular fuels at particular qualities, as well as the economics of current and future refinery operations. Since each refinery in Australia has a different configuration, the timing of the need for and economics of options to build octane in petrols is complex and difficult to estimate. This is a matter that the Taskforce should discuss with individual AIP member companies.

Background

The technical options for refineries for octane enhancement are:

- Refinery capital investment, primarily in isomerisation
- Ethanol
- MTBE and ETBE
- MMT
- Ferrocene
- Lead

Octane Enhancers not suitable for Australia

Lead has been phased out in Australia, and is being phased out generally world-wide. It is therefore not an option for consideration.

MTBE, and other ethers such as ETBE, are widely used in many parts of the world. In Europe, in particular, MTBE and ETBE are used to help refiners meet octane requirements. However MTBE has a major disadvantage in that it presents a major risk of contamination of ground water supplies from leaking fuel tanks. For this reason, it has been effectively banned in Australia, and is being generally phased out in the USA.

ETBE can be made as part of chemical processes or from ethanol. It presents similar difficulties in relation to water contamination as does MTBE, and so does not offer a realistic option in Australia.

MMT is a manganese based additive used as an octane enhancer. The producer is Afton Chemical. There is disagreement between the vehicle industry and the manufacturer of MMT over the effects of MMT on engines and ancillary systems. The principal concern is over the possible detrimental effects of ash-forming additives such as MMT on modern injection engines.

AIP does not have a view on whether MMT is detrimental to vehicle engines. However, it is recognised that the vehicle industry is opposed to its use in Australia in ULP and PULP, and accordingly it is unlikely that refiners will regard MMT as an option for octane enhancement. MMT has been used without problems in lead replacement petrol (LRP); however, since LRP was only used in pre-1986 vehicles, the possible detrimental effect on engines has not arisen.

Ferrocene is an iron oxide based additive, manufactured by Octel. The vehicle industry has the same reservations about the possible effects of ash-formation in engines, as with MMT. To date, ferrocene has not been widely used internationally, and is not known to have been used in Australia. Based on the little evidence to hand, AIP does not consider that ferrocene represents a serious option.

Refinery capital investment and ethanol

This leaves the only two currently identified and viable options for octane enhancement in Australian refineries as being

- refinery solutions - capital investment and/or the import of selected crude oils or high octane blendstocks), and
- ethanol.

Refinery solutions are a viable option. The usual route is investment in isomerisation capacity. However each refinery has different configurations and octane capabilities, and so each refinery will have a different technical and commercial solution. Imports of high octane blendstocks such as reformate also present an option.

Ethanol is a viable octane enhancer, and may well be an attractive option for some refiners.

A key issue is the economics and availability of ethanol. If a refiner locks in to ethanol as its primary route to enhance octane, its cost to produce petrol will depend partly on the ethanol economics. For example, if the cost of ethanol rises above the cost of other blendstocks, the resulting blend will be that much less competitive against other petrols. In this context, possible outcomes could be:

- the general level of petrol prices rising higher than would be justified by normal market conditions
- losses being suffered by an ethanol blender. If sustained, this could lead to the closure of the refinery.

Similarly, if the ethanol supply is lower than planned, refiners relying on ethanol to produce the required octane enhancement would be constrained in their ability to supply fuel complying with Australian standards.

Customer Demand for Biofuels

A key factor in assessing the potential demand for biofuels, is the likely level of consumer demand. Apart from vehicle fleet use, where management decisions can effectively impose a required or preferred fuel option, retail fuel demand is very dependent on customer preference and personal views of motorists about the suitability of the fuel for use in their vehicle.

At present, biodiesel and diesel blends are being used by fleet operators and agricultural consortia. Biodiesel and diesel blends are not available for general retail sale.

Caltex and BP are currently marketing E10 blends in Queensland and in Northern NSW. Most recent data indicates that E10 accounts for between 10-25% of ULP sales at some 70 service stations, although the figures have been somewhat higher in cases where ethanol producers, fuel distributors and retailers have engaged in high profile promotions. Despite strong promotion of E10 blends in Queensland, there still appears to be significant consumer resistance to using E10.

Understanding the reasons for this will be critical to understanding the possible future demand for E10.

A recent (February 2005) ANOP survey of motorists conducted for the Australian Automobile Association indicated

- 25% were happy to buy petrol containing ethanol
- 21% have reservations about buying petrol with ethanol in it
- 35% were unhappy to buy petrol containing ethanol
- 19% were unsure about buying petrol with ethanol in it

In the ANOP survey, over 50% of motorists who were happy to buy E10 saw it as no different to regular petrol (ULP). Only some 20% of E10 buyers would choose E10 because of its perceived environmental benefits, although this proportion has grown over the past two years and is somewhat higher in Queensland where the issue has been emphasised in promotional material.

On the other hand, of the motorists who were not happy or have reservations about buying E10

- over half continued to be concerned about damage to their vehicle engine or the safety of using E10 in their vehicle, but only about 10% were concerned about the impact of E10 on vehicle performance or knew that it is unsuitable for their vehicle.
- some 25% of the group believed they don't know enough and wanted more information and facts, even in Queensland where a significantly higher proportion of motorists were happy to buy E10.

The proportion of motorists who were unsure about the ethanol issue was relatively consistent across the country.

These results are consistent with the results of separate market research undertaken by Caltex and BP on the views of fuel purchasers. Both companies are trying to get a better understanding of these attitudes, particularly why some 40% of motorists are unsure or have doubts about whether E10 is good or bad for their cars, and what information or action will change their purchasing intentions.

The results of the market research suggest that E10 uptake could improve if general awareness about the facts of E10 increases, but this restoration of consumer confidence will take time. Fuel quality standards and vehicle manufacturers' advice on suitability of E10 are the starting points for increased consumer confidence. However, a positive marketing campaign will be needed to capture the motorists who are potentially willing to use E10 but see it as bad or unsafe to use in their cars.

More sophisticated communications strategies will be needed to target repeat messages to each fuel market demographic to

- strengthen the view that E10 is a normal fuel that meets national fuel standards
- demonstrate that extended use of E10 has no impact on durability or operability of engines in all makes and models of vehicles capable of using E10
- increase awareness of information that resonates with that market segment
- improve access to basic facts about E10 in ways that have been demonstrated to most effectively reach each demographic.

This will require a strong level of consultation and co-operation on communications and promotion involving oil companies, fuel suppliers, ethanol producers, vehicle manufacturers and repairers, motoring organisations and governments at all levels. Governments also need to look more closely at strengthening their role in consumer education and their support for promotional activities at this initial stage of industry development. There are some more targeted communications strategies and programs in Queensland, and these could provide models for broader campaigns in other parts of the country.

ECONOMIC ANALYSIS AND ASSESSMENT —BIOFUEL PROJECTS

Studies of Biofuel Project Viability and Project Subsidies

Both the ABARE/BTRE/CSIRO 2003 study and the ABARE 2004 update on that study provide a detailed and robust analysis of the economics of biofuels production options in Australia.

The ABARE methodology provides an upper limit for the potential ethanol price to the fuel industry, and hence a reasonable basis for calculating the best case economics for various biofuels projects. With changes in international crude oil and petroleum product prices since the update of the ABARE study, it is appropriate to consider how such prices might impact on the economics of biofuels production. Data in ABARE analysis (ABARE 2004) focused on long run oil price scenarios post 2015 (as set out in the table below). AIP believes it is highly informative and essential that the analysis also look at the project economics in the current and shorter term, given the number of projects currently poised to start construction and enter the market. For convenience, approximate comparable data is included in the following table based on current petroleum product prices in the Singapore market.

Threshold ethanol and biodiesel prices based on ABARE report April 2004

	Ethanol		**Biodiesel**	
	ABARE April 04	Sing prices June 05	ABARE April 04	Sing prices June 05
Estimated short term ex refinery prices		52.8		61
Estimated medium term ex refinery prices*	30		34	
Relative energy density*	0.68	0.68	0.9	0.9
Threshold fuel prices in absence of assistance	**20.4**	**35.9**	**30.6**	**54.9**
Excise relief – short term*	25.9	25.9	34.3	34.3
Excise relief – medium term*	13.4	13.4	15.2	15.2
Capital subsidy*	1	1	1	1
Threshold fuel prices including excise relief and capital subsidy – short term	**47.3**	**62.8**	**65.9**	**90.2**
Threshold fuel prices including excise relief and capital subsidy – medium term	**34.8**	**50.3**	**46.8**	**71.1**

* data as calculated by ABARE

AIP has not attempted to recalculate the rates of return for various biofuels projects, but we believe this task should be undertaken by the Biofuels Taskforce as part of its review of current market conditions.

When this data on short term and medium term threshold fuel prices (particularly prices based on current petroleum prices reported from the Singapore market) are taken into account in calculating rates of return for various ethanol and biodiesel projects, it is clearly apparent that substantially higher rates of return could be available to most of these projects, particularly in the shorter term. These returns appear to be a high commercial rate of return in comparison to that of the downstream petroleum sector where underlying profitability has been below the average long term bond rate of 6.1 percent since 1997.

AIP believes it would also be appropriate for the Taskforce to review the ABARE data on capital and operating costs for the various biofuels projects in light of new information available from the project proponents. There appears to be some divergence emerging in the aggregate estimates of fixed and operating costs that needs to be clarified, so that it can be captured in the average figures used in the economic analysis and the ranges tested in the sensitivity analysis. Data on biofuel feedstock costs also needs to be reviewed in light of movements in feedstock and by-product prices over the past 12 months, as well as analysis of the impact of competing consumers for the feedstock materials. In presenting the results of the analysis, it would also be helpful for the range of project types to be extended to include any significantly different production technologies, so that there is a clear understanding of the relative economies of production of different processes, and not just the most efficient processes.

Regional Economic Impacts

Several studies (ABARE/BTRE/CSIRO (2003), LECG,) have analysed the regional economic impacts of the development of a biofuels industry in Australia. The conclusions of these studies suggest substantially different outcomes in regional economies from an expansion of the biofuels industry in Australia. AIP is strongly of the view that the Taskforce should review these studies in light of currently available information about the various project economics as well as latest Australian macro-economic data.

AIP encourages the Taskforce to update and extend the ABARE macro-economic impact analysis from the 2003 report. It would be appropriate to assess the 350ML target with and without subsidies, not just the incremental subsidy required over current policy settings. The analysis should cover current policy settings, for two cases: the base case 350 ML with concessional excise/grants versus no excise concessions/grants; and a hypothetical 100 ML ethanol plant in addition to the 350 ML target.

In reviewing the various economic analyses (particularly regional economic analyses), AIP believes it will be important to ensure that any comparisons of the cost of production of ethanol and biodiesel with current or projected petrol and diesel prices are based on the full costs of the biofuels production (ie fixed AND variable costs). The reason for this is that petrol and diesel fuel prices implicitly include a component for capital cost recovery.

It will also be important to take into account the full supply chain costs for getting biofuels to the market. For biofuels this should include transport costs from the plant to the terminal, new terminal and blending infrastructure, service station conversion and marketing costs.

It would also be appropriate for the Taskforce to consult with individual petroleum refiners about the assumptions in several of the studies concerning the crude oil price/petrol terminal gate product price relativities, and the Singapore product price/Australian IPP product price relativities. Assumptions about ‘octane credits’ should also be discussed with AIP member companies, as the economics of using ethanol as an octane enhancer will vary between refineries

AIP is also concerned about the significant difference in multipliers used in the various studies to calculate indirect regional employment and regional economic effects. The basis for these different factors needs to be better understood by all stakeholders. It is also a concern that data relating to the ongoing operation of the biofuels industry is being aggregated with data on plant construction to arrive at simplistic and misleading employment and economic indicators.

AIP is also of the view that regional economic impact studies based on US data are not able to be translated directly to the Australian situation without a very careful and explicit assessment of each of the various factors and their relevance/applicability to the Australian case.

ENERGY SECURITY AND THE ROLE FOR ETHANOL BLEND FUELS AND OTHER BIOFUELS

AIP believes that there are a number of dimensions of the energy security issue that need to be assessed when considering whether there are energy security reasons for advancing the role of biofuels:

1. whether biofuels have a meaningful role in increasing supplies of liquid fuels in a situation when crude oil and/or petroleum product supplies are curtailed
2. whether biofuels have a meaningful role in reducing price spikes in crude oil and petroleum product prices
3. whether biofuels have a meaningful role in replacing crude oil supplies as crude production declines in Australia and elsewhere
4. whether biofuels have a meaningful role in reducing the import bill for crude oil and imported petroleum products and hence the national balance of payments.

Key Points from the Energy White Paper

These issues were considered in detail in the preparation of the Energy White Paper in which the Government concluded that the level of supply security in transport fuels is not currently under threat.

The political instability of some countries in the Middle East has been a major factor behind concerns about transport fuel security. In the longer term concerns also exist about the longevity of oil supplies. These concerns need to be placed into context. Past disruptions have had a relatively small impact on world oil flows and have not had a major impact on the reliability of oil supplies to Australia. Australia, like other countries, has had to face increases in oil prices, often with significant economic impacts, but access to oil has not been a major problem. There is no reason to believe this situation will change as the level of crude oil self-sufficiency declines in Australia over the next two decades.

As the Energy White Paper indicated, multilateral efforts to ensure that world markets remain open and that effective response mechanisms are in place to mitigate the impact of short term supply disruptions, remain Australia's best path to provide for the continuity of oil supplies. The operation of a strong market for transport fuels, mitigation strategies by industry such as targets for stock levels, and emergency response arrangements provide confidence in Australia's ability to provide reliable supplies and competitively priced fuels into the future.

In looking at longer term alternative sources of supply of transport fuels, the Energy White paper noted that Australia has access to potentially large sources of alternative fuels: technology exists to convert coal and gas to liquid fuels; Australia has enormous shale resources; Australia has significant resources of naturally occurring LPG, and can use CNG in transport applications. These resources are all in addition to the potential sources of biofuels. The existence of these resources provides comfort that Australia is well positioned to respond to any longer term changes in oil supply conditions, particularly the outlook for crude oil production in Australia.

As the Energy White Paper concluded, 'there is currently no case for the Government to accelerate the uptake of these fuels on energy security grounds. To do so would involve additional costs to consumers, with few energy security benefits.'

Review of the Liquid Fuels Emergency (LFE) Legislation
These issues were also considered in further detail in the recent review of the LFE legislation by ACIL Tasman. While Governments have yet to respond formally to the review recommendations, there is a clear recognition in the review recommendations that shorter term supply disruptions can be managed through the current fuel supply chain management arrangements in Australia. Multilateral arrangements are in place to provide a strong level of support for Australia in the event of a more substantial supply disruption.

Apart from their role in helping to manage shorter term supply disruptions, liquid fuel stockpiles in Australia were not seen in this review to be able to play any significant role in offsetting major international supply disruptions, or in mitigating rapid rises in international crude oil or petroleum product prices. The same conclusions can be reached about the potential role of biofuels in addressing these factors.

Australia's Balance of Payments
Given Australia's position as a significant net exporter of energy and net beneficiary of the global market for energy commodities, AIP believes the Taskforce should assess, through ABARE's general equilibrium economic model, the benefits to be gained through a reduction in fuel imports through the use of ethanol compared with the economy wide costs of the subsidies provided to the ethanol production industry.

DECISIONS BY OTHER COUNTRIES TO SUPPORT THE INTRODUCTION OF BIOFUELS IN THE TRANSPORT FUEL MARKET

Extensive information is available from the governments of these countries that explains the policy rationale for decisions to support the introduction of biofuels, by way of financial incentives and subsidies, as well as market mandates for these fuels.

An overview description of actions and reasons is set out in Chapter 7 of the 2004 IEA publication *Biofuels for Transport*. More recent information on the background to policy decisions in Europe, US and Latin America is contained in presentations from a recent IPIECA workshop on biofuels.

In general, the policy rationale has been presented as a reflection of the benefits flowing from

- support for the agricultural sector, particularly sugar crop producers
- support for regional employment and regional economic development
- climate change emission reductions from the transport sector in regions committed to supporting the Kyoto Protocol, and/or having access to the Clean Development Mechanism (CDM)
- security of liquid fuel supplies in regions with extremely high dependence on liquid fuel imports and/or seeking to reduce exposure to the economic impacts of petroleum imports (particularly developing countries wishing to manage their balance of payments position).

While this information is readily available, the Taskforce is encouraged to explore the drivers behind such considerations to ensure that they have a clear understanding of the political factors behind each of these policy rationales in each of the countries and regions of interest. In most cases there are other agendas present that extend beyond the policy rationale.