



**Queensland  
Government**

Premier of Queensland  
and Treasurer

For reply please quote: *Mail Number/NL01/ECP*

02 MAR 2006

Senator Rachel Siewert  
Chair  
Senate Rural and Regional Affairs and  
Transport References Committee  
SG.62  
Parliament House  
CANBERRA ACT 2600.

Dear Rachel

Thank you for your letter of 15 December 2005 inviting a Submission to the Inquiry into Future Oil Supply and Alternative Transport Fuels.

I have particular concerns, as do many Queenslanders, about rising fuel prices and supply security, brought about by a range of factors, including declining global oil reserves. With growing demand for fuel, this country's dependence on foreign oil imports and exposure to global markets will increase, unless sustainable and long term solutions can be found.

Immediate action is also required to ensure current impacts of record fuel prices on industry and the wider community are minimised. In particular, the Queensland Government holds concerns about the effectiveness of the *Trade Practices Act 1974*, and the Australian Competition and Consumer Commission's (ACCC) ability to prevent anti-competitive behavior. For this reason, this Government supports inclusion of predatory pricing provisions within the Oilcode - a proposal rejected by the Australian Government.

My Government has repeatedly called for a national inquiry into petrol pricing. In the absence of adequate action by the Commonwealth and the ACCC, a Parliamentary Impact of Petrol Pricing Select Committee was formed to investigate issues related to fuel pricing in this State. The Select Committee is due to report its findings in March 2006. It is recommended that this report be considered by your Inquiry.

Queensland is leading the way with its ethanol policy and the *Queensland Ethanol Industry Action Plan 2005 – 2007*. The Queensland Government is seeking to build on the successes of its ethanol policy and is currently investigating opportunities relating to biodiesel and other alternative fuels. Continued development of alternative fuels, combined with other strategies such as enhanced efforts in oil exploration, more efficient technologies and

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practices, and demand management, will be pivotal for ensuring reliable and low cost fuel supplies and that Australia's economy remains strong and continues to grow, while also meeting responsibilities in relation to reducing greenhouse emissions.

A more detailed Queensland Government Submission to your Inquiry is attached.

Yours sincerely

A handwritten signature in cursive script, appearing to read 'P Beattie', written in black ink.

**PETER BEATTIE MP**  
**PREMIER OF QUEENSLAND**

Submission to the Senate Rural and Regional Affairs  
and References Transport Committee

# **Inquiry into Australia's future oil supply and alternative transport fuels**

Queensland Government

February 2006

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## Executive summary

The Australian economy is highly reliant on transport energy to service its dispersed population centres and extensive agricultural and mining activities. With growing demand for fuel, Australia's dependence on foreign oil imports and exposure to global markets will increase, unless sustainable and long term solutions can be found.

The Queensland Government recognises that maintaining a reliable and competitively priced transport fuels sector is fundamental to Australia's future economic prosperity. Continued development of alternative fuels, combined with other strategies such as enhanced efforts in oil exploration and more efficient use of transport will be pivotal in ensuring economic prosperity, while also meeting responsibilities in relation to reducing greenhouse emissions.

The Queensland Government considers that there is a requirement for governments to work collaboratively with industry to thoroughly *investigate all fuel options* open to Australia and to ensure that *appropriate policies settings* are established to encourage the increased use of alternative fuels, including a potential longer term transition to a hydrogen economy.

Australia should safeguard against the threat of peak oil<sup>1</sup> by *diversifying its fuel base* through the *investment in, or expanded use of, alternative fuels*. These include fuels such as Liquefied Petroleum Gas (LPG), natural gas, methanol, ethanol, biodiesel and synthetic fuels produced from coal or natural gas. Australia in particular, has an abundance of coal and gas that could be converted to liquids such as clean burning diesel.<sup>2</sup> This is an important factor given that demand growth for diesel fuel in the Australian fuel market, is now twice that of petrol

Although there are a range of *alternative fuel options* that could be considered to increase Australia's fuel diversity, the challenge facing government and industry is that some fuel options have yet to be proven commercially viable while some face unique technical, environmental, and in some cases consumer acceptance barriers that will need to be addressed before entry into mainstream fuel markets.

The Queensland Government is currently developing an alternative fuels policy to help expand the State's fuel base beyond petroleum. A key aim of this policy will be to increase the investment in, and expanded use of, alternative fuels in the Queensland economy.

There is also a need for action now to ensure the fuel prices remain as low as possible and impacts on the community and industry are minimised. In particular, the Queensland Government holds concerns about the effectiveness of the Trade Practices Act 1974, and the Australian Competition and Consumer Commission's (ACCC) ability to prevent anti-competitive behavior. For this reason, this Government supports inclusion of predatory pricing provisions within the Oilcode - a proposal rejected by the Australian Government.

The Queensland Government has repeatedly called for a national inquiry into petrol pricing. In the absence of adequate action by the Commonwealth and the ACCC, this Government initiated formation of a Parliamentary Impact of Petrol Pricing Select Committee to investigate issues related to fuel pricing in this State. The Select Committee is due to report its findings in March 2006. It is recommended that this report be considered by your Inquiry.

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<sup>1</sup> Peak oil is regarded as the point in time where oil supply cannot sustain demand.

<sup>2</sup> South Africa produces an average of 150,000 barrels of high quality fuel per day from low-grade coal. This is equivalent to about 20 percent of Australia's daily consumption of crude oil.

## 1 Introduction

This submission has been developed to assist the Senate Rural and Regional Affairs and References Transport Committee in its consideration of issues under its current Inquiry pertaining to Australia's future oil supply, potential new sources of oil, alternative transport fuels and options to reduce Australia's transport fuel demands.

The terms-of-reference for this Inquiry are as follows:

1. Projections of oil production and demand in Australia and globally and the implications for availability and pricing of transport fuels in Australia;
2. Potential of new sources of oil and alternative transport fuels to meet a significant share of Australia's fuel demands, taking into account technological developments and environmental and economic costs;
3. Flow-on economic and social impacts in Australia from continuing rises in the price of transport fuel and potential reductions in oil supply; and
4. Options for reducing Australia's transport fuel demands.

Section 2 provides a range of policy options that the Queensland Government recommends for consideration by the Senate Committee in addressing the above terms-of-reference. The policy options presented here intend to act as a starting point for discussion by the Senate Committee.

Section 3 of this submission provides an overview of the key issues that require consideration in relation to the above terms-of-reference.

Attachment 1 provides information to support the policy options and key issues raised in this submission.

Attachment 2 contains an extract of a modeling analysis undertaken by Queensland Treasury which examined the potential impacts of higher oil and petroleum prices on the Queensland economy. A full report was recently provided to the Queensland Parliamentary Impact of Petrol Pricing Select Committee.

The Queensland Government has drawn on industry experience from the petroleum and alternative fuels sector as well as a variety of reports, papers and analysis in the preparation of this submission.

## 2 Key policy responses

The Queensland Government recommends a range of policy options for consideration by the Senate Committee. The policy options presented here intend to act as a starting point for discussion by the Senate Committee.

### 2.1 Oil exploration

#### 2.1.1 Continued investment in oil exploration and discovery

*The Queensland Government supports increased investment in oil exploration and discovery as a means to enhance Australia's self sufficiency in crude oil.*

The Queensland Government acknowledges that there is need to supplement existing oil reserves through continued investment in oil exploration and discovery.

In terms of increasing oil exploration, the Queensland Government supports

- *A review of all offshore areas in respect to their petroleum potential, excluding areas of environmental significance such as the Great Barrier Reef;*
- *A review of offshore technology in relation to operational risks associated with petroleum production in respect to its performance, reliability and potential environmental impacts; and*
- *Geoscience Australia's acquisition of pre-competitive seismic data in frontier areas as a means of attracting exploration.*

Queensland supports the concept of flow-through shares as a mechanism for accessing additional funds for exploration; and the concept of a reconnaissance tenure to be introduced in relation to offshore exploration. The tenure enables a company to undertake research before formally committing to an exploration program. This type of tenure is to be included into the Commonwealth legislation.

Queensland supports the activities of Geoscience Australia in acquiring pre-competitive seismic data in frontier areas as a means of attracting exploration. It is recognized that this data only provides a basic understanding of the geology and petroleum potential of these areas and that drilling is the only way to test whether or not petroleum is present.

### 2.2 Transport efficiency

#### 2.2.1 Increase the efficient use of transport in Australia

*The Queensland Government supports the introduction of practical measures to increase the efficient use of transport in the Australian economy. These measures are seen as a practical means to help reduce fuel consumption in the economy and include options such as:*

- Increasing investment in public transport (PT) infrastructure;
- Encouraging widespread use of public transport (eg. bus, rail);
- Improving traffic management efficiency including the application of Intelligent Transport Systems (ITS);
- Encouraging societal changes such as car pooling, cycling, walking, and telecommuting;

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- Improving integration of transport and land use;
- Supporting innovation in heavy vehicle design to promote more productive freight vehicles;
- Facilitating integrated transport networks that support the efficient movement of freight along the logistics chain;
- Harmonising regulation of the transport industry to promote efficient movement of freight between jurisdictions and across modes; and
- Seek to ensure an appropriate balance of freight distribution between road and rail which best promotes economic growth and that preserves safety, infrastructure and community amenity. A higher mode share for rail over long distances can promote significant fuel savings.

The Queensland Government believes that there is a requirement for governments to work collaboratively with each other to identify and introduce practical measures to increase the efficient use of transport in the Australian economy. Measures such as those described above could contribute substantially to a reduction in fuel consumption in the economy

### 2.2.2 Continued funding for TravelSmart

**Commonwealth Government funding for TravelSmart concludes in mid-2007. The Queensland Government considers that this tested program, which has directly resulted in reducing kilometres travelled, should receive continued funding beyond that date.**

### 2.2.3 Encourage the use of low emission, fuel efficient hybrid electric vehicles (HEVs)

**The Queensland Government recommends that the Commonwealth Government considers introducing tax incentives to encourage the uptake of low emission, fuel efficient hybrid electric vehicles to help reduce fuel consumption in the Australian economy.**

Hybrid electric vehicles offer fuel efficiency of up to twice the fuel efficiency of conventional vehicles. Increased use of hybrid vehicles by Australian motorists could lead to a significant reduction in overall fuel consumption in the economy.

Under the current import tariff regime, fuel inefficient four wheel drive vehicles (4WDs) receive favourable tariff concessions compared to other passenger motor vehicles (PMVs). The intent of the 4WD tariff policy was to grant a concession to vehicles used for 'off road' purposes such as mining and agricultural activities. However, the majority of 4WDs, which account for more than 20 percent of the passenger vehicle market, are not being used for off-road purposes yet they receive a tariff advantage over more fuel efficient passenger vehicles. As of 1 January 2005, Four wheel drives (5%) receive less of a tariff advantage over passenger cars (10%, down from the previous 15%). It is understood that this may be further altered, with the tariff on imported passenger cars being reduced down to 5%, scheduled to occur in 2010.

The Queensland Government therefore believes that in light of rising fuel demand and fuel prices, any further review of tariff policy needs to consider whether low emission, fuel efficient vehicles such as hybrid electric vehicles should receive favourable tariff (and other tax) treatment.



Both Commonwealth and state governments may also consider options for showing leadership by setting “quotas” or “targets” for the purchase of hybrids in vehicle fleets to stimulate domestic demand in the market.

#### 2.2.4 *Increased use of low emission fuel efficient vehicles*

*The Queensland Government believes that the further use of low emission fuel efficient vehicles would be an effective way to reduce total fuel consumption in Australia.*

To be effective this type of program should be led at a national level through the Australian Transport Council (ATC) and the National Environment Protection Council (NEPC) with agreement by all states.

The Queensland Government has been active in encouraging the uptake of hybrid vehicles across the government fleet through its vehicle leasing and fleet management service provider, QFleet. QFleet encourages client agencies to consider the Toyota Prius as a fuel-efficient alternative to conventional four-cylinder passenger vehicles.

#### 2.2.5 *Facilitate entry of Flexible Fuel Vehicles into the Australian vehicle market*

*The Queensland Government believes that the Commonwealth Government should work closely with the Australian auto-industry to fast track the introduction of Flexible Fuel Vehicles (FFVs) into the Australian vehicle market*

There is a strong case that the Australian auto-industry would introduce Flexible Fuel Vehicles (FFVs) into the Australian market given appropriate encouragement by the Commonwealth Government.

Key impediments/issues that would need to be addressed before entry of FFVs into Australia include:

- The Commonwealth Government would need to increase the 10 percent cap on ethanol blends (to enable use of higher blend ratios);
- Consumers would need to be highly confident in using higher ratios of ethanol blended fuels;
- Ethanol production capacity would need to be sufficient to meet increased demand for ethanol from domestic uptake of FFVs; and
- Fuelling distribution infrastructure (eg. E85 refueling stations) would need to be in place to support fuelling of FFVs.

Increased use of FFVs in the domestic vehicle market will help to stimulate demand for alternative fuels such as ethanol and methanol.

### 2.3 *Fuel diversification*

#### 2.3.1 *Expanded use of alternative fuels in the Australian fuel market*

*The Queensland Government supports the expanded use of alternative fuels to ensure diversification of the Australian fuel market. These include fuels such as Liquefied Petroleum Gas (LPG), natural gas, methanol, ethanol, biodiesel and synthetic fuels produced from coal or natural gas.*

The Queensland Government maintains that alternative fuels are essential to Australia's future economic prosperity and believes that there is an imperative for governments to work collaboratively with industry to *thoroughly investigate all fuel options open* to Australia. It is therefore essential that appropriate policy settings are established so that alternative fuels secure a place in the domestic fuel mix, potentially including a longer term transition to hydrogen.

### 2.3.2 *Increased innovation, research and development in alternative fuels*

***Given Australia's increasing dependence on crude oil, the Queensland Government believes that a greater national effort is required to promote collaborative alternative fuels-related research, development and innovation.***

The Queensland Government maintains that the Commonwealth Government should provide more funding to promote increased research, development and innovation in relation to alternative fuels to help establish these fuels in the Australian fuel market.

Specifically, in relation to alternative fuels, the Queensland Government supports:

- A research and development program to facilitate the use of alternative fuels such as Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) in transport;
- A study into the technological and economic factors associated with the development of a Gas-to-Liquids (GTL) technology for the production of transport fuels;
- An assessment of the role that oil shale could play in the future supply of transport fuels considering the potential greenhouse effects; and
- An assessment of suitability of hydrogen as a possible transport fuel.

In 2008, Queensland will host the *World Hydrogen Energy Conference* in Brisbane. This conference will provide a unique opportunity for Australia to demonstrate its expertise in hydrogen and fuel cell technologies. Importantly in the lead up to this conference, there remains a window of opportunity for *increased collaboration* between government and industry on hydrogen-related demonstration projects. These projects could be showcased at the conference to demonstrate Australian expertise in the area.

Initiatives such as the *International Partnership for the Hydrogen Economy* (see Attachment 1, section 2.12) can help raise the profile of hydrogen/fuel projects both nationally and internationally, and assist in attracting new research participants and funding.

### 2.3.3 *Delay introduction of fuel excise on alternative fuels*

***The Queensland Government maintains that the introduction of a net excise on alternative fuels in 2011 will be detrimental to the long term development of a biofuels industry in Australia.***

Essentially, the 2011 phase-in places additional pressure on the domestic biofuels industry to establish its credentials in the marketplace and become viable before 2011. This is not realistic given the time required to plan, obtain approvals, finance and construct a new facility.

Therefore, the Queensland Government's preference is that the introduction of a net fuel excise on alternative fuels be placed further out to allow sufficient time for the industry to attract vital capital investment.

### 2.3.4 Increase the current 350ML biofuels target

*The Queensland Government maintains that the Commonwealth Government's current target of 350 million litre (ML) by 2010 is not sufficient to stimulate large scale production and guarantee the future of the biofuels industry.*

The current voluntary target of 350 million litre (ML) by 2010 accounts for around 1 percent of the total Australian fuel market of around 27 billion litres. Planned ethanol production in Queensland alone of (estimated at between 324 ML – 413ML) would account for the entire biofuels target.

The mining industry, the second largest consumer of fuel in Queensland, is highly dependent on liquid fuels and therefore vulnerable to fuel price increases and shortages. As a large consumer of diesel, the mining industry would benefit from blending biodiesel which in turn can help to offset strong demand growth for diesel in the domestic market. It is therefore essential to provide some degree of market surety to biodiesel producers to encourage large scale production.

### 2.3.5 Engine warranties for biodiesel

*The Queensland Government recommends that the Commonwealth Government consult with diesel engine manufacturers to validate engine warranties for biodiesel.*

In ensuring continued growth of the biodiesel industry, the Queensland Government believes that it will be vital for the Commonwealth Government to ensure that biodiesel fuel standards meet the requirements of diesel engine manufacturers in regard to engine warranties<sup>3</sup>.

As was the case for ethanol, the Commonwealth Government will need to consult engine manufacturers to ensure current fuel standards meet engine warranty requirements to avoid any confusion by prospective consumers of biodiesel.

### 2.3.6 Assess appropriate feedstocks for biodiesel

*The Queensland Government supports an assessment of the biofuel industry in relation to its potential to meet future energy demand, particularly in relation to biodiesel. This assessment should consider the type of crops to be grown and the area of agricultural land needed to make a significant difference. Energy balance associated with the production of biofuels should also be considered.*

A potential lack of suitable feedstock has been identified by industry as a possible impediment to biodiesel industry growth. For instance, initial production facilities in Queensland will rely on tallow as a primary feedstock and based on planned production, tallow stocks could deplete very quickly. The energy balance needs to be considered in relation to the production of biofuels to understand the total amount of energy necessary for their production.

<sup>3</sup> Biodiesel of a high standard in blends of up to 5 percent might be acceptable to some diesel engine manufacturers as at this ratio the energy content remains largely unchanged.

Therefore a major opportunity exists to develop alternative crops suitable for the production of biodiesel in Australia and suited to Australian climatic conditions. This represents a significant opportunity for Commonwealth, State and Territory Governments to work cooperatively with the agricultural industry and relevant research institutions to develop suitable crops that would provide a new income source for rural industries.

#### **2.4 Industry regulation and reform**

##### *2.4.1 Ensure effective and fair competition in the petroleum sector*

**The Queensland Government holds concerns about the effectiveness of the Trade Practices Act 1974 and the ACCC's ability to prevent anti-competitive behaviour and supports inclusion of predatory pricing provisions within the Oilcode.**

Promotion of effective and fair competition in the petroleum sector is essential for the delivery of competitively priced transport fuels in the economy. A mandatory industry code (the Oilcode) is expected to be introduced to the Australian Parliament during 2006.

The Queensland Government holds concerns about the effectiveness of the *Trade Practices Act 1974 (Act)*, and the Australian Competition and Consumer Commission's (ACCC) ability to prevent anti-competitive behaviour. For this reason, this Government supports inclusion of predatory pricing provisions within the Oilcode - a proposal rejected by the Commonwealth Government.

The Queensland Government also considers that the petroleum retail sector contains sufficient market participants to ensure fair and effective competition, and therefore supports price monitoring by the ACCC.

The Queensland Government's only direct influence on fuel prices is through its Fuel Subsidy Scheme, which provides consumers in Queensland with an 8.35 cent per litre subsidy for leaded and unleaded petrol and on-road diesel. The annual cost of the Scheme is currently estimated at over \$500 million. Queensland is therefore the only State offering a practical means to reducing the impact of high fuel prices on consumers.

The Queensland Parliament passed a motion in 2003 calling on the Commonwealth Government to establish a national inquiry into fuel pricing.

In the absence of stronger action from the ACCC or the establishment of a national inquiry on the subject of petrol pricing, the Queensland Government initiated formation of the *Parliamentary Impact of Petrol Pricing Select Committee* to investigate different aspects of automotive fuel pricing and transport issues in Queensland.

The findings of the Queensland Joint-Parliament Committee are due for release at the end of March 2006. It is recommended that the Senate Inquiry consider the findings of this Committee.

### 3 Overview of key issues

The Australian economy is highly reliant on transport energy to service its dispersed population centres and extensive agricultural and mining activities. The Queensland Government considers that in ensuring Australia's future economic prosperity, some of the key transport energy issues that need to be addressed include:

#### 3.1 *Rising fuel demand and import dependence*

Australia's future oil position will be one of growing demand and a widening gap between supply and demand. Australia is heavily reliant on petroleum-based fuels to meet its transport energy needs and demand for transport fuels is projected to rise significantly over the next decade.<sup>4</sup> Australia's oil import dependency is expected to continue to grow as domestic oil production declines and consumption increases. Production of oil will continue to come from politically unstable regions of the world and owing to the tightness of supply, any disruption to supply from these regions will result in a significant increase in the price of oil. Increases in global oil production are likely to come from new sources, for example west coast of Africa (eg Angola, Mauritania). Australia's petroleum trade deficit has increased threefold over the past decade from \$AUD2.1 billion (1996/97) to \$AUD6.2 billion (2004/05).<sup>5</sup>

Australia's self sufficiency in relation to oil is likely to *continue to decline* owing to the age of the fields and the failure to find sufficient new reserves. Any decrease in self sufficiency will make Australia more susceptible to global disruptions in oil supply. Given that petroleum-based fuels meet the majority of Australia's transport energy needs, a key challenge will be to supplement existing oil reserves through *continued investment in oil exploration* and discovery. Offshore Australia provides the best opportunity for the new oil discovery while onshore oil (due to limited field size) offers limited prospects to influence Australia's level of self sufficiency.

Determining the actual world stock of oil remains problematic due to the availability of reliable data. This severely undermines the ability to accurately predict current and future reserves of oil and therefore 'peak oil'- the point in time where oil supply cannot sustain demand.

#### 3.2 *Higher energy prices*

In the past two years world oil and energy prices have risen strongly and there is a continued expectation among industry analysts of sustained high oil prices into the future. Rising oil and commodity prices have been substantially driven through the resource demands of countries like China and India. Sustained high oil prices will gradually affect industrial activity, particularly in the transport (eg. airline)<sup>6</sup> and mining sectors of the Australian economy. Sustained high oil prices puts pressure on the small business sector and has a direct impact on the Consumer Price Index and inflation. However, high oil prices affect all industries world wide and impacts are not isolated to Australia. Consequently, to the extent

<sup>4</sup> The International Energy Agency predicts that transport energy use in Australia is expected to grow by 2.0% per year between 2001/2001 to 2019/20.

<sup>5</sup> Australian Bureau of Agriculture and Resource Economics (ABARE)

<sup>6</sup> The airline industry could be particularly affected, which in turn may impact on the tourism industry.

that Australian industry uses oil as an input to production in a similar way to the rest of the world, the relative competitiveness of Australian firms will not be affected by high oil prices.

In the event of continuing high oil prices, *alternative fuel sources will become more viable* while there will be more incentive for industry to invest in the research and development of alternative fuel technologies. The challenge for government and industry is to work to offset the effects of high energy prices on the domestic economy due to a steady decline in world oil production.

Given that oil is a globally traded commodity, the Australian market (which represent about 1 percent of the world market<sup>7</sup>), will exert little influence on setting the price of oil. However, Australia could, to some extent, help offset the impact of high oil prices by using *transport more efficiently* and by expanding its fuel base *beyond petroleum* through the *investment in, or expanded use of, alternative fuels*.

### 3.3 *Transport efficiency and fuel diversification*

Besides investment in oil exploration and discovery, Australia could aim to insulate itself from the threat of peak oil by implementing demand side measures that increase the efficient use of transport. The result could be a reduction in overall fuel consumption within the economy. For instance, transport efficiency can be achieved through investment in public transport (PT) infrastructure; encouraging widespread use of public transport (eg. bus, rail); improving traffic management efficiency including the application of Intelligent Transport Systems (ITS); and by encouraging societal changes such as car pooling, cycling, walking, and telecommuting. Transport efficiency could also be achieved by encouraging the uptake of fuel efficient vehicles including diesel vehicles, hybrid electric vehicles and flexible fuel vehicles.

Australia could safeguard itself against the threat of peak oil by *diversifying its fuel base* through the *investment in, or expanded use of, alternative fuels*. These include fuels such as Liquefied Petroleum Gas (LPG), natural gas, methanol, ethanol, biodiesel and synthetic fuels produced from coal or natural gas. Australia in particular, has an abundance of coal that could be converted to liquids such as clean burning diesel. This is an important factor given that demand growth for diesel fuel in the Australian fuel market, is now twice that of petrol.<sup>8</sup> An alternative to coal liquefaction is the conversion of gas to liquids, a process that would capitalise on Australia's large reserves of natural gas. Natural gas in Australia enjoys a significant cost advantage over oil and therefore needs to be seriously considered as a future transport fuel. Both Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) has the potential to fill this role. Australia also has abundant resources of oil shale which could produce potentially large quantities of liquid fuel.

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<sup>7</sup> The world crude oil market is in excess of 80 million barrels per day. In 2004/05, the crude oil market in Australia averaged 747,000 barrels per day.

<sup>8</sup> Although petrol is the dominant fuel in the Australian fuel market, demand growth for diesel is now twice that of petrol (4% pa compared to 2% pa respectively).

Consequently, there are a range of *alternative fuel options* that could be considered to increase Australia's fuel diversity. However, the challenge facing government and industry is that some alternative fuel options have yet to be proven commercially viable while some face unique technical, environmental, and in some cases consumer acceptance barriers that will need to be addressed before entry into mainstream fuel markets. In terms of biofuels, the Queensland Government does not consider the Commonwealth Government's current target of 350 million litres to be enough to stimulate large scale production and guarantee the future of the biofuels industry.

There is a requirement therefore for governments to work closely with industry to thoroughly *investigate all fuel options* open to Australia and to ensure that *appropriate policies settings* are established to ensure that alternative fuels secure a place in the domestic fuel mix. The result could be a stronger national economy underpinned by a diversified fuel base.

### ***3.4 Industry regulation and reform***

The Australian petroleum industry is diverse and dynamic and has undergone a number of structural changes over the years in response to a range of competitive, market and legislative forces. It is vital that Australia has a responsive market and regulatory framework that encourages the availability of high quality and competitively priced transport fuels within the economy. As highlighted in the Commonwealth Government's national energy policy<sup>9</sup>, and given the complexity and national nature of the downstream petroleum sector, there is a need for greater cooperation between jurisdictions to encourage further investment in this industry.

#### Oilcode

The Queensland Government holds concerns about the effectiveness of the *Trade Practices Act 1974 (Act)*, and the Australian Competition and Consumer Commission's (ACCC) ability to prevent anti-competitive behaviour. For this reason, this Government supports inclusion of predatory pricing provisions within the Oilcode - a proposal rejected by the Australian Government. The Queensland Government also considers that the petroleum retail sector should contain sufficient market participants to ensure fair and effective competition, and supports effective ACCC price monitoring.

#### Fuel standards

Fuel standards, will play a continuing role in encouraging investment in, and the consumer uptake of, emerging alternative fuels such as biodiesel. In terms of biodiesel, there is uncertainty in the market on the appropriate blend ratios and the extent of warranty protection offered by diesel engine manufacturers. These issues are identical in nature to those that undermined early confidence in the ethanol industry. Further inter-jurisdictional cooperation will therefore be required in setting appropriate fuel standards to ensure growth of the alternative fuel industry.

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<sup>9</sup> "Securing Australia's Energy Future" 2004, page 88.

Fuel excise

Under current Commonwealth Government policy settings, biofuels such as ethanol and biodiesel receive excise relief until 2011, at which point domestic producers will compete with imported biofuels. The Queensland Government believes that the introduction of excise on biofuels should be delayed considerably or removed to enable sufficient time for the domestic biofuels industry to establish itself in the marketplace. This policy proposal has so far been rejected by the Commonwealth Government.



**Resources**

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REN21 Renewable Energy Policy Network 2005 Renewables 2005 Global Status Report  
Washington DC: WorldWatch Institute

**Attachment 1. Supporting information****Table of Contents (Attachment 1)**

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## Supporting information

This section provides additional information to support the key issues raised in section 3. Also highlighted are examples of initiatives introduced by the Queensland Government in relation to alternative fuels, transport efficiency as well as other measures to expand the State's fuel base beyond petroleum.

### 1.0 Economic and social impacts of high oil prices

In terms of flow-on economic and social impacts of oil, the Queensland Government through the Office of Economic and Statistical Research undertook a modelling analysis of the potential impacts of higher oil and petroleum prices on the Queensland economy.

The model's key strength is its industry detail, which facilitates a comprehensive account of the distribution of economic impacts across industries, consumers, and government.

Attachment 2 provides a synopsis of information provided to the Parliamentary Impact of Petrol Pricing Select Committee, a Joint-Parliament Committee which is due to report to the Queensland Parliamentary by the end of March 2006.

### 2.0 Australia's oil supply, pricing and oil exploration potential

Australia's self sufficiency in relation to oil is likely to continue to decline owing to the age of the fields, failure to find sufficient new reserves and increase consumption of transport fuels. Any decrease in self sufficiency will make Australia more susceptible to global disruptions in oil supply.

Australia will have to pay the world price if it has to buy oil overseas as local supply decreases. Australia needs to maintain parity pricing for locally produced oil to ensure that there is no exodus of exploration or development funds from Australia to other parts of the world.

A key challenge therefore will be to supplement existing oil reserves through continued investment in oil exploration and discovery. Onshore Australia probably has limited potential to contain oil fields of the size of make a significant difference to Australia's level of self sufficiency.

However, offshore Australia provides the best opportunity for the discovery of a new oil province that will make a substantial contribution to the level of self sufficiency. This oil province is likely to be in deep water (1000 – 3000m) and may be located in or adjacent to environmentally sensitive areas. Production of oil from water depths greater than 1000m is already occurring in many parts of the world (eg Gulf of Mexico, Brazil, Angola).<sup>10</sup>

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<sup>10</sup> This technology generally uses floating, production, storage and off-take facilities. This technology has enabled the production of oil in a safe and efficient manner.

Oil production has the potential to cause environment damage. The petroleum industry in general is perceived to be a 'major' polluter and their activities detrimental to the environment. However, the environmental record of the offshore petroleum industry in Australia is of high-quality.<sup>11</sup> This improved performance reflects among others, improvements in technology and training.

The ability to accurately predict current and future reserves has been raised as an issue due to the availability of the data required to make these predictions.

In terms of increasing exploration, Queensland supports

- A review of all offshore areas in respect to their petroleum potential, excluding areas of environmental significance such as the Great Barrier Reef;
- A review of offshore technology in relation to operational risks associated with petroleum production in respect to its performance, reliability and potential environmental impacts;
- The concept of flow-through shares as a mechanism for accessing additional funds for exploration;
- Geoscience Australia's acquisition of pre-competitive seismic data in frontier areas as means of attracting exploration; and
- The concept of a reconnaissance tenure to be introduced in relation to offshore exploration (the tenure enables a company to undertake research before formally committing to an exploration program. This type of tenure is to be included into the Commonwealth legislation).

In addition, Queensland supports the continuation of world parity pricing in relation to price of oil and the introduction of flow-through shares as a means of encouraging exploration for petroleum resources.

The activities of Geoscience Australia in acquiring pre-competitive seismic data in frontier areas as a means of attracting exploration. It is recognized that this data only provides a basic understanding of the geology and petroleum potential of these areas and that drilling is the only way to test whether or not petroleum is present. Although other techniques exist to estimate future discoveries, none of them are sufficiently reliable to enable an accurate estimate of future crude oil supply.

### **3.0 Potential new sources of oil, alternative fuels**

The development of alternative sources of transport fuels is essential to ensure diversification of the Australian fuel market. Alternative fuels include potential new sources of oil such as oil shale or fuels such as Liquefied Petroleum Gas (LPG), natural gas, methanol, ethanol, biodiesel and synthetic fuels produced from coal or natural gas.

There are a range of alternative fuel options that offer potential to enhance Australia's fuel diversity. Some fuels such as LPG are already produced on a commercial scale, however, some fuel options have yet to be proven commercially viable and face unique technical, environmental, and in some cases consumer acceptance barriers that will need to be addressed before entry into mainstream fuel markets.

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<sup>11</sup> There were several gas blowouts in the 1960s but as these were gas there was no pollution. There has been no significant incidents for 35 years. Most oil pollution incidents have arisen from ships running aground and not from blowouts.

A variety of alternative fuel options are presented briefly below. However, this is not an exhaustive list of options, nor does it provide detail on all the economic, technical, or environmental factors that need to be addressed to encourage large scale commercial production.

## 2.1 *Oil shale*

Oil shale which is a type of sedimentary rock<sup>12</sup> represents a potential new source of crude oil as Australia has significant quantities of this resource. Tertiary oil shales for instance, that occur in the coastal strip between Proserpine and Bundaberg and in the Duaringa area, could yield more than 4629 Gigalitres (equivalent to 27.774 billion barrels) of oil. This represents about 46 times Australia's initial crude oil reserves.

However, considerable economic, ecological and technological barriers exist in the commercialisation of oil shale as future source of oil. The production of oil shale in significant quantities is also highly energy and water intensive, a significant impediment for a dry continent like Australia.<sup>13</sup> Environmental concerns also exist in relation to the emission of greenhouse gases as part of the production of this oil.

Queensland has large deposits of oil shale and the Stuart Oil Shale project (10 km north of Gladstone) which commenced in 1999, produced trial quantities of shale oil<sup>14</sup>, however the next stage of the project is 'on hold' subject to environmental approvals.

The commercial production of oil shale has yet to be fully demonstrated although production may be possible if the technology and scale of operation are appropriate.

A definitive policy position in relation to oil shale as an alternative source of oil is required by the Commonwealth Government if there is going to be investment in this industry.

## 2.2 *Fischer-Tropsch fuels*

Fischer-Tropsch (FT) fuels which have been used to some degree since 1920's, are not as yet widely used today. However, high fuel prices together and changing consumer preferences for more fuel efficient vehicles (such as diesel), are fundamental trends driving renewed interest in the large scale production of these fuels.

Fischer-Tropsch technology<sup>15</sup> converts coal, natural gas, low-value refinery products and waste sludge<sup>16</sup> into high-value, clean burning fuel. Known generically as Coal-to-Liquid

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<sup>12</sup> Oil shale generally refers to any sedimentary rock that contains solid bituminous materials (kerogen) that are released as petroleum-like liquids when the rock is heated. To obtain oil from oil shale, the kerogen in the shale must be heated and resultant liquid must be captured in a process called retorting.

<sup>13</sup> For example the RAND Corporation notes that about three barrels of water are needed per barrel of oil shale produced. Considerable oil shale deposits also exist in the United States and RAND believes that it will be approx 12 years before oil shale achieves commercial scale development in the USA.

<sup>14</sup> Oil Shale sold was reportedly 551,224 barrels of oil products (naphtha and medium shale oil).

<sup>15</sup> While about half a dozen techniques have been developed for gas-to-liquids conversion, they are mostly derivatives of the Fischer-Tropsch technology, initially developed for coal-to-liquids.

<sup>16</sup> Waste sludge from sewerage is being investigated as a potential feedstock option to produce synthetic fuels in Queensland.

(CTL) or Gas-to-Liquid (GTL) processes, the result is a colourless, odourless fuel that is ideal for use as a substitute to conventional diesel.

FT fuels can be blended with conventional diesel with little or no engine modification and relative to conventional diesel and depending on engine design, produce less nitrogen oxides, carbon monoxide and little or no particulate emissions.

The Fischer-Tropsch process can produce a range of alternative fuel types including:

- Methanol;
- Dimethyl ether;
- Fischer-Tropsch diesel or gasoline-like fuels; and
- Hydrogen (H<sub>2</sub>).

### **2.3 Coal-to-Liquids (CTL)**

Developing coal liquefaction facilities to create synthetic liquid fuels could be a viable policy option in Australia as:

- The coal liquefaction technology is well developed;
- Australia has large reserves of coal and exports considerably more than it needs for domestic consumption and;
- Australia has existing electricity generation plants located near its coal reserves that can enable development of liquid fuel facilities 'on site'.

However, the production of synthetic fuels via coal liquefaction would be dependent upon the capacity for geological sequestration due to the large amounts of carbon dioxide that this process produces. In Queensland for example, the Bowen-Surat Basins as well as other locations have been identified as possible location for carbon dioxide storage.

In South Africa, Fischer-Tropsch fuels have been used in virtually all diesel powered vehicles (eg. buses, trucks and taxicabs) for many years. The fuel is produced from low-grade coal by Sasol (a world leader in Fischer-Tropsch technologies) with production volumes reportedly averaging 150,000 barrels of high quality fuel per day. This is equivalent to 20 percent of Australia's daily consumption of crude oil.

Currently, several oil companies are researching large scale production of Fischer-Tropsch fuels with pilot plants announced for Indonesia, Africa, South America, and the United States.

In Australia, a pilot project integrating Fischer-Tropsch liquefaction technology with underground coal gasification technology is being developed in Queensland (Chinchilla) by Linc Energy. The first commercial phase of the Chinchilla project (slated for 2006) involves the installation of a 30-40 Megawatt (MW) power plant to provide electricity to local markets. The second commercial phase, involves the development of a 17,000 barrel per day synthetic diesel fuel plant.

### **2.4 Gas to Liquids (GTL)**

An alternative to coal liquefaction is converting natural gas to liquids (GTL). This process is reportedly less capital intensive and more environmentally friendly than coal liquefaction.

The conversion of natural gas to liquids is a way of capitalising on Australia's large reserves of natural gas. However, given that the process is reliant on natural gas as a production input, the economic viability of GTL projects is highly dependent upon natural gas prices.

Other major impediments to the development of a GTL industry need to be fully identified by government and industry.

### **2.5 Industry Conference (synthetic fuels)**

Given current high oil prices, there is mounting interest by industry in developing synthetic fuels as an alternative fuels industry in Australia. A major conference being held in Perth (23-24 March 2006) will focus on the industry development opportunities and investment aspects of establishing the coal and gas to liquid industry in Australia.

### **2.6 Natural gas**

Natural gas is one of the most widely used forms of energy and is commonly used to provide heating or cooling to households and industry. Natural gas and its 'byproducts' are used in transport applications in the form of Compressed Natural Gas (CNG), Liquefied Natural Gas (LNG) and Liquefied Petroleum Gas (LPG).<sup>17</sup>

The utility of natural gas for various transport modes depends on vehicle storage area and access to fuelling stations. LNG, for instance, results when natural gas is cooled to a liquid and requires a greater storage area on vehicles. LNG is more suited for limited distribution at particular sites (eg mining, trucks and bus fleets) with access to central LNG refueling stations.

Conversely, LPG is stored in high pressure fuel cylinders, requires less storage area on vehicles and is well suited for everyday passenger transport vehicles such as taxis. LPG is readily accessible at service stations around Australia.

LPG (or propane) is an established alternative motor vehicle fuel and has a significant share of the transport fuels market in Australia due to its excise exemption status. However, as for other alternative fuels, there might be potential scope for LPG to gain additional market share in the domestic fuel market.

Australia produces significant amounts of LPG (some from refineries but mainly from the North West Shelf and Bass Strait in association with gas and crude oil) however, much of it is exported.

In terms of Queensland, the state is well placed for gas supplies well into the future. The Papua New Guinea Gas Pipeline Project (PNG Pipeline) is poised to proceed and will provide gas for large commercial users and domestic consumers in the south-eastern Australian market. If the PNG Pipeline does not proceed, there is potential for alternate pipelines to bring gas from the Northwest Shelf or Timor Sea. Interstate demand for gas may see more Queensland gas being sold interstate.

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<sup>17</sup> LPG is a byproduct of natural gas processing and petroleum refining.

Given that Australia has abundant gas reserves<sup>18</sup>, the expansion of natural gas as an alternative fuel for transport should be seriously considered. Both compressed natural gas (CNG) and liquefied natural gas (LNG) has the potential also to fill this role. In Australia, CNG is already readily used in bus fleets such as the Brisbane City Council fleet.

The Commonwealth Government provides initiatives to encourage the conversion of vehicles to run on LPG/natural gas. The Australian Institute of Petroleum estimates that LPG comprises about two percent of fuel sold in Australia and runs in approximately three percent of vehicles.

## 2.7 *Methanol*

Most methanol is produced from natural gas, however, it can be also made from a wide range of renewable sources such as wood or waste paper.

Methanol-fueled vehicles have been in use for more than 30 years in countries such as the United States and due to methanol's high performance and safety benefits, it is widely recognised as a fuel of choice for the car racing industry. Methanol is used in fuel-flexible vehicles which can use a mixture of petrol or methanol. For instance, it is reported that more than 15,000 M85 (85% methanol/15% petrol) flexible fuel vehicles are in use in the United States. Methanol also offers significant emissions benefits compared to petrol where it can reportedly reduce hydrocarbon emissions by up to 30 percent in M85 vehicles.

Methanol is a common industrial chemical that has been used as an alternative blended liquid transportation fuel and under consideration for wider use.

Methanol is projected to be increasingly used as a fuel, so comparisons to LNG could be made. Like LNG, methanol is manufactured from natural gas with higher capital costs per unit of energy than LNG but it is cheaper to transport.

Compared with LNG and other fuels, it has a lower energy content; equivalent to around 66 per cent of the gas consumed in its production. Its main appeal is therefore as a potential clean-burning fuel suitable for gas turbines, gasoline engines and in new fuel cell technologies. The lower energy content of methanol compared to LNG, can be offset by lower transport costs so at larger distances, methanol is competitive, creating opportunities for its manufacture in gas-rich regions.

## 2.8 *Biomass-to-liquid (BTL) fuels.*

Biomass-derived fuels such as ethanol and biodiesel have the potential to gain an increasing share of the Australian fuel market. Further development of biomass-to-liquid (BTL) projects could lead to an improvement in production economics and the logistics of feedstock supply.

Co-production of BTL fuels and hydrogen could also provide a cost-efficient pathway to large volume renewable hydrogen production. Developments in ethanol and biodiesel are discussed briefly as follows.

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<sup>18</sup> Geoscience Australia, the Australian government's geoscience agency, estimates Australian identified gas resources as 3 921 billion cubic metres (bcm) at 1 January 2004. These resources represent 120 years of current production; 20% of these reserves are considered commercially proven (783 bcm).



## ***Ethanol***

The Queensland Government is developing the ethanol industry through the Queensland Ethanol Industry Action Plan 2005-2007 ("the Action Plan") which allocates \$7.3 million for industry development.

Under the Action Plan, substantial funding has been allocated to the Queensland Ethanol Conversion Initiative, a program designed to increase the distribution of ethanol-blended fuels throughout the State. Under the Action Plan, a communications campaign will be implemented to boost consumer confidence in and increase the use of ethanol-blended fuels.

The Queensland Cabinet has endorsed the use of E10 in Government fleet vehicles (where practical). This policy directive was the first introduced by any government in Australia and consumption of E10 by the government now averages over 200,000 litres per month.

Among other initiatives, the Queensland Government in supporting the ethanol industry, has

- Provided financial support for the establishment of ethanol production and blending facilities including support for feasibility studies;
- Hosted an International Ethanol Conference (Brisbane, May 2005) which included international and national experts in ethanol; and
- Become a major sponsor to a follow-up ethanol conference<sup>19</sup>, to be held in Brisbane, 8 and 11 May 2006.

The network of ethanol-blended fuel outlets has increased substantially in Queensland. As at 19 January 2006, one hundred and twenty four (124) fuel outlets offered ethanol-blended fuels. This number is expected rise as more service stations are converted to accommodate ethanol-blended fuels under the Queensland Ethanol Conversion Initiative.

Despite increased consumer interest in ethanol in Australia, ethanol-blended fuels are sold at less than 10 percent of service stations around the nation. Both Commonwealth and State/Territory Governments need to work with the fuel industry to ensure that ethanol and other biofuels are made more accessible to consumers at service stations around the nation.

## ***Biodiesel***

Biodiesel is a clean burning alternative fuel, produced from renewable resources that can be used in diesel engines with little or no modification.<sup>20</sup> It can be blended at any ratio with petroleum diesel to create a biodiesel blend. For instance, a B20 blend equates to a blend of 20% biodiesel and 80% petroleum diesel. A B5 blend equates to a blend of 5% biodiesel and 95% petroleum diesel.

The commercial production of biodiesel is an emerging industry in Australia and only recently become commercially available and a number of projects are at various stages of project planning and/or construction in Australia.

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<sup>19</sup> Ethanol 2006 Australia: Cheaper, Cleaner, Greener Conference and Ethanol 101 Seminar

<sup>20</sup> Biodiesel can be used directly in an unmodified diesel engine and due to its similar properties to petroleum diesel, it can be mixed with petroleum diesel fuel in any ratio (most commonly a B20 mix of 20% biodiesel and 80% petroleum diesel).

Some key impediments to biodiesel industry growth include:

- *Lack of suitable feedstock* to sustain biodiesel industry growth. For instance, initial production facilities in Queensland will rely on tallow as a primary feedstock. Queensland, as the largest beef processor in Australia has large stocks of tallow. However, biodiesel production will compete with other industries that use tallow as an input for production.
- *Industry profitability.* Under the current fuel excise regime, biodiesel is effectively excise tax free until 2011. A recent ABARE<sup>21</sup> study raised concerns about the industry's long term profitability when excise taxes are phased in from 2011, despite an ongoing 50% discount for biodiesel beyond 2015, concluding that bio-diesel would require an additional 21-32 cent per litre subsidy.
- *National biodiesel fuel standards.* It will be important for the Commonwealth Government to ensure that fuel standards meet the requirements of diesel engine manufacturers to validate engine warranties. Biodiesel of a high standard in blends of up to 5 percent might be acceptable to some diesel engine manufacturers as at this ratio the energy content remains largely unchanged. As was the case for ethanol, the Commonwealth Government will need to consult engine manufacturers to ensure fuel standards meet engine warranty requirements.
- *Marketing and communication.* A national approach to increase consumer awareness and knowledge of biodiesel may be required to ensure the sustainable growth of the industry.
- *Technical issues.* A number of technical issues need to be resolved to ensure industry growth. These include storage of biodiesel in cold climatic conditions (gel point), which could present a problem especially in cooler regions of Australia.
- *Price and availability.* Like crude oil, biodiesel is a commodity susceptible to price fluctuations. The transport industry's uptake of the biodiesel will ultimately rely on two things, price and availability.

The Queensland Government is currently investigating the potential for biodiesel to complement the government's efforts in ethanol as part of a broader effort to establish an alternative fuels industry in Queensland.

One biodiesel production facility is due to commence operations at the Narangba Industrial Estate early in 2006. The facility will have an initial production capacity of 33 million litres per annum and an expandable capacity of 80 million litres per annum. A second facility is planned at Narangba by one of Australia's leading biodiesel producers, the Australian Biodiesel Group. This facility is expected to be commissioned in June 2006 and will have a production capacity of 160 million litres per annum.

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<sup>21</sup> Australian Bureau of Agricultural and Resource Economics (ABARE)

The Queensland Government is also investigating options to undertake trials of biodiesel in government vehicles and other modes of transport and continues to work closely with the fuel industry to establish suitable trials. The promotion of biodiesel in state and local government diesel fleets could assist in developing a market for biodiesel blends and increase consumer confidence in the product.

As mentioned in section 2.3.3, the Queensland Government considers that the introduction of a net excise on alternative fuels in 2011 will be detrimental to the long term development of a biofuels industry in Australia. In addition, it is the Queensland Government's view that the 350 million litre voluntary target for biofuels is insufficient to encourage large scale production of biofuels as the target represents around only 1 percent of the total Australian fuel market of nearly 27.6 billion litres.

## **2.9 Hydrogen**

Hydrogen, is seen as a potential main energy carrier<sup>22</sup> in the long term for both clean transportation and stationary power applications. The production of hydrogen could therefore emerge as a significant export opportunity for the Australian coal/gas industries.

However, the transitional issues associated with a shift to hydrogen are both challenging and complex, and a number of technical and cost-related barriers need to be overcome in relation to hydrogen production, safety and storage and distribution. Issues also remain in relation to public acceptability of hydrogen and to the development of appropriate public policies (eg. hydrogen regulation, codes and standards) for the promotion of hydrogen.

A key enabler for the shift to a hydrogen economy will be a combination of technology advances and the availability of low cost, abundant hydrogen. Coal, due to its abundance and affordability, has the potential to become a leading source of hydrogen and therefore an integral part of the emerging hydrogen system. In essence, coal and natural gas could become key transition fuels for a move toward hydrogen as a future energy carrier.

Advancement in coal gasification or other technological breakthroughs could accelerate development of the hydrogen economy. Specifically, advancement of gasification systems and carbon capture techniques as well as the creation of carbon storage options will be required before coal can play an active role in the emerging hydrogen economy.

Queensland, for example, is in a strong position to benefit from any advancement in technology that allows coal to become a source of hydrogen. Queensland is Australia's most significant producer of coal. In 2003-04, Queensland accounted for 56 per cent of national production. Around 85 per cent of saleable coal produced during the year was exported overseas. Queensland's considerable reserves of coal, as well as proposed options for the supply of natural gas and coal seam gas, could potentially provide sufficient energy for the State and its trading partners as more advanced technologies begin to enter commercialisation in the medium to longer term.

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<sup>22</sup> Hydrogen is regarded as an energy carrier rather than a source of energy.

### ***2.10 Centre for Low Emission Technology***

The Centre for Low Emission Technology (cLET), a joint venture between the Queensland Government and the CSIRO<sup>23</sup> was established to support the development of next generation low emission clean coal technologies for electricity and hydrogen production. Part of cLET's proposed research program involves the extraction of hydrogen in the gasifying process.

The Centre's research priorities include:

- Pulverised coal combustion using post-combustion and oxy firing techniques to remove carbon dioxide and other pollutants;
- Coal gasification techniques;
- Retrofitting and upgrading existing power plants; and
- Developing a technology transfer program to ensure that the Centre's industry participants obtain maximum value from the research and development activities.

### ***2.11 World Hydrogen Energy Conference 2008***

In 2008, Queensland will host the World Hydrogen Energy Conference in Brisbane. This conference will bring together international experts in hydrogen and fuel cell technologies to discuss latest technological developments and the path to commercialisation for hydrogen technologies.

This conference will provide an unique opportunity for Australia to demonstrate its expertise in hydrogen and fuel cell technologies. Importantly in the lead up to this conference there remains a window of opportunity for increased collaboration between government and industry on hydrogen-related demonstration projects. These projects could be showcased at the conference to demonstrate Australian expertise in this area.

Initiatives such as the *International Partnership for the Hydrogen Economy* can help raise the profile of hydrogen/fuel projects both nationally and internationally, and assist in attracting new research participants and funding.

### ***2.12 International Partnership for the Hydrogen Economy (IPHE)***

The International Partnership for the Hydrogen Economy (IPHE) aims to identify and promote potential areas of international collaboration on hydrogen and fuel cell technologies. In addition, IPHE aims to foster the implementation of large-scale, long term public-private cooperation to advance hydrogen and fuel cell technology and infrastructure research, development, demonstration and commercial use.

Australia, as a member country, can submit proposals for R&D projects to receive endorsement. If a project receives endorsement then it may be entitled to label or badge itself as an officially endorsed IPHE project, which can increase its profile both nationally and internationally, and assist in attracting new research participants and funding.

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<sup>23</sup> Commonwealth Scientific and Industrial Research Organisation. Other partners include Tarong Energy, Stanwell Corporation, the University of Queensland and Australian Coal Research Limited.

In 2005, the IPHE endorsed ten (10) hydrogen/fuel cell research, development and demonstration projects, including two with an Australian flavour. These were the CSIRO project on producing hydrogen from the solar reforming of methane and the bus trials in Perth utilising hydrogen.

Submissions are made through the Department of Industry, Tourism and Resources.

#### 4.0 Options for reducing Australia's transport fuel demands

##### 2.13 Transport efficiency measures

Australia could aim to insulate itself from the threat of peak oil by implementing demand side measures that increase the efficient use of transport. The result could be a reduction in overall fuel consumption within the economy.

As mentioned in section 2.2, transport efficiency can be achieved through a range of measures including:

- Increased investment in public transport (PT) infrastructure;
- Encouraging widespread use of public transport (eg. bus, rail);
- Improving traffic management efficiency including the application of Intelligent Transport Systems (ITS); and
- Encouraging societal changes such as car pooling, car sharing schemes<sup>24</sup>, cycling, walking, and telecommuting.

The merits of such measures are discussed in more detail as follows:

*Travel demand management and promotion of choice* is a key to obtaining early quick wins and preparing the community for possible greater oil price rises. Examples include the TravelSmart program and social marketing campaigns.

Commonwealth Government funding for TravelSmart finishes in mid-2007. The Queensland Government considers that this tested program, which has directly resulted in reducing kilometres travelled, should receive continued funding beyond that date.

*Public transport, cycling and walking.* The Queensland Government continues to invest in public transport, walking and cycling to alleviate the impacts of high petrol prices on the community. Under likely future scenarios however, further investment in PT infrastructure and services may be required to keep pace with demand.

*Anticipatory land use planning:* Regional and urban planning can help to reduce demands for road transport fuels. Offering more location choices with low in-built transportation needs can lead to an improvement in fuel dependency.

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<sup>24</sup> Brisbane City Council is considering introducing car-sharing schemes in the inner city such as those available in Sydney, Melbourne and internationally. Unlike car pooling, members of a car-sharing scheme typically pay an annual membership fee and book their car out at an hourly rate whenever they need to use a private vehicle, rather than public transport. Similar schemes have been adopted in over 600 cities worldwide in high density areas surrounded by multiple dwellings.

### **2.14 Advanced transport technologies**

Transport efficiency in the Australian economy could be supplemented by encouraging the uptake of advanced transport technologies such as Hybrid Electric Vehicles (HEV's), Dual Phase Injection Systems and Fuel Cell Vehicles (FCV's).

The Queensland Government recognises the important role that such technologies will play in reducing fuel consumption within the economy and is actively;

- Encouraging through QFleet, the uptake of hybrid electric vehicles across the Queensland government fleet;
- Supporting trials of Dual Phase Injection Systems by Queensland diesel fleet operators and;
- Monitoring international developments in Flexible Fuel Vehicles (FFVs) and Fuel Cell Vehicles (FCVs).

These technology options are discussed in more detail as follows:

### **2.15 Hybrid Electric Vehicles (HEVs)**

Low emission fuel efficient vehicles such as Hybrid Electric Vehicles (HEVs) are becoming more popular in Australian and overseas markets<sup>25</sup> and can play a practical role in helping to offset overall fuel demand in the Australian economy.

Hybrids offer fuel efficiency of *up to twice* the fuel efficiency of conventional vehicles and importantly, their wide spread deployment requires no investment in new infrastructure.

Almost all major automakers have immediate plans to produce hybrids and several new models are planned for introduction in overseas markets. At present, there are two hybrids available in the Australian market, the Toyota Prius and Honda Civic.

The introduction/mandating of low emission fuel efficient vehicles would be an effective way to reduce total fuel consumption in Australia. To be effective this type of program should be led at a national level through the Australian Transport Council (ATC) and the National Environment Protection Council (NEPC) with the agreement of all states.

Creating incentives for organisations with large number of fleet vehicles to purchase HEVs could also be considered.

Opportunities need to be investigated, again at a national level, for reforms to regulations, standards, codes and labelling requirements to better inform consumers. The two biggest fuel users by group are passenger cars and light commercial vehicles. These two groups should be the initial focus.

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<sup>25</sup> In the United States for instance, uptake of HEV's has grown rapidly in the last few years. New hybrid vehicle registrations reached nearly 84,000 in 2004, while sales of hybrids in the first five months of 2005 reached 73,000. Public and private fleets are contributing to this surge in popularity. More than 90 city, state and county governments, and some private fleets, use light duty hybrids.

The Queensland Government has been active in encouraging the uptake of hybrid vehicles across the government fleet through its vehicle leasing and fleet management service provider, QFleet. QFleet encourages client agencies to consider the Toyota Prius as a fuel-efficient alternative to conventional four-cylinder passenger vehicles.

Commonwealth, State and Territory Governments could consider showing leadership by setting “quotas” or “targets” for the purchase of hybrids in vehicle fleets to stimulate domestic demand in the market.

### Tax policy

As mentioned in section 2.2.3, under the current import tariff regime, highly *fuel inefficient* four wheel drive (4WDs) vehicles receive favourable tariff concessions compared to more fuel efficient vehicles.

The Queensland Government therefore believes that in light of rising fuel demand and fuel prices, any further review of tariff policy needs to consider whether low emission, fuel efficient vehicles such as hybrid electric vehicles should receive favourable tariff (and other tax) treatment.

Economic signals favouring fuel efficient vehicles could lead to a substantial uptake of these vehicles in the economy.

Both Commonwealth and state governments may also consider options for showing leadership by setting “quotas” or “targets” for the purchase of hybrids in vehicle fleets to stimulate domestic demand in the market.

### **2.16 Dual Phase Injection Systems**

Dual Phase Injection Systems enable the simultaneous combustion of two fuels, such as:

- Diesel and Compressed Natural Gas (CNG);
- Diesel and Liquefied Petroleum Gas (LPG); and
- Diesel and liquid ethanol.

These systems are currently being trialed in Australia. For instance, one Australian company<sup>26</sup>, recently received a Commonwealth grant to further develop a system known as an “Ethanol Co-Fuel System” that injects ethanol vapour (via the air stream) into a diesel engine.

Due to the complications associated with combined storage of liquid ethanol and diesel (known as E-Diesel or diesohol), the dual phase injection technology is being considered seriously by the Queensland Government as a means to improve fuel efficiency in diesel fleet vehicles. For example, diesel fleet operators such as local councils, mining and road transport companies.

The Queensland Government through the Queensland Ethanol Conversion Initiative is progressing applications by fleet vehicle operators for the trial of Dual Phase Injection

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<sup>26</sup> Global Fuel Solutions

Systems. It is anticipated that subject to successful trials, this injection technology will be used increasingly by State fleet vehicle operators and as a consequence, help increase demand for fuel grade ethanol.

### **2.17 Flexible Fuel Vehicles (FFVs)**

Flexible Fuel Vehicles (FFVs) which can run on virtually any ratio of ethanol / petrol such as E85 (85% ethanol / 15% petrol) are now available to consumers in countries such as the United States, Canada, Brazil and Sweden. Essentially, this technology enables the driver to use any fuel combination of petrol or ethanol (from 100 percent unleaded petrol to 85 percent ethanol) that is available in a vehicles tank.

Auto-manufacturers that produce FFVs include Daimler Chrysler, Ford, General Motors, Isuzu, Mazda, Mercedes Benz, Mercury and Nissan although the uptake of these vehicles can depend on the availability of suitable fuelling infrastructure. For example, although sales of these vehicles are increasing in the US, only a small proportion have been fuelled with E85 because of a limited ethanol distribution system (it is reported that only about 130,000 vehicles have been fuelled with E85 in the US due to the limited number of E85 refueling stations, estimated at 180).

FFVs are not commercially available in Australia as current legislation limits the ratio of ethanol/petrol fuel that can be sold in the domestic market to a maximum of 10 percent.

The 10 percent limit on ethanol was introduced by the Commonwealth Government to overcome consumer uncertainty that occurred during trials of ethanol blended fuels in New South Wales in 2002. Some fuel retailers during these trials were allegedly selling ethanol blended fuels contained up to 25 percent ethanol which resulted in a loss of consumer confidence in fuel quality and raised concern over vehicle operability.

There is a prospect that the Australian auto-industry may introduce FFVs into Australian market at some stage in the future. However, this may be dependent upon a number of factors occurring to support importation of these vehicles namely;

Key impediments/issues that would need to be addressed before entry of FFVs into Australia include:

- The Commonwealth Government would need to increase the 10 percent cap on ethanol blends (to enable use of higher blend ratios);
- Consumers would need to be highly confident in using higher ratios of ethanol blended fuels;
- Ethanol production capacity would need to be sufficient to meet increased demand for ethanol from domestic uptake of FFVs; and
- Fuelling distribution infrastructure (eg. E85 refueling stations) would need to be in place to support fuelling of FFVs.

The Queensland Government will continue to monitor developments in FFVs, particularly in relation to their prospective introduction into the Australian vehicle market.



### 2.18 Fuel Cell Vehicles (FCVs)

Fuel cells essentially replace the internal combustion engine as a means of propulsion and fuel cell vehicles are currently being trialled in various countries, including Australia<sup>27</sup>, as a future means of transport. These vehicles can run on pure hydrogen or hydrogen rich fuels such as ethanol and most major auto-manufacturers have collectively invested several \$US billion in their development.

Other than in certain niche application areas, it is highly likely that Australia will become a 'technology adopter' rather than a 'technology developer' of fuel cell vehicles (FCVs). This view is supported by the Commonwealth Government which assessed energy technologies in developing the national energy policy where FCVs were regarded as a 'reserve category' whereby reserve applies to those technologies that Australia should continue to monitor overseas technology developments.

These vehicles are not yet commercially available due to high manufacturing costs and the limited availability of supporting hydrogen fuelling infrastructure. Accordingly, it is generally regarded among industry experts that such vehicles will not enter mainstream vehicle market until at least next decade.

Ethanol could be used as a fuel choice to produce hydrogen for use in fuel cell vehicles. The Queensland Government will continue to monitor international developments in fuel cell powered vehicles.

### 2.19 Diesel vehicles

Diesel vehicles require a special mention as they are becoming increasingly popular among the motoring public in Australia. Advanced diesel engines are becoming more powerful and fuel efficient than similar-sized petrol engines (about 30-35% more fuel efficient).

Today's diesel vehicles are much improved over diesels of the past due to improved fuel injection and electronic engine control technologies. New engine designs, along with noise and vibration damping technologies, have made diesel vehicles quieter and smoother.

Consequently, it is anticipated that *fuel efficient* diesel vehicles will increase in popularity in the Australian vehicle market over the coming years and could therefore make a positive contribution to reduced fuel use in the economy.

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<sup>27</sup> Fuel Cell Buses are currently being trialled in Perth.

## Attachment 2: Modelling analysis of high oil prices on the Queensland economy

Queensland Treasury's Office of Economic and Statistical Research (OESR) has employed its computable general equilibrium model (QGEMF) to simulate the potential impacts of higher oil and petroleum prices on the Queensland economy. The model's key strength is its industry detail, which facilitates a comprehensive account of the distribution of economic impacts across industries, consumers, and government.

### *Scope and key assumptions*

The scope of the modelling is to estimate the economic impacts on Queensland of a rise in oil prices similar to that experienced over the past two years. During that time, the world price of crude oil has increased from approximately \$US30 to \$US60 a barrel. Hence, a 100% increase in the world price of oil is assumed in the simulations. Two scenarios are addressed: a 'permanent increase' scenario, in which the oil price is assumed to remain elevated until the end of the projection period; and a 'temporary increase' scenario, in which the oil price remains elevated for two years, before returning to its starting-point level. In both scenarios, the assumed oil price increase is introduced over two years.

From a modelling perspective, a key feature of oil price shocks is that they have world-wide impacts. Hence, as well as affecting the domestic economy, they also change the international environment. OESR has worked with Treasury's Economic Policy Branch to develop an agreed set of assumptions relating to Australia's external environment.

These assumptions are as follows:

- a decline of 1.25% in aggregate export demand, reflecting an assumed negative impact of higher oil prices on world GDP;
- varying increases in the prices of overseas-produced commodities, on the assumption that the effects of higher oil prices on business costs will be similar for overseas and Australian firms.

A key potential impact not modelled here is the effect of higher oil prices on the demand for coal. An increase in the world oil price that was perceived to be permanent would be expected to shift demand towards cheaper sources of energy, like coal and gas.

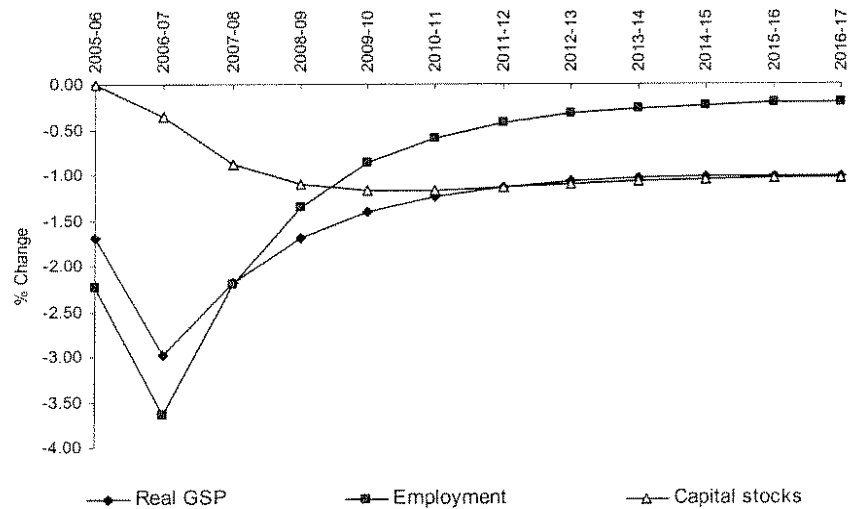
### *Projections*

In the 'temporary increase' scenario, the long term impact on the Queensland economy is projected to be broadly neutral. Hence, for brevity, only the results of the 'permanent increase' scenario are summarised here.

The dominant macroeconomic feature of the 'permanent increase' scenario is the decline in the terms of trade, driven by the increased prices of imported oil and petroleum. This represents a decline in real income for Queenslanders.

Figure 1 shows the projected changes in Queensland employment, capital stock and real gross state product (GSP). By the second year of the simulation, real GSP is projected to fall 2.98%, relative to the basecase.

Figure 1  
Projected changes to employment, capital stock and real GSP, Queensland, 'permanent increase' scenario (cumulative deviation from basecase)



The apparent severity of the short-run impact on real GSP, especially relative to current experience, arises from two main factors:

- A model assumption that workers immediately demand higher wages in order to maintain their spending power. This creates additional 'pain' in the form of employment losses, which in turn drives down real GSP, relative to the basecase. If instead real wages were allowed to decline in the short run (as seems to be happening currently), then the projected employment and GSP decline would be milder.
- As mentioned earlier no flow-on benefits to the coal industry are projected. In the recent past, coal prices have increased roughly in proportion with oil prices, and this has worked against the negative effect of the latter on Queensland's terms of trade.

In the long run, real wages are assumed to be flexible, and so real GSP is projected to recover somewhat, to a level 1.01% lower than it would otherwise have been.

The projections for individual industries show three broad forces in operation:

- the direct impact of higher fuel prices on operating costs and therefore output prices;
- the effect of the projected decline in real income, and therefore real private and public consumption; and
- the effect of a projected depreciation of the exchange rate, which benefits the more trade-exposed industries.

The most adversely affected industry is air transport, for which activity is projected to be some 27% lower by 2016-17 than it would otherwise have been. This is because air transport is the most fuel-intensive industry, and also because most of the exports that are assisted by the projected depreciation of the exchange rate do not use air transport. Conversely, water transport activity is projected to be some 12% higher than the basecase level, because of its strong linkages with commodity exports. The impact on road transport is projected to be approximately neutral, because its core role in the domestic economy makes it relatively price-insensitive.

Table 1 focuses on the industry results that signify the greatest economic impacts on Queensland, positive or negative. The results are ordered by percentage point contribution to the change in real GSP.

Table 1  
Projected activity changes for major affected Queensland industries, 'permanent increase' scenario (cumulative percentage deviation from basecase)

Positively affected	2016-17	Negatively affected	2016-17
Coal and gas	11.02	Retail trade	-4.73
Non ferrous ores	11.36	Health	-2.74
Meat	5.69	Education	-3.71
Beef cattle	3.13	Public administration	-3.00
Food products	10.06	Construction	-1.80

It can be seen that the greatest positive impacts are associated with export oriented industries, and industries that are suppliers to export industries (eg. Beef cattle). This is mainly due to the projected depreciation of the exchange rate, which enhances the competitiveness of Australian-produced goods.

The greatest negative impacts are associated with service industries which sell a large share of their output to households and government. As real private consumption and government consumption are projected to decline, the activity of these industries is also projected to decline.