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Oil Supply and Petrol Prices

by

Stewart Smith

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Stewart Smith

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EXECUTIVE SUMMARY

The transport sector consumes 41 percent of final energy consumption in Australia, with the demand for transport energy growing at about 2.4 percent per year. Road vehicles moving passengers and freight account for 75 percent of transport fuel use. The Australian and international economy are deeply reliant on the supply of abundant petroleum resources at reasonable prices. However, significant challenges are confronting the petroleum and transport industry, both domestically and internationally. The first of these is tight supplies of crude oil, coupled with a growing market base of emerging economies. The second is the necessity to reduce greenhouse gas emissions to prevent dangerous climate change. This paper focuses on the former issue, and explores the factors contributing to the price of petrol in Australia.

The proven world oil reserves at the end of 2007 were 1,237.9 thousand million barrels, enough to supply the world at 2007 levels of consumption for 41.6 years. World distribution of proven oil reserves is heavily weighted to the Middle East (61%). The Asia Pacific region has the least, with just 3.3% of total proven reserves. At the end of 2007, Australia had proven reserves of 4.2 thousand million barrels of oil, which at present rates of production would last 20.3 years.

Total world oil consumption in 2007 was 85.22 million barrels/day, some 1.1% greater than 2006. The USA was the largest single consumer of oil (23.9% of world total), with China the second largest (9.3% of world total). OECD countries are predicted to account for the bulk of global oil demand in the medium term, yet several key non-OECD countries, particularly in Asia and the Middle East, are catching up. Non-OECD demand is likely to be greater than OECD demand by 2015.

Crude oil prices have increased dramatically in recent years. The price of West Texas Intermediate, a crude oil benchmark, remained about US\$20 per barrel over much of the 1990s. Prices began to climb in 2005, with oil futures reaching a peak of US\$147.27 on July 11, 2008. Since then, prices have dropped, and are around US\$95 per barrel.

The causes of the recent spike in world oil prices have been attributed to fundamental supply and demand issues. Continued demand growth from China and India, coupled with supply constraints, has led to lower spare capacity of oil supplies. This puts upward pressure on prices and leaves world oil markets vulnerable to supply disruptions. Whilst there may be some easing of the oil price in the short term, unless there is considerable investment in the oil industry there are fears that it is likely to suffer from a supply 'crunch' by 2013. This will again lead to a spike in the oil price.

Petrol prices in Australia have recently been investigated by the ACCC. It concluded that the unleaded petrol industry is competitive, and that there is no evidence of price fixing or collusion between the major participants in the industry. However, the ACCC also found the petrol refining industry to be highly concentrated, with some 98% of Australia's total fuel requirements largely controlled by the four refiner – marketers (Shell, Mobil, Caltex and BP).

In regards to the retail price of petrol, the ACCC noted a significant degree of price

competition. However, it found an imbalance in pricing transparency between buyers and sellers of petrol. For instance, the refiner-marketers and larger independent retailers subscribe to a petrol price monitoring service, providing near real time price information of about 3,500 sites. One option identified to help correct this lack of retail pricing transparency was the introduction of a FuelWatch scheme.

Western Australia has had a FuelWatch scheme in place since January 2001. The Federal Government has proposed a similar scheme to be in place in metropolitan and major regional centres by mid December 2008. Under the scheme, retailers are required to notify the regulator of their next day's fuel price on a daily basis by 2pm. Retailers must charge these notified prices from 6am the following day for 24 hours. Prices for the following day are made publicly available either through: an email; SMS alert; toll free number; or FuelWatch website.

The proposed introduction of a national FuelWatch scheme has attracted some debate and criticism. Analysis by the ACCC found that the introduction of FuelWatch in Western Australia reduced the weekly average price by 1.9 cents per litre.

The price of petrol before tax across the OECD is fairly similar. However, with the addition of fuel excises, in the third quarter of 2007 petrol prices in the OECD ranged from a high of around A\$2.75 per litre in Turkey to a low of A\$0.75 per litre in Mexico. Australia has a petrol excise of 38.143 cents per litre, with the result that we have the fourth cheapest petrol in the OECD.

The introduction of an emissions trading scheme in 2010 will cause an increase in the price of petroleum products. An emission permit price of \$20/tonne in 2010 would increase the price of petrol by \$0.05 per litre.

1.0 INTRODUCTION

The movement of goods and people in Australia is dependent on petroleum based fuels, with alternatives accounting for only three percent of total fuel consumption. The transport sector consumes 41 percent of final energy consumption in Australia, with the demand for transport energy growing at about 2.4 percent per year. Road vehicles moving passengers and freight account for 75 percent of transport fuel use. Air transport is the second highest user (16 percent) and water and rail transport four and two percent respectively.¹ The Australian economy, together with the wider global economy, are deeply reliant on the supply of abundant petroleum resources at reasonable prices.

However, significant challenges are confronting the petroleum and transport industry, both domestically and internationally. The first of these is tight supplies of crude oil, coupled with a growing market base of emerging economies. The second is the necessity to reduce greenhouse gas emissions to prevent dangerous climate change. This paper focuses on the former issue, and explores the factors contributing to the price of petrol in Australia.

1.1 The Terminology of Crude Oil

Crude oil is a naturally occurring flammable liquid found in the earth. The liquid contains a complex matrix of hydrocarbons, which are compounds comprised of hydrogen and carbon. Other 'impurities' may also be found in crude oil, including sulphur, oxygen and nitrogen. Crude oil and natural gas has formed from the preserved remains of prehistoric zooplankton and algae. Over geological time, and under heat and pressure, the organic matter chemically changes into a liquid and gaseous hydrocarbon.

Crude oil is categorised by several factors:

- the geographic location it is produced in (e.g. West Texas, Brent, or Oman);
- its density; and
- its sulphur content.

'Light' crude oil has a low density whilst 'heavy' crude oil has a high density. It is referred to as 'sweet' if it contains relatively little sulphur or 'sour' if it contains substantial amounts of sulphur. Light crude oil is more desirable than heavy oil since it produces a higher yield of fuel products, while sweet oil commands a higher price than sour oil because it has fewer environmental problems and requires less refining to meet sulphur standards imposed on fuels in consuming countries. Crude oil produced in Australia tends to be of the light form with low sulphur. In contrast, much of the crude oil from the Middle East tends to be described as heavy and sour.

Some of the common reference crudes are:

- West Texas Intermediate (WTI), a very high-quality, sweet, light oil delivered at Cushing, Oklahoma for North American oil;
- Brent Blend, comprising 15 oils from fields in the Brent and Ninian systems in the East Shetland Basin of the North Sea. Oil production from Europe, Africa and Middle Eastern oil flowing West tends to be priced off the price of this oil, which

¹ CSIRO, *Fuel for Thought. The future of transport fuels: challenges and opportunities*. Future Fuels Forum, June 2008. [See: http://www.csiro.au/resources/FuelForThoughtReport.html](http://www.csiro.au/resources/FuelForThoughtReport.html)

forms a benchmark;

- Dubai-Oman, used as benchmark for Middle East sour crude oil flowing to the Asia-Pacific region;
- Tapis (from Malaysia, used as a reference for light Far East oil);
- Minas (from Indonesia, used as a reference for heavy Far East oil);
- The OPEC Reference Basket, a weighted average of oil blends from various OPEC (The Organization of the Petroleum Exporting Countries) countries.²

Australia's regional market is the Asia-Pacific market. Tapis crude oil is the key crude oil benchmark for the Asia-Pacific market and for Australia – not West Texas Intermediate (the US market benchmark) which is widely reported in the media.

2.0 THE WORLD OIL INDUSTRY

2.1 Oil Supplies

The proven world oil reserves at the end of 2007 were 1,237.9 thousand million barrels. Reserves have grown by 107.8 billion barrel since 2001 and by 14% over the last decade. Proven oil reserve is defined as those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions. Another measure is known as the reserves to production ration (R/P). This is defined as the reserves remaining at the end of the year divided by the production in that year. The result is the length of time that those remaining reserves would last if production were to continue at that level. At the end of 2007, the world reserve / production ratio was 41.6 years.³

As can be seen in Figure 1, world distribution of proven oil reserves is heavily weighted to the Middle East (61%). OPEC members control 75.5% of total reserves. The Asia Pacific region has the least, with just 3.3% of total proven reserves. At the end of 2007, Australia had proven reserves of 4.2 thousand million barrels of oil, with a reserve / production ratio of 20.3 years.⁴

² Wikipedia, *Petroleum*, Accessed June 2008.

³ BP, *BP Statistical Review of World Energy*, June 2008, at 6.

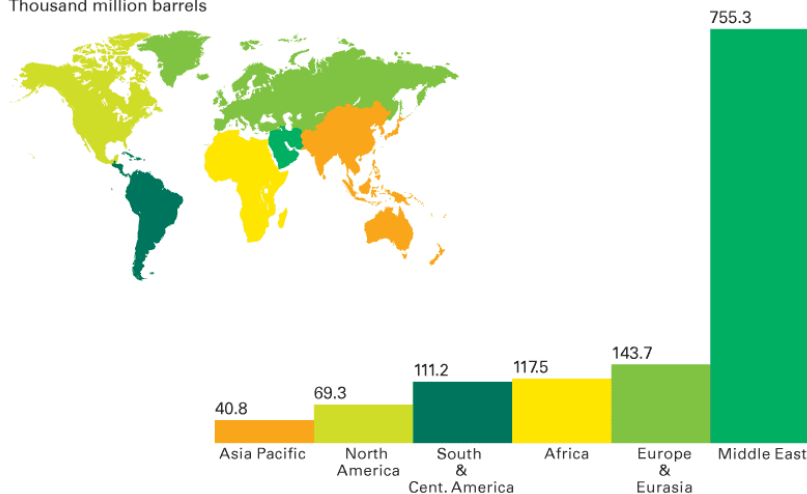
⁴ BP, *BP Statistical Review of World Energy*, June 2008, at 6.

Figure 1: Distribution of Proved Oil Reserves at end 2007

Proved oil reserves



Proved reserves at end 2007
Thousand million barrels

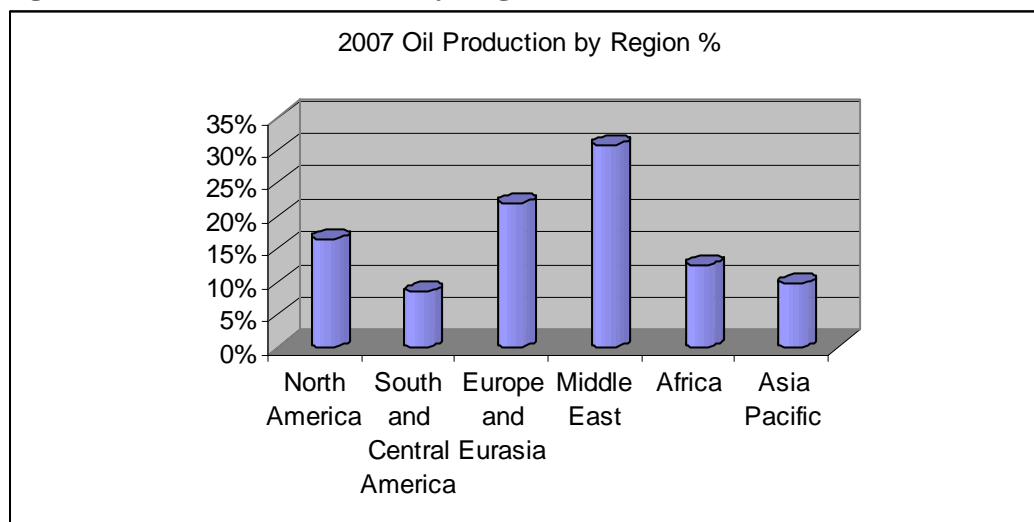


BP Statistical Review of World Energy 2008

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2.2 World Oil Production

Total world oil production in 2007 was 81,533 thousand barrels a day. The two largest country producers were Saudi Arabia and the Russian Federation, each responsible for 12.6% of world production. By region, the Middle East is clearly the world's most important producer of oil (31% of total world production), as shown in Figure 2 below.

Figure 2: 2007 Oil Production by Region (%)

However, compared to 2006, world oil production fell by 130,000 barrels/day in 2007. OPEC production cuts led to a decline of 350,000 barrels/day, and OECD production dropped by at least 400,000 barrels/day. In contrast, production in the former Soviet Union rose by nearly 500,000 barrels/day. Australia produced some 561,000 barrels/day in 2007,

which is 0.6% of total world production.⁵ In 2007, the top 10 oil producers represented about half of total world production. Geopolitical risk surrounds many of these top producers, either because of current supply disruptions (Iraq, Nigeria) or the perceived threat of a disruption (Iran, Venezuela).

OPEC

The Organisation of Petroleum Exporting Countries (OPEC) was founded in 1960 by five oil producing countries: Iran, Iraq, Kuwait, Saudi Arabia and Venezuela. These countries are referred to as the Founder Members of the Organization. Since then, eight other countries have joined, as shown in Table 1. The stated function of OPEC is to: coordinate their oil production policies in order to help stabilize the oil market; help oil producers achieve a reasonable rate of return on their investments; and to ensure that oil consumers continue to receive stable supplies of oil. The Ministers of energy and hydrocarbon affairs of the respective member countries meet twice a year to review the status of the international oil market, and decide on appropriate production policies.⁶

Table 1: OPEC Countries

Country	Joined OPEC
Iran, Iraq, Kuwait, Saudi Arabia, Venezuela	1960 –Founder Members
Qatar	1961
Indonesia, Libya, Indonesia	1962
United Arab Emirates	1967
Algeria	1969
Ecuador	1973 (Suspended its membership in 1992 and reactivated October 2007)
Angola	2007

2.3 Australian Petroleum Production and Trade

Around 53% of Australia's consumption of crude oil and LPG are met by domestic production. The Carnarvon Basin off Western Australia is currently Australia's most prolific region for the production of crude oil, condensate and LPG, accounting for 63 percent of total Australian production. Mature oil fields in the Gippsland Basin in Bass Strait have been producing since the late 1960s. However, production peaked in the mid 1980s and has steadily declined since. The Gippsland Basin now produces 19 percent of total production of petroleum liquids.⁷

⁵ BP, *BP Statistical Review of World Energy*, June 2008.

⁶ See: <http://www.opec.org/>

⁷ ABARE, *Energy in Australia 2008*. Australian Government Department of Resources, Energy and Tourism. See: http://www.abareconomics.com/publications_html/energy/energy_08/energyAUS08.pdf

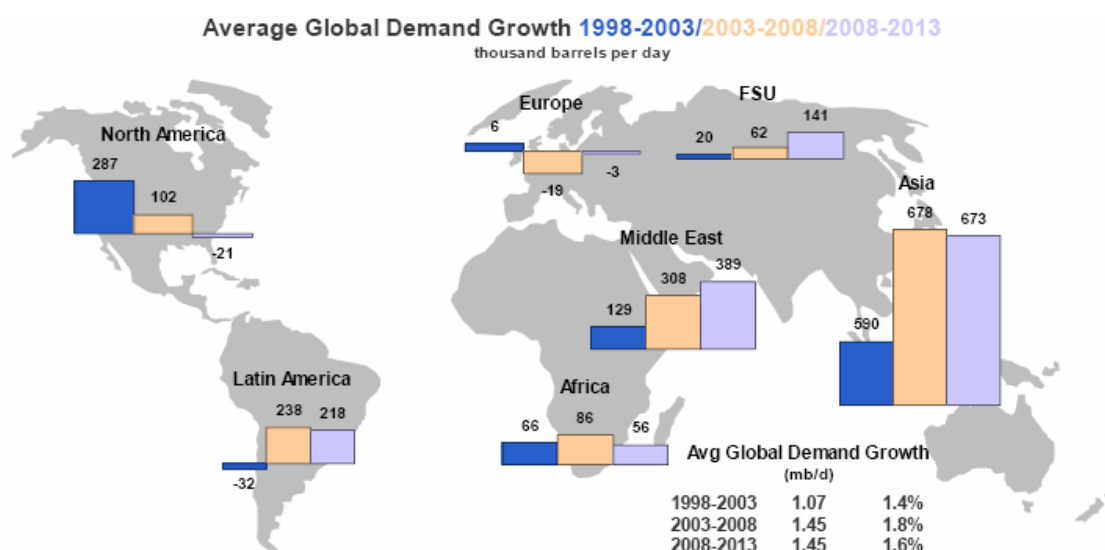
Production from the Carnarvon Basin is mostly exported to the Asian region (Korea, Japan and Singapore being the larger markets). In contrast, production from the Gippsland Basin and other smaller onshore oil fields in eastern Australia are mostly used as feedstock for local refineries. Increasing production in the north west of Australia, and declining production in the south east, has led to an increase in Australian trade in crude oil, both exporting and importing. Since the mid 1990s, Australia's imports of Middle Eastern crude oil have gradually fallen and been partially replaced by crude oil from the south east Asian region.⁸

2.4 World Oil Consumption

Total world oil consumption in 2007 was 85.22 million barrels/day, some 1.1% greater than 2006. The United States of America was the largest single consumer of oil (23.9% of world total), with consumption the same as all of Europe and Eurasia combined. The next single largest consumer of oil was China, consuming 9.3% of the world total.

OECD countries are still predicted to account for the bulk of global oil demand in the medium term. Yet several key non-OECD countries, particularly in Asia and the Middle East, are catching up, with non-OECD demand likely to be greater than OECD demand by 2015. Average global oil demand growth is shown in Figure 3, clearly showing the high demand growth in Asia and the Middle East.

Figure 3: Average Global Oil Demand Growth



Source: International Energy Agency, *Medium Term Market Report – Presentation by Lawrence Eagles*, World Petroleum Congress, Madrid 1 July 2008.

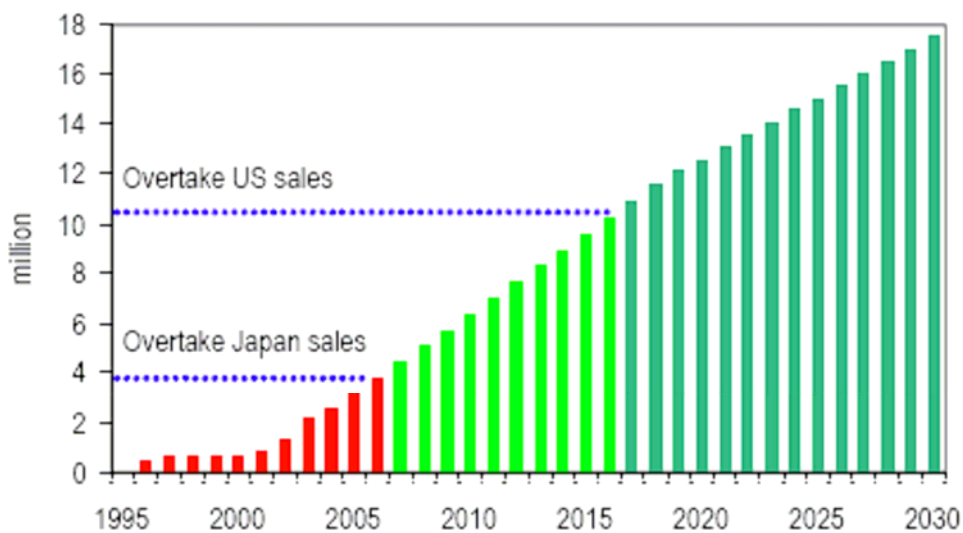
⁸ ABARE, *Energy in Australia 2008*. Australian Government Department of Resources, Energy and Tourism. See: http://www.abareconomics.com/publications_html/energy/energy_08/energyAUS08.pdf

The International Energy Agency has a series of projections of world energy use to 2030. In the Agency's reference or base line scenario, the world's total energy needs will be 26% higher in 2015 and 55% higher in 2030 than today. Oil and gas are projected to account for just over half of the overall increase in demand between 2005 and 2030, and fossil fuels in total for 84%. Oil remains the single largest fuel, with primary demand growing by 1.3% per year, from 85 mb/day in 2006 to 116 mb/day in 2030. Some 42% of the increase in oil use comes from China and India, with transport the main driver in most regions (see Box 1). Worldwide, consumption of oil for transport is projected to grow by 1.7% per year over 2005-2030.⁹

Box 1: The Growing Importance of China and India in World Oil Demand

China and India account for 42% of the global increase in oil demand between 2006 and 2030. In the International Energy Agency's Reference Scenario, the two country's combined oil consumption increases from 9.3 mb/day in 2005 to 23.1 mb/day in 2030, growth of 3.7% per year. Demand is already 60% higher at 14.8mb/day in 2015. Indian demand grows fastest, on average by 3.9% per year, while Chinese demand grows at 3.6% per year. As an example, new car sales in China overtake United States sales in 2016. China accounts for the biggest increase in oil demand in absolute terms of any country or region. Oil demand outstrips indigenous production in both China and India, pushing up net imports from 5.4 mb/day in 2006 to 19.1 mb/day in 2030.

International Energy Agency Reference Scenario: New Light Vehicle Sales per year in China



China's oil imports are projected to jump from 3.5 mb/day in 2006 to 13 mb/d in 2030, as car ownership increases 7 fold.

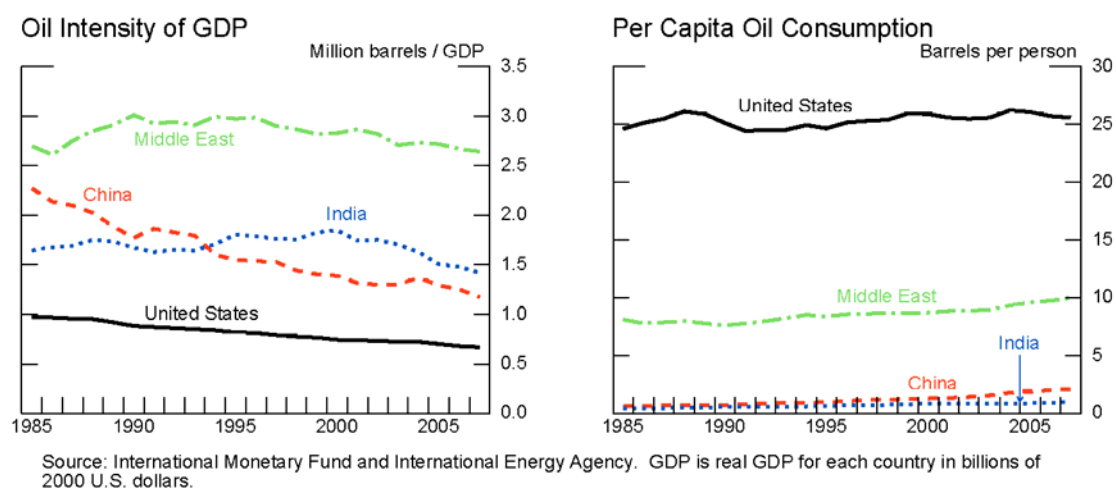
Source: International Energy Agency, *The New Challenges in the Oil Sector*. Speech by Nobuo Tanaka, Executive Director, IEA. <http://www.iea.org/textbase/speech/2008/tanaka/tristone.pdf>

⁹

International Energy Agency, *Global Energy Trends: Towards a More Secure, Lower Carbon Future*. Background Paper by the International Energy Agency for the International Energy Forum, 22 April 2008. See: www2.iefs.org.sa.

The key driver of oil demand over the last decade has been robust global economic growth, particularly in emerging market economies. As shown in Figure 4, China, India and the Middle East use substantially more oil to produce a dollar's worth of real output than the United States, even though the US has the world's highest per capita oil consumption.

Figure 4: Oil intensity and gross domestic product



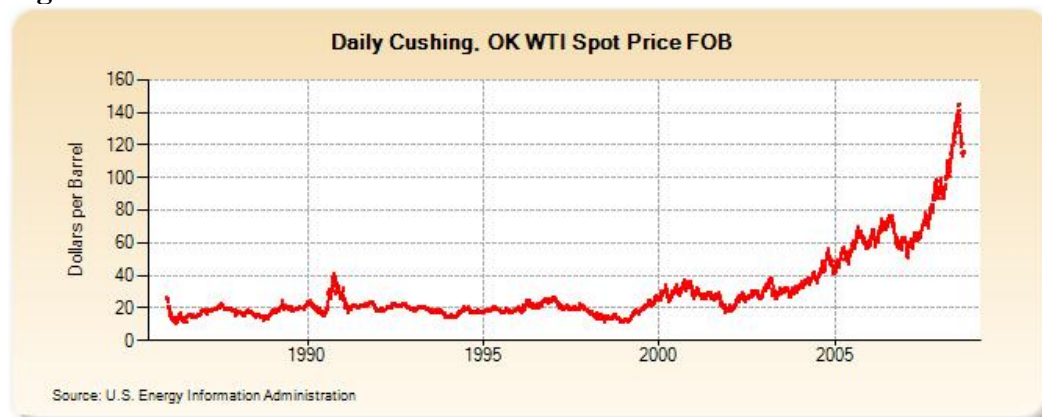
Source: Commodity Futures Trading Commission, Interim Report on Crude Oil, Interagency Task Force on Commodity Markets. July 2008.

See: <http://www.cftc.gov/stellent/groups/public/@newsroom/documents/file/itfinterimreportoncrudeoil0708.pdf>

3.0 THE PRICE OF CRUDE OIL

Crude oil prices have increased dramatically in recent years. As shown in Figure 5, the price of West Texas Intermediate (WTI), a crude oil benchmark, remained about US\$20 per barrel over much of the 1990s. However, by 2005 prices had risen to around US\$57, and to US\$66 per barrel by 2006. In 2007 and 2008, oil prices continued to climb, with WTI futures reaching a peak of US\$147.27 on July 11, 2008. Since then, prices have dropped, and are around US\$95 per barrel.

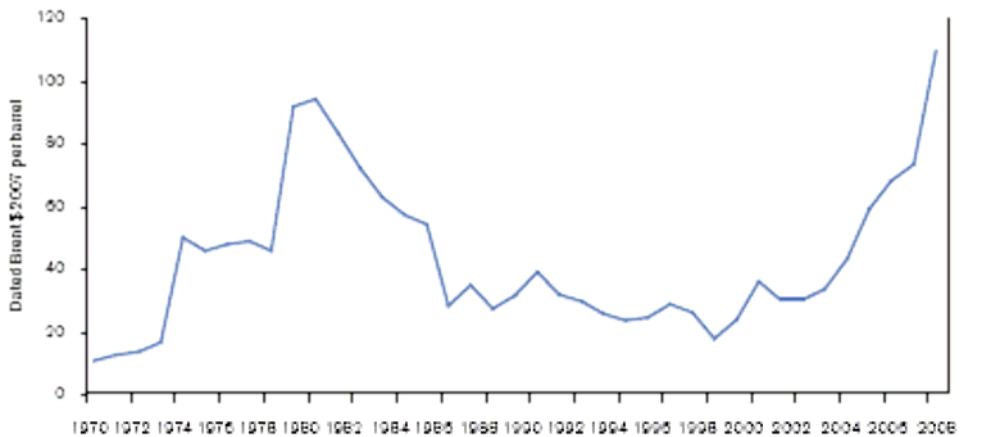
Figure 5: Crude Oil Benchmark Price - West Texas Intermediate 1986 -2008



Source: US Energy Information Administration, West Texas Intermediate, 1986-2008 Crude Oil Price. See: http://tonto.eia.doe.gov/dnav/pet/pet_pri_spt_s1_d.htm

Figure 6 shows a comparison of oil prices now to those of the ‘oil shocks’ in the 1970s and early 1980s in 2007 dollars equivalent. It is evident that current prices clearly exceed the annual average oil price of those periods.

Figure 6: Crude Oil Prices (Brent) 1970 – 2008 in 2007 dollars equivalent per barrel



Source: Stevens, P. *The Coming Oil Supply Crunch*. A Chatham House Report. 2008. See: http://www.chathamhouse.org.uk/files/11937_0808oilcrunch.pdf

With fears that high oil prices will threaten the global economy, there has been a considerable amount of comment and investigation by energy agencies across the world seeking answers to why crude oil prices have escalated so rapidly. The Executive Director of the International Energy Agency stated:

Record prices in the oil market in recent months have become a threat to the global economy and social welfare of millions of people – some are calling it the third oil shock. While we have seen some weakening in demand in the OECD, supply constraints, refinery limitations and continued demand growth in key emerging markets will maintain pressure in the market over the medium term. ... OPEC production is at record highs and non-OPEC producers are working at full throttle, but stocks show no unusual build. These factors demonstrate that it is mainly fundamentals pushing up the price.¹⁰

The International Energy Forum identified that the recent increase in oil prices is due to:

- Market fundamental related factors, including:
 - Lower crude oil spare capacity;
 - Limited refining capacity;
 - Fears of supply disruptions, driven by geopolitical concerns, accidents, weather and technical problems;
 - Perceived market concerns over resource base and future supply
- Other important causes, not related to underlying supply and demand trends:

¹⁰ International Energy Agency, *Media Release - Despite Slowing Oil Demand, IEA Sees Continued Market Tightness Over the Medium Term*. 1 July 2008. See: http://www.iea.org/Textbase/press/pressdetail.asp?PRESS_REL_ID=267

- Increasing interaction between oil and financial markets, making oil more of a financial asset;
- Increasing investment inflows from financial institutions into oil and other commodity futures markets;
- Uncertainties about monetary, fiscal, energy, investment, trade and environmental policies.¹¹

3.1 The Oil Supply-Demand Balance

While global demand for oil has remained strong, overall non-OPEC production growth has slowed. In the past three years, non-OPEC production growth has been well below rates seen earlier in the decade. World oil consumption growth has outpaced non-OPEC production growth every year since 2003. This imbalance has increased reliance upon OPEC production and/or inventories to fill the gap. The International Energy Agency predicts that OPEC's share of world oil supply will jump from 42% now to 52% by 2030.¹² However, since 2003, OPEC oil production has grown by only 2.4 million barrels per day while the "call on OPEC" (defined as the difference between world consumption and non-OPEC production) increased by 4.4 million barrels per day. As a result, the world oil supply - demand balance has tightened significantly.¹³

The US Commodities Futures Trading Commission notes that world surplus production capacity remains low (the estimated 1.35 million barrels per day in June 2008 is equivalent to less than 2 percent of consumption, an amount well below the 1996-2003 annual average of 3.9 million barrels per day). This puts upward pressure on prices and leaves world oil markets vulnerable to supply disruptions. In addition, this surplus capacity is highly concentrated in a few countries, with Saudi Arabia holding almost all of it. Without significant surplus capacity, market participants can no longer rely on increased production from key members of OPEC to offset supply disruptions and restore balance without the need for significant price changes (as was the case in the 1990s). The combination of these factors means that prices react strongly to actual or perceived supply disruptions.

Supply disruptions are a frequent occurrence in the oil industry. During the past 24 months, there have been almost two dozen supply disruptions, lasting from a few days to many weeks, which affected world oil production and exports. These disruptions were caused by power failures, worker strikes, pipeline leaks and explosions, cyclones and hurricanes, saboteurs, and civil wars. More than half of these disruptions resulted in oil production outages exceeding 100,000 barrels per day. The most significant of these to oil markets

¹¹ Noe van Hulst, Secretary General, International Energy Forum, *Global Efforts to Stabilize the International Oil Market*. Presentation to the Jeddah Energy Meeting, 22 June 2008. See: <http://www2.iefs.org.sa>

¹² International Energy Agency, *Global Energy Trends: Towards a More Secure, Lower Carbon Future*. Background Paper by the International Energy Agency for the International Energy Forum, 22 April 2008.

¹³ Commodity Futures Trading Commission, *Interim Report on Crude Oil, Interagency Task Force on Commodity Markets*. July 2008. See: <http://www.cftc.gov/stellent/groups/public/@newsroom/documents/file/itfinterimreportoncrudeoil0708.pdf>

resulted from the ongoing strife in Iraq and Nigeria. These disruptions have varied in size over time, with Iraq losing more than 500,000 barrels per day of exports in March 2008 and Nigeria reaching more than 1.4 million barrels per day of shut-in production at one point in April 2008.¹⁴

The International Energy Agency provides an outlook on the short term (2008-2013) oil market. It expects that oil supply growth from new projects during 2008-2010, combined with weaker economic growth, will result in a potential spare capacity rise in excess of 4 mb/d. However, this expansion slows from 2011 onwards when global demand growth recovers, leading to a narrowing of spare capacity to minimal levels by 2013. Crucially, with declining mature oil field production, over 3.5 mb/d of new production will be needed each year just to hold global production steady. The Agency emphasised the need for sustained and increased industry investment both upstream (oil field exploration and development) and downstream (refining and distribution), to ensure that the market is adequately supplied.¹⁵

However, there are some industry observers who question the ability of international oil companies and national oil companies to make these required investments, and predict that unless there is a collapse in oil demand within the next five to ten years, there will be a serious oil supply 'crunch'. Evidence for this is presented in terms of the failure of OPEC to meet plans for capacity expansion since 2005, and the poor performance on non-OPEC producers. On this basis, it is argued that a supply side 'crunch' will appear around 2013, with a resultant spike in oil prices.¹⁶

Notwithstanding this five year projection, it is increasingly apparent that a major determinant of oil prices in the shorter term (6-12 months) will be the global economic outlook. If the level of oil demand from both the United States and China falters due to reduced economic growth, and assuming no catastrophic weather or oil disruption events, then the oil price trend is likely to be down. In early September 2008, the price of crude oil had dropped some 35% from its peak, partly as a response to weaker international economic growth. For instance, in the four week period ending 29 August 2008, total petroleum products supplied in the US was down by 3.5% compared to the corresponding period in 2007.¹⁷

¹⁴ Commodity Futures Trading Commission, Interim Report on Crude Oil, Interagency Task Force on Commodity Markets. July 2008. See: <http://www.cftc.gov/stellent/groups/public/@newsroom/documents/file/itfinterimreportoncrudeoil0708.pdf>

¹⁵ International Energy Agency, *Oil Market Report*, 10 July 2008.

¹⁶ Stevens, P. *The Coming Oil Supply Crunch*. A Chatham House Report. 2008. http://www.chathamhouse.org.uk/files/11937_0808oilcrunch.pdf

¹⁷ US Energy Information Administration, *Summary of Weekly Petroleum Data for the Week Ending August 29, 2008*. See: http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/weekly_petroleum_stat_us_report/current/txt/wpsr.txt

3.2 Peak Oil

Peak oil is the point in time when oil production reaches its maximum annual rate, after which the annual production rate declines each year. The term is mostly used to describe a peak in total world oil production. However, in practice a succession of peaks has already occurred in different oil producing regions throughout the world. Growth in global oil supplies has been sustained by expansions in supply from new oil fields. Eventually the rate of production decline at mature oil fields exceeds the rate of expansion at new oil fields and total world oil production will have peaked.¹⁸

The peak may be sharp if, for example, some of the giant fields start to decline rapidly, or it may be an undulating plateau spread over a number of years. There is considerable debate on when peak oil will occur, assuming it has not already. We may have already passed the peak, or it may be some years ahead, but the Australian Association for the Study of Peak Oil states that the exact date is less important than accepting the principle and taking action to prepare for it.¹⁹

Information is limited on what oil prices might be with a peak in global oil production in the near term (2008-13). According to modelling for the CSIRO, projected petrol prices in the range of A\$2 to as high as \$8 per litre by 2018 in Australia are possible, depending on how rapidly alternative fuels and vehicles become available and what share of diminishing global oil supplies Australia will have access to.²⁰

4.0 THE AUSTRALIAN PETROL MARKET

In the latter half of 2007, the Australian Competition and Consumer Commission completed a major review of unleaded petrol prices. The Commission concluded that the unleaded petrol industry in Australia is competitive, and that there is no evidence of price fixing or collusion between the major participants in the industry. However, the Commission noted some fundamental structural issues that raise concerns about the industry:

- The Australian refining industry is relatively concentrated;
- There are significant barriers to entry at the refining level.²¹

¹⁸ CSIRO, *Fuel for Thought. The future of transport fuels: challenges and opportunities*. Future Fuels Forum, June 2008. See: <http://www.csiro.au/resources/FuelForThoughtReport.html>

¹⁹ Statement by Ian Dunlop, Deputy Convener of the Australian Association for the Study of Peak Oil. Ockham's Razor, *Peak oil - the trigger for global sustainability*. 27 July 2008. See: <http://www.abc.net.au/rn/ockhamsrazor/stories/2008/2313512.htm#transcript>

²⁰ CSIRO, *Fuel for Thought. The future of transport fuels: challenges and opportunities*. Future Fuels Forum, June 2008. See: <http://www.csiro.au/resources/FuelForThoughtReport.html>

²¹ Australian Competition and Consumer Commission, *Petrol prices and Australian consumers: Report of the ACCC inquiry into the price of unleaded petrol*. December 2007. See: <http://www.accc.gov.au/content/index.phtml/itemId/806216>

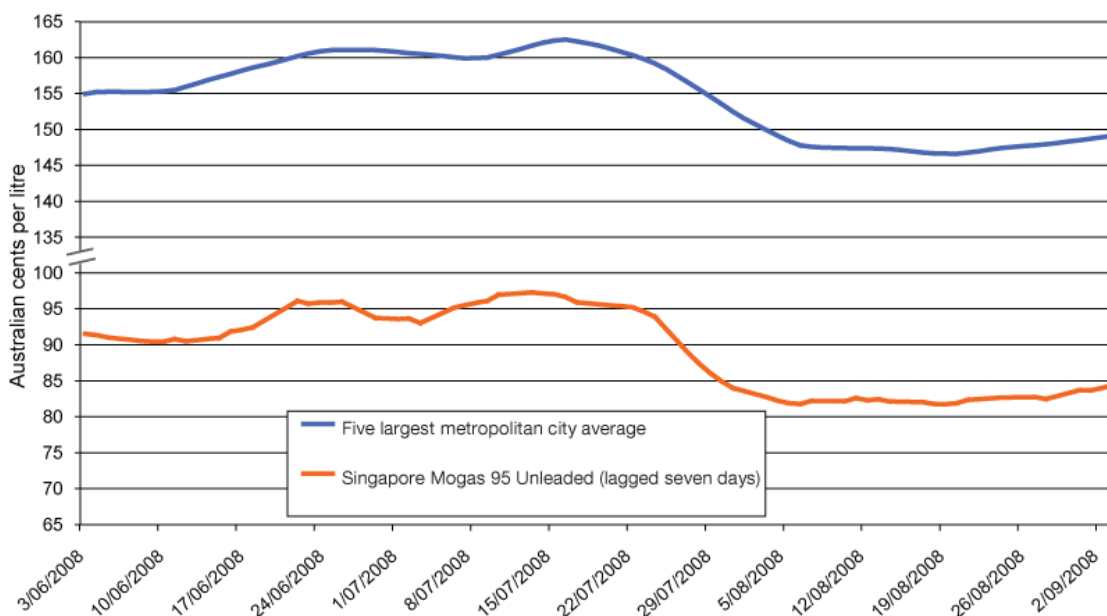
Although existing demand for petrol cannot be met through domestic production alone, there are significant impediments to the large scale importing of petrol by parties other than refiners – marketers, resulting in very little independent importing. The result is that 98% of Australia’s total fuel requirements are largely controlled by the four refiner-marketers (Shell, Mobil, Caltex and BP).

There are several key issues impacting on the price of petrol in Australia. In regards to refining and importing the most important is the practice of import parity pricing (IPP). This is the policy of pricing locally refined petrol on the basis of the cost of importing refined petrol. IPP is the base for all wholesale prices that feed into pump prices. Currently around 80 to 85% of unleaded petrol is produced locally but is priced by reference to the land cost of alternative available supply. Across the four refiners the formula for any petroleum product can be generally expressed as:

IPP based domestic refinery price = a benchmark refinery price (eg, MOPS95) + quality premium + shipping costs + wharfage + insurance and loss.

The benchmark refinery price is the key driver of petrol prices, and the benchmark used in Australia for unleaded petrol is the Platts quote for Mogas 95, known as MOPS95 (Mean of Platts Singapore). Changes in the exchange rate have an impact on the price because the Singapore benchmark price is expressed in US dollars per barrel. The benchmark refinery price contributes around 92% of the domestic refinery price. Figure 7 shows the relationship between the retail unleaded petrol price and the Singapore Mogas 95 price.

Figure 7: Retail unleaded petrol prices in the five largest metropolitan cities and Singapore Mogas 95 Unleaded prices - seven day rolling averages – 3 June to 3 September 2008.



Source: ACCC, *Comparison of Australian retail petrol price movements with Singapore Mogas 95*.

See: <http://www.accc.gov.au/content/index.phtml/itemId/793605>

The Australian Competition and Consumer Commission concluded that the IPP based pricing formula used by domestic refiners is currently working in their favour, enabling them to operate profitably in the Australian petroleum market. The ACCC noted that whilst the future profitability of the industry might be less robust, none of the evidence suggested that there would be major changes in local refinery profitability in the foreseeable future.

4.1 The Wholesale Petrol Price

To ensure that refiners have an adequate supply of product in locations where they do not have a refinery, they have organised a 'buy-sell' arrangement with other refiners. These contracts set out how much petrol will be supplied and at what price. The ACCC concluded that the evidence suggests that the buy-sell price is not available to independent resellers, and is lower than prices that independent resellers are able to negotiate. These arrangements provide refiners with a competitive advantage at the wholesale level by enabling them to obtain fuel that they sell in their non-refinery states at a lower price than any other reseller of fuel.

The ACCC found that the exclusive supply arrangements between the supermarkets, Coles Express with Shell and Woolworths with Caltex, have diminished the supply options for many independent resellers. There is very little importing by independent wholesalers, so that most fuel sold by them is re-selling of fuel obtained from the domestic refiners. The ACCC concluded that the evidence suggests that whilst wholesaling is a profitable activity, wholesale margins are narrow.

4.2 The Retail Petrol Price

The ACCC found that there is a significant degree of price competition at the retail level. It found that:

- The most important factor determining the retail price generally is the wholesale price at which the retailer purchased the fuel;
- Particular pricing strategies of different types of retail organisations (eg owner operated service station, franchise, supermarket alliance) also have an impact, as follows:
 - At owner operated sites, the owner of the site determines the retail price. However, such owners may have agreements with their wholesale supplier that includes price support. These arrangements usually also include a maximum retail price for the period in which price support is supplied.
 - At commission agent sites, a site is managed on behalf of another organisation, typically a refiner – marketer. The retail price will be set by the principal refiner – marketer.
 - At franchise operated sites, the operator rents a site or number of sites and operates under a franchise agreement, under which fuel will be sourced from the owner (refiner – marketer) of the site. While the franchisee may be responsible for setting the retail price, the wholesale price is generally determined by the owner of the site, and in addition, the owner may also provide price support;
 - For supermarket alliances, the relevant refiner – marketer supplies fuel to the supermarket under a wholesale supply agreement, and the supermarket sets the retail price. Price support may also be included.

A feature peculiar to the Australian metropolitan petrol market is the practice of price cycles. This is generally weekly in nature with higher prices from Wednesday afternoon to Friday evening and lower prices on Tuesdays and Wednesday morning. The ACCC looked at the issue of price cycles closely, and concluded that the causes of the well defined price cycle is an enigma. It noted that consumers can take advantage of price cycles, but at the cost of time and effort. The ACCC found that there is an imbalance in pricing transparency between buyers and sellers of petrol. The imbalance allows sellers to react more quickly than buyers to price movements with likely negative effects on competition. A contributor to this imbalance is the subscription price share service, Informed Sources. This service provides near real time monitoring of about 3,500 fuel retail sites, and subscribers can generate reports based on the data received. Subscribers are generally the refiner – marketers and larger independent retailers / supermarket chains.

The ACCC considered that the main options available to reduce the pricing transparency imbalance were:

- Reducing the potential for price information sharing among suppliers (ie, restricting access to near real time pricing information supplied by Informed Sources);
- Adopting increased pricing information and price commitment rules – a national FuelWatch Scheme;
- Expanding the availability of pricing information to consumers either through Informed Sources or through the ACCC.

The ACCC did not do a full assessment of the above or other options, and noted that a detailed assessment would have to be made before government could confidently embark on any one of the suggested options.

4.3 The National FuelWatch Scheme

The Western Australian Government introduced a fuel price monitoring and reporting service in January 2001, known as FuelWatch. The scheme applies to approximately 80 per cent of fuel retailers in WA. A key element of FuelWatch is a form of retail pricing commitment, the 24-hour rule. Under these arrangements fuel retailers are required to notify the Department about their next day's fuel prices for ULP, PULP, Diesel, LPG, Ron 98 and biodiesel blends on a daily basis by 2 pm. Retailers must charge these notified prices from 6am the next day for 24 hours.

Prices for the following day are made publicly available on the FuelWatch website and through an automated telephone service after 2.30 pm, enabling consumers to plan their purchases and to find out what will be the cheapest price in their area. A feature of the 24-hour rule is that tomorrow's prices are widely available, by email, internet and mass media, by around 4 pm on the current day. This means that if prices are going up tomorrow, consumers have a window between 4 pm on the current day until 6 am the following day to purchase petrol at the lower prices. The system allows WA motorists and retailers to be informed about fuel prices for the following day at service stations across the state, and to be assured that the prices will remain constant throughout the day.

The ACCC noted the considerable debate of the effectiveness of Fuelwatch in Western Australia, with most of the fuel companies criticising the scheme, but motoring

organisations such as the RACWA supporting it. In response, the ACCC conducted two econometric analyses of Fuelwatch in Western Australia to determine its effect on fuel prices. The initial tests examined the difference in price that occurred in Perth relative to the eastern capitals before and after the introduction of Fuelwatch. It concluded that the weekly average petrol price margin was reduced in Western Australia by 1.9 cents per litre with the introduction of Fuelwatch.²² In its second analysis, published in May 2008, the ACCC wanted to check that consumers who benefit from the price cycle by buying on the lowest price day each week would not be harmed by the introduction of the Fuelwatch system.

The ACCC looked at price changes for the lowest price day of the week, the highest price day of the week and for the remaining five days of the week. The ACCC's analysis showed that:

- prices decreased an average of 3.5cpl for the highest price day of the week;
- prices decreased an average of 0.7 cpl for the lowest price day of the week;
- prices decreased an average of 1.8 cpl for the remaining middle five days of the week.

The ACCC concluded that from the econometric analysis, on a conservative basis, it can say that there is no evidence that the introduction of Fuelwatch in Western Australia led to any increase in prices and it appears to have resulted in a small price decrease overall.²³

Following the introduction of Fuel Watch in Western Australia in 2001, and in response to the ACCC report and further rises in fuel prices, in March 2008 the Federal Government approved the establishment of a National FuelWatch Scheme. However, implementation of the Scheme is subject to Parliament passing the legislation, which is not guaranteed.

Under the proposed Scheme, petrol stations in metropolitan and major regional centres will be required to:

- Notify the ACCC of their next day's prices by 2pm the day before;
- Maintain this advised price for a 24 hour period; and
- Apply the scheme to unleaded petrol, premium unleaded petrol, LPG, diesel, 98 RON and biodiesel blends.

The petrol price information collected from these petrol stations will be made available to consumers through:

- An email and SMS alert service informing subscribed consumers details of the cheapest fuel in their area;
- A national toll free number where motorists can locate the cheapest petrol in the area they are looking to purchase fuel; and

²² Australian Competition and Consumer Commission, *Petrol prices and Australian consumers: Report of the ACCC inquiry into the price of unleaded petrol*. December 2007, at 243.

²³ Australian Competition and Consumer Commission, 'ACCC issues details of further fuelwatch econometric analysis.' 29th May 2008. See: <http://www.accc.gov.au/content/index.phtml/itemId/829429>

- A National FuelWatch website with station by station, day by day and suburb by suburb petrol price information.

The Scheme will cost \$20.9 million over four years, and it was the Government's intention for it to commence on 15 December 2008. The extension of the scheme outside of metropolitan areas and major regional centres will be subject to negotiation between the ACCC and local government authorities in rural areas. Rural local authorities will be able to opt in to the National FuelWatch Scheme, as they can under the WA Fuelwatch model. The Government stated that it will review the effectiveness of the national FuelWatch Scheme twelve months after it commences.²⁴

4.4 Fuel Excise

An excise is a levy on an amount per unit of good. Inflation erodes the real value of the amount if the rate is not increased. In 1983, the Hawke Government announced the indexation of excise rates to the consumer price index. On 1 March 2001 the Howard Government announced the cessation of all future indexation on the excises on petroleum fuels. This decision was taken in the context of the introduction of the GST on 1 July 2000 and rising world petrol prices at the time, which gave rise to concern that the interaction of the two would push petrol prices even higher. The excise on petrol has since remained at 38.143 cents per litre.²⁵

On 16 December 2003, the Federal government announced new arrangements for applying fuel tax to all fuels used in internal combustion engines. These new arrangements involved the application of fuel tax on an energy-content basis to all fuels used in transport applications. Fuel tax rates for fuels were based on energy content, with four broad fuel tax bands:

- a high energy content band of 38.143c/L;
- a mid energy content band of 25c/L;
- a low energy content band of 17c/L; and
- a fourth fuel tax category dealing with certain other fuels at a rate of 38 cents per cubic metre.

At this time, the government also announced that alternative fuels would receive a 50% discount on energy-content fuel tax rates on the basis of a range of industry, regional and other factors. In March 2004, the government further announced that the introduction of effective fuel tax on alternative fuels would be postponed from 1 July 2008 to 1 July 2011, and apply in five equal, annual steps to reach the final rates on 1 July 2015. The transition arrangements were extended to provide more time for existing fuel producers (including the LPG industry) and users to adjust, and for new transport fuels (such as biofuels,

²⁴ "A National FuelWatch Scheme", Hon Chris Bowen MP Assistant Treasurer Minister for Competition Policy and Consumer Affairs, Joint Media Release with The Hon Kevin Rudd MP Prime Minister, 15 March 2008. See: <http://assistant.treasurer.gov.au/DisplayDocs.aspx?doc=pressreleases/2008/023.htm&pageID=003&min=ceb&Year=2008&DocType=0>.

²⁵ Webb, R. *Excise Taxation: developments since the mid 1990s*. Parliament of Australia, Parliamentary Library Research Brief No 15, 13 April 2006.

compressed natural gas and liquefied natural gas) to establish their credentials in the market.²⁶

Fuel ethanol and biodiesel are currently both, in effect, fuel-tax free. Fuel tax of 38.143c/L is applied to both, but domestically produced ethanol and imported and domestically produced biodiesel receive equivalent production grants—offsetting fuel tax until 1 July 2011, when effective fuel tax will begin to be applied incrementally to these fuels. The final fuel tax rates (net of production grants) will be 12.5c/L for fuel ethanol and 19.1c/L for biodiesel in 2015 (a 50% discount to the full energy content fuel tax rates).

From 1 July 2011, imported ethanol and domestically produced ethanol will be treated equivalently, opening domestically produced ethanol to full international competition. The Taskforce noted that ethanol can be exported from Brazil at considerably lower prices than Australian ethanol is sold. Unless the Australian product becomes significantly more cost competitive, the Taskforce concluded that much of the Australian consumption of fuel ethanol will be supplied from overseas.

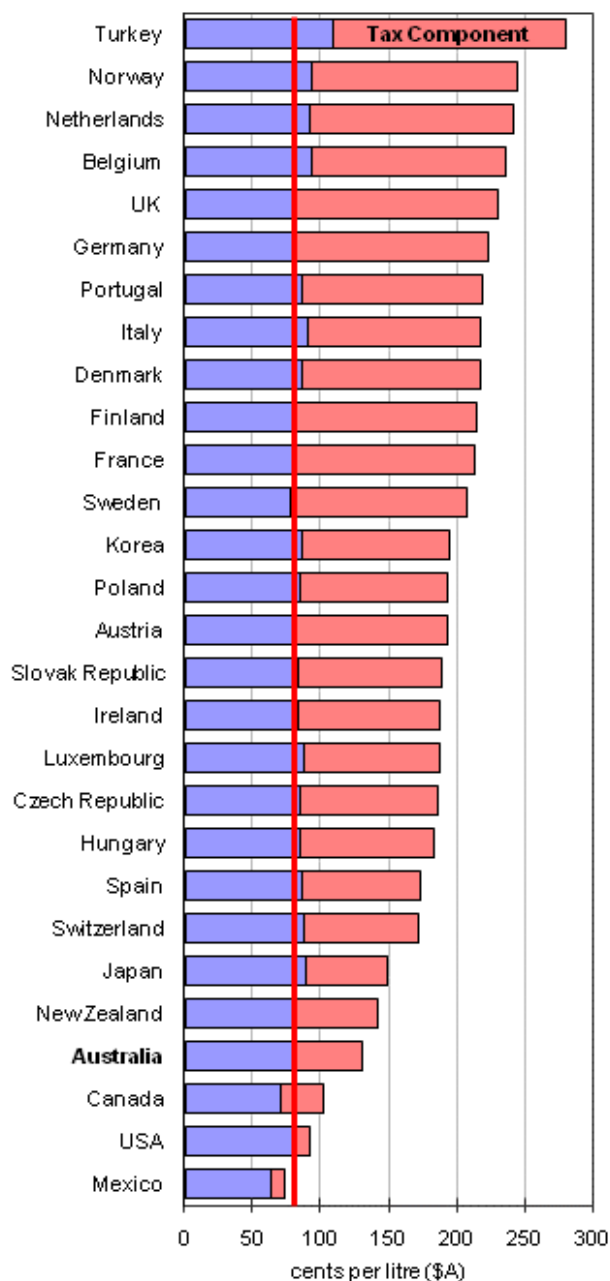
The phase-ins of effective fuel tax and applicable fuel tax rates for alternative fuels are detailed in Table 3.

Table 3 **Effective fuel tax rates for alternative fuels at 1 July, 2003 to 2015 (cents/L)**

Year	Ethanol			Biodiesel		
	Fuel tax	Production grant	Effective tax	Fuel tax	Production grant	Effective tax
2007	38.143	38.143	0.0	38.143	38.143	0.0
2008	38.143	38.143	0.0	38.143	38.143	0.0
2009	38.143	38.143	0.0	38.143	38.143	0.0
2010	38.143	38.143	0.0	38.143	38.143	0.0
2011	38.143	35.643	2.5	38.143	34.343	3.8
2012	38.143	33.143	5.0	38.143	30.543	7.6
2013	38.143	30.643	7.5	38.143	26.743	11.4
2014	38.143	28.143	10.0	38.143	22.843	15.3
2015	38.143	25.643	12.5	38.143	19.043	19.1

Australia has some of the lowest fuel prices and fuel excise duty paid in the developed world, as shown in Figure 8.

²⁶ Commonwealth of Australia, Biofuels Taskforce, *Report of the Biofuels Taskforce to the Prime Minister*, August 2005, at 45.

Figure 8: Petrol Prices and Taxes in OECD Countries, December Quarter 2007

Source: Australian Institute of Petroleum, *International Price Comparison*. See: <http://www.aip.com.au/pricing/internationalprices.htm>. Accessed August 2008.

It is evident from Figure 8 that petrol prices across the OECD are fairly similar – it is the level of taxation that makes the biggest difference to petrol prices across the countries.

4.5 The Impact of an Emissions Trading Scheme on Petrol Prices

Assuming that transport is included with the introduction of an emission trading scheme in Australia in 2010, the cost of petroleum products will increase. Modelling conducted by the CSIRO for the Future Fuels Forum projects that the price of emission permits can be expected to begin at around \$25-40/tonne CO₂e, increasing to \$70-100 /tonne CO₂e for a 60% emission cut by 2050 target. If Australia chooses to pursue near zero emission targets

within the emission trading scheme, the price of a permit is project to be \$200-300 /tonneCO₂e.

Emission permit prices of \$40 and \$100 tonne CO₂e translate to petroleum fuel price increases of \$0.10 and \$0.25 per litre respectively.²⁷ The Garnaut Review has recommended that initially, carbon emission permits should be sold at A\$20 /tonne in 2010, rising each year by 4 percent plus the increase in the consumer price index. This would equate to an increase in the petrol price of A\$0.05 per litre.²⁸

Historically, Australian petrol price increases over the four year period 2005 to 2008 are expected to be higher than those resulting from the implementation of any carbon emission trading scheme.

5.0 CONCLUSION

The CSIRO Future Fuels Forum comprises representatives of Australia's transport stakeholders. The Forum noted:

However, we, after sometimes robust and far-reaching debate, do agree that Australia will have to change its transport fuel mix. Such change will take considerable time, resources and the participation of all stakeholders.²⁹

This statement reflects the reality that ultimately, petroleum based products are a finite resource. The Forum identified the following key risks, opportunities and challenges for the future of transport fuels in Australia:

- Increasing cost of oil and the need to reduce greenhouse gas emissions will drive change;
- Our fuel mix will be more diverse;
- The price of oil based fuel products will increase;
- The transport sector will make a modest contribution to reducing greenhouse gas emissions;
- Simultaneous response will be required to both reducing greenhouse gas emissions and the risk of increasingly costly and scarce oil supply;
- Australia is very vulnerable to changing market conditions;
- Any increase in transport costs will adversely impact low income Australians;
- There is likely to be only moderate preparatory responses by individuals and businesses, implying a role for government;

²⁷ CSIRO, *Fuel for Thought. The future of transport fuels: challenges and opportunities*. Future Fuels Forum, June 2008. [See: http://www.csiro.au/resources/FuelForThoughtReport.html](http://www.csiro.au/resources/FuelForThoughtReport.html)

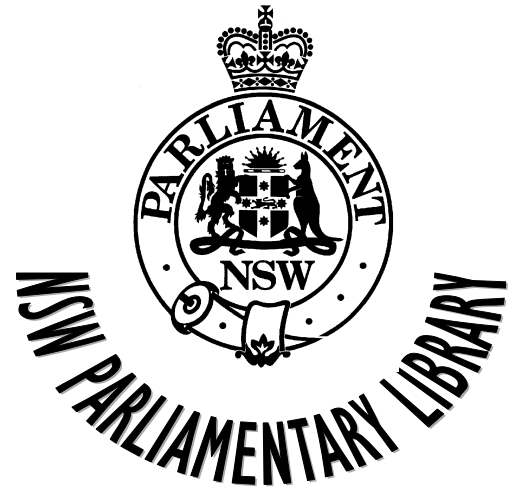
²⁸ Garnaut Climate Change Review, *Targets and Trajectories, Supplementary Draft Report*, September 2008. [See: http://www.garnautreport.org.au/reports/Garnaut%20Review%20-%20Targets%20and%20trajectories%20-%20Supplementary%20Draft%20Report%20-%2005%20Sept%202008.pdf](http://www.garnautreport.org.au/reports/Garnaut%20Review%20-%20Targets%20and%20trajectories%20-%20Supplementary%20Draft%20Report%20-%2005%20Sept%202008.pdf)

²⁹ CSIRO, *Fuel for Thought. The future of transport fuels: challenges and opportunities*. Future Fuels Forum, June 2008. [See: http://www.csiro.au/resources/FuelForThoughtReport.html](http://www.csiro.au/resources/FuelForThoughtReport.html)

- Technology alone will not be sufficient to meet the potential fuel supply gap;
- Australian travel preferences are as important as fuel and technology preferences in reducing greenhouse gas emissions.

The main determinant of petrol prices in Australia is the price of crude oil, which has experienced considerable volatility over the last 12 months or so. Whilst the price of crude oil may continue its recent decline with slower global economic growth, there are fears that the oil industry will experience significant supply constraints in the years to 2013. The laws of supply and demand tell us that if this is the case, then crude oil, and hence petrol prices, will again experience another spike.

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