

# Downstream Petroleum 2007

LANE  
**ONE  
FORM**



**Shell**

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**AIP**

Australian  
Institute of  
Petroleum

## AIP mission and objectives

AIP was formed in 1976 to promote effective dialogue between the oil industry, government and the community. It replaced a number of other organisations such as the Petroleum Information Bureau that had been operating in Australia since the early 1950s. AIP has gained national and worldwide recognition as a key representative body of Australia's petroleum industry.

AIP's mission is to promote and assist in the development of a strong, internationally competitive Australian petroleum products industry, operating efficiently, economically and safely, and in harmony with environment and community standards. Through the active involvement of its members, AIP provides responsible and principled representation of the industry along with factual and informed discussion of downstream petroleum sector issues.

As well as its policy development role, AIP also runs the Australian Marine Oil Spill Centre (AMOSOC) in Geelong that develops preventative strategies for oil spills and responds to major spills to water that may threaten the environment.

AIP encourages decisions on regulations or self regulation which are taken on a case-by-case basis in the best interests of the consumer and the industry so as to achieve excellence in standards of industry safety and product performance; and works to ensure that due diligence is maintained at all times on industry safety, occupational health and environment protection.

## Members and Associate Members

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CALTEX AUSTRALIA LIMITED

MOBIL OIL AUSTRALIA PTY LTD

THE SHELL COMPANY OF  
AUSTRALIA LIMITED

AED OIL LTD

AFTON CHEMICAL  
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ASP SHIPPING  
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### **Downstream Petroleum 2007 sets out key industry facts and the issues impacting on the downstream petroleum sector in Australia.**

A reliable supply of high quality liquid fuels at reasonable prices is critical for almost all economic activity in Australia.

Petrol and diesel prices in Australia are consistently among the lowest in OECD countries. The ACCC has confirmed the high level of competitiveness in fuel retailing activities, and has established without doubt that there is a consistent relationship between Australian fuel prices and the internationally traded prices of fuels in Singapore.

Given the exacting challenges of maintaining continuous operations at Australia's refineries, there will be times when technical problems result in supply disruptions. The downstream petroleum industry in Australia has demonstrated a strong capability to manage local and international disruptions of fuel supplies. Overall, Australian fuel consumers enjoy a high level of fuel supply reliability compared to many other countries.

These benefits flow from the industry's investment of over \$3 billion since 2004 in new and upgraded facilities at Australian refineries, in the supply distribution networks, and at service stations.

These investments have also delivered fuel quality in Australia similar to that in Europe and North America. The national Cleaner Fuels Program has significantly reduced benzene and sulfur levels in fuels, and together with improved vehicle technologies is dramatically improving air quality in our major cities and towns.

Over the past ten years, AIP member companies have invested \$6.7 billion in Australia compared with industry profits over the same period of \$6.5 billion. However, this level of investment is not guaranteed for the future. Competitive pressures in Australia and across the region will determine the level of investment in the unsubsidised Australian industry.

There are numerous factors which have the potential to undermine investment and the robust refiner margins of 2006 and 2007 and hence the ongoing viability of the Australian refining industry.

Growth in demand for fuels across the Asia-Pacific region remains strong, particularly in China and India. However, there is uncertainty about the extent to which the current regional supply shortfall will be offset by the construction of new refineries, particularly in China and India.

Australian government policies that raise uncertainty about future returns on investment will also impact on future refinery viability and investment.

One of Australia's biggest challenges in coming years will be the development of effective climate change policies that do not stifle Australia's economic growth potential. The downstream petroleum industry will play an important part in helping to meet this challenge. The introduction of greenhouse gas emissions trading and other complementary transport sector measures in Australia must be carefully considered to ensure that the trade exposed Australian refining industry remains viable. The impacts of these measures on fuel prices and the associated inflationary effects will be a significant community issue.

Biofuels and other alternative fuels such as GTL and CTL have a role to play in the Australian fuels mix, depending on their price competitiveness, supply reliability, and acceptability to consumers. In the short to medium term, the development of alternative fuels faces significant challenges in terms of project construction costs, energy consumption, and environmental concerns.

There is also a growing number of regulations impacting the downstream petroleum sector. It is essential for regulatory decisions relating to fuels and the fuels industry to be closely linked to business realities. Australia's small, integrated economy is best served by national approaches to regulation of the fuels industry. It is also critical that environmental, consumer affairs, economic and industry policy regulators work with the industry in a holistic way. Environmental regulation must be soundly based and affordable for industry and consumers, and the expectations of consumer affairs regulators must recognise the drivers and industry costs associated with improving our environment.

**Russell Caplan**  
Chairman, AIP

## Key messages

- The Australian refining industry is a price taker in the Asia–Pacific region.
- Australian refineries are generally smaller than regional competitors and must be highly efficient to compete.
- The Asia–Pacific region has moved to a negative regional supply balance due primarily to supply not keeping pace with rapidly increasing demand.
- Demand growth and the move to cleaner fuels have put upward pressure on prices.
- The Australian downstream petroleum industry has a good record over recent decades of ensuring reliable supply to consumers. Regulatory measures are unlikely to enhance security of supply.

## Petroleum refining in Australia

**In 2006–07, domestic refineries supplied around 78 per cent of petroleum products required by major industries and the fuel distribution network of around 6000 service stations. The reliability of the fuel supply system is high given the unique logistical and geographical challenges in Australia.**

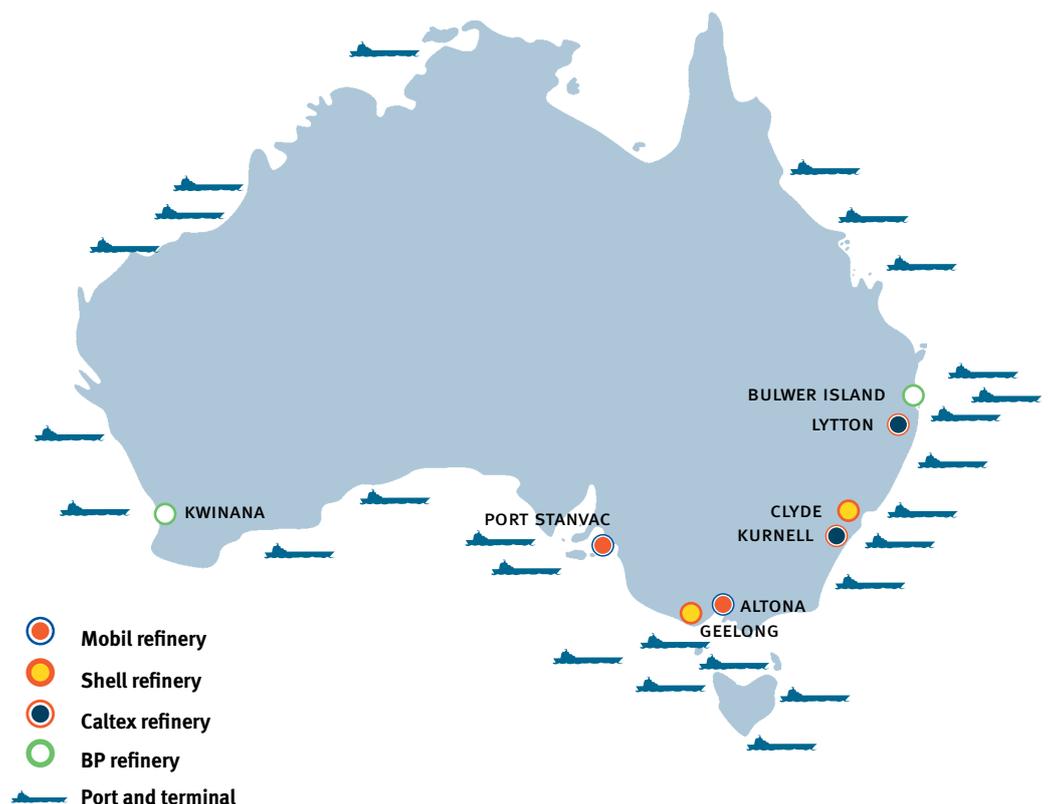
The Australian oil refining industry produces a full range of petroleum products comprising:

- petrol (46%)
- diesel (29%)
- jet fuel (14%)
- fuel oil (2%)
- LPG (4%)
- lube oils, bitumen and other products (5%).

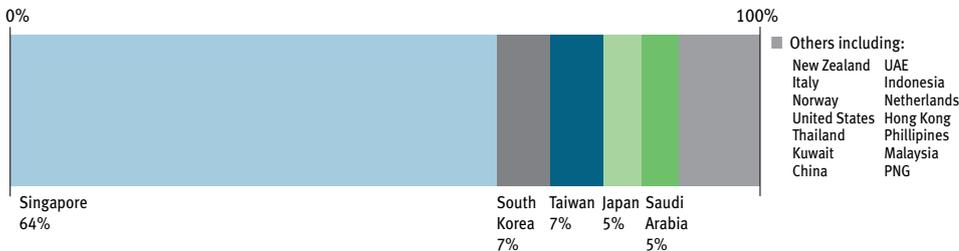
The industry also produces a substantial volume of chemical feedstock.

In 2006–07 Australia consumed 49 750 ML (megalitres) of petroleum products. Australian refineries produced 38 800 ML, of which around four per cent was exported (excluding LPG). Imports accounted for 26 per cent (or 12 900 ML) of total consumption. A proportion of this imported volume was supplied to northern and north western areas of Australia where domestic refineries generally are unable to competitively supply market needs. Import terminals are located throughout Australia. The bulk of imported petrol was from Singapore.

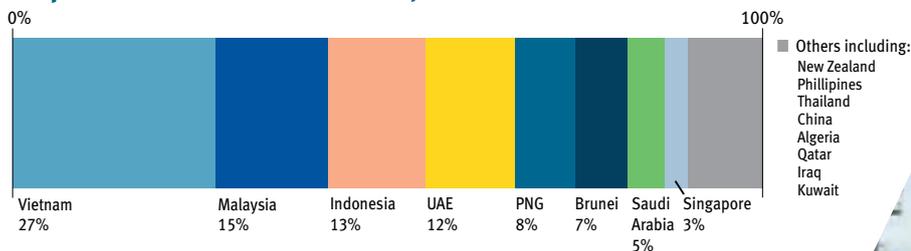
While Australia has substantial crude oil production, around 58 per cent of this oil was exported in 2006–07. Crude oils required to meet the product demand mix in Australia were imported by domestic refineries mainly from Asia (83%) and the Middle East (17%).



## Imports of petroleum products: 2006–07



## Imports of crude oil: 2006–07



Australia has seven major operating refineries that were generally constructed in the 1950s and 1960s, although they have been extensively modified since then, particularly during 2005 and 2006. These refineries are relatively small with the largest having a capacity of 8000 ML pa (megalitres per year), compared with the four largest Asian refineries which produce between 30 000 ML pa and 70 000 ML pa.

Australian refineries must price their output to be competitive with imports (i.e. import parity) from the Asia–Pacific region. There is no tariff protection and all seaboard capitals have product import facilities. Profitability of the Australian refining industry is therefore largely determined by product prices in Asia, and its viability depends on our competitiveness against imports from Asian refiners. In future, the growing demand in Australia will continue to be largely met by imports, further strengthening the price relationship with Asian product prices.

**The demand for petroleum products in Australia was around 49 750 ML in 2006–07 (or around 136 ML per day – a 5.5% increase since 2004–05).**

## Australian refineries

Refinery	Capacity: (ML pa)
Bulwer Island (BP—Brisbane)	5110
Lytton (Caltex—Brisbane)	6270
Clyde (Shell—Sydney)	4930
Kurnell (Caltex—Sydney)	7540
Altona (Mobil—Melbourne)	4530
Geelong (Shell—Geelong)	6380
Kwinana (BP—Kwinana, WA)	7960
<b>Total</b>	<b>42 720</b>

The Port Stanvac refinery (capacity: 4520 ML pa) was mothballed by Mobil in July 2003. As one of the smallest refineries in the Asia–Pacific region, it could not compete against larger regional refineries.

## International refining industry

**The international refining industry is highly cyclical. Demand for liquid fuels closely follows economic growth and development. Fuel supply is heavily dependent on the construction of capital intensive and long-lived assets, and their capacity, reliability and utilisation.**

While the market for liquid fuels is international, there are three distinct but interconnected regional markets covering Asia, Europe and the United States. Each of these markets has its own supply and demand characteristics which also influence market opportunities between the regions. For example, Europe is oriented towards diesel consumption with surplus gasoline exported to the United States.

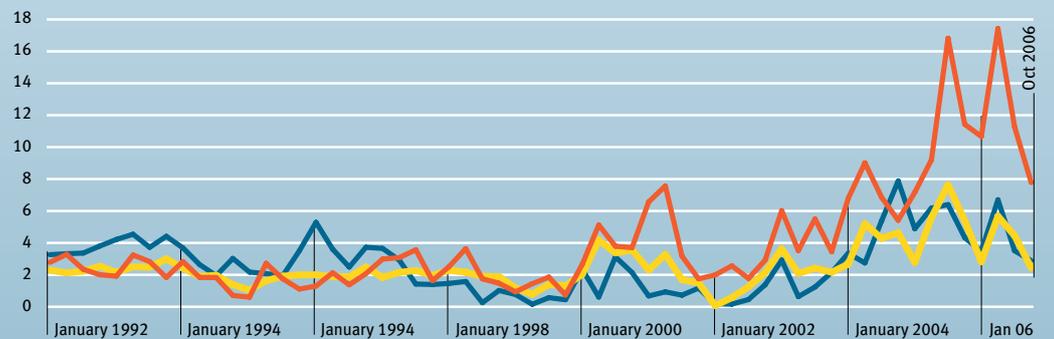
The major factors affecting the international liquid fuels market over the last five years have been strong world economic growth, and refinery construction levels which have not kept pace with demand. This has resulted in a general increase in world refining margins from around US\$1 per barrel in 2002 to over US\$4 per barrel in 2006.

Over the period, regional markets have been strongly influenced by local events:

- United States refining margins rose to almost \$18 per barrel after Hurricane Katrina before falling back to around US\$8 per barrel in 2006 as refineries came back on stream.
- Asian margins rose rapidly in 2004 to almost US\$8 per barrel in response to a growing regional supply shortfall arising from strong economic growth in China and India.

Future international refiner margins will depend on regional demand and supply. Changes in the crude oil market, the market for construction services, and regional government policies such as cleaner fuels and other environmental regulations will also play a major role. For individual refiners, profitability will be critically dependent on production efficiency and reliability, as well as supply chain and logistics efficiency.

### World refining margins: 1992–2006



US\$ per barrel: — SINGAPORE DUBAI HYDROCRACKING — USGC WEST TEXAS SOUR COKING — NWE BRENT CRACKING

SOURCE: BP STATISTICAL REVIEW OF WORLD ENERGY, JUNE 2007



## Refinery competitiveness

Economies of scale provide a key competitive advantage in refining, with larger refineries having lower unit costs of production.

Economies of scale arise from larger production runs, lower labour costs per unit of capital, and lower purchasing costs for greater volumes of inputs, such as crude oil, energy inputs and transport. In addition, newer refineries have additional efficiencies arising from newer technologies and the associated flexibility in the crude oil and product slates.

Refiners seek to run the optimal mix of crude oils through their refineries, depending on the specific equipment at the refinery, the desired output mix to meet the demand and quality standards of their target markets, and the relative price of available crudes domestically and internationally.

There are also competitive disadvantages in industrialised countries which impact on capital and operating costs of new and expanded

refinery investments. These include higher labour and construction costs as well as environmental and other regulatory constraints. Comparatively favorable taxation treatment is also provided in industrialising countries (particularly in Asia)—both for new facility construction and for substantial refinery upgrades.

The major refineries currently under construction are very large and generally in industrialising countries. For example, the Reliance refineries at Jamnagar, India are doubling capacity to nearly 70 000 ML pa (nearly twice Australia's total refining capacity). Other large projects under construction or being considered in the region have capacities ranging from 12 000 to 75 000 ML pa in China and 25 000 ML pa in South Korea. The size of these refineries and the installation of newer technologies will make these refineries the benchmarks for competition in the Asian region.

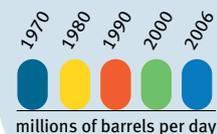
## General make-up of refinery costs

The cost of crude oil is the major input cost for refineries. Some of the other key costs for refineries include:

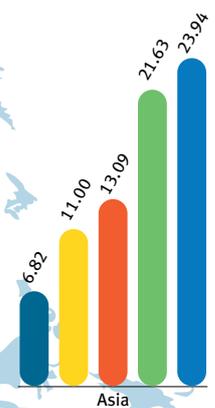
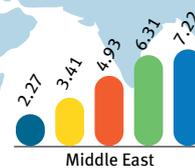
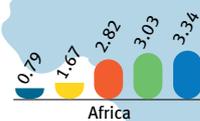
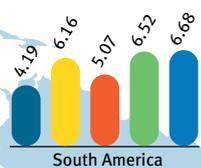
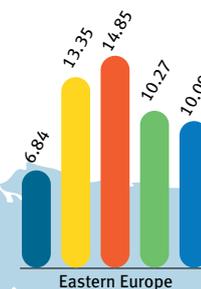
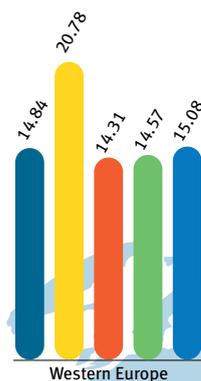
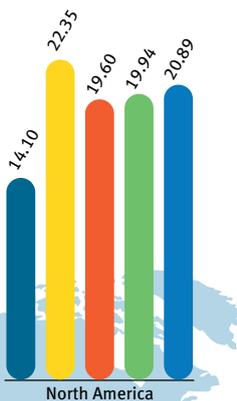
- crude oil shipment and storage costs
- the cost of additives, catalysts and chemicals
- capital costs/depreciation
- wages and salaries
- plant maintenance and 'outages' costs
- costs of site security and systems
- environmental protection costs
- product shipment and storage
- utilities charges
- government taxes and charges.

## World refining capacity

### Key



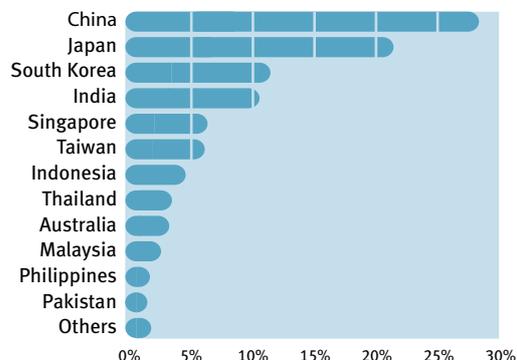
SOURCES:  
● BP STATISTICAL REVIEW OF WORLD ENERGY, JUNE 2007  
● OIL & GAS JOURNAL



## 8 Petroleum refining in Asia

The total consumption of petroleum products in the Asian region was 1 370 000 ML in 2006. In comparison, the total Australian demand for petroleum products was 48 800 ML in 2006 (less than 4 per cent of regional demand).

**Asian region distillation capacity: 2006**  
(PROPORTION OF TOTAL DISTILLATION CAPACITY)

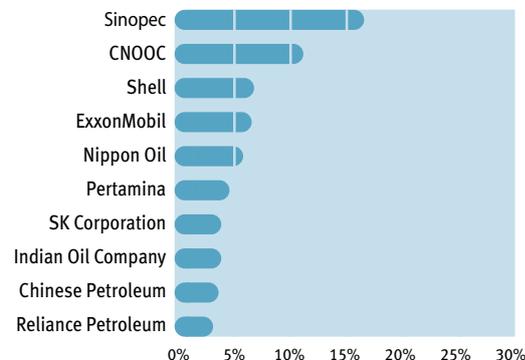


The growth in Asian region liquid fuels demand has been quite volatile compared to demand growth in Europe and North America, with highly variable growth rates in Asia between 0.5 per cent and 6.3 per cent over the last ten years. This has made capacity planning difficult.

Although there are uncertainties about the future economic performance of the various countries in the Asian region and beyond, the International Monetary Fund expects that world economic growth will ease only marginally over the next few years. This points towards continuing demand growth across the Asian region for petroleum products.

Refinery investment in the region over the past 20 years has been large and lumpy, leading to fluctuations between significant under and over capacity. For example, the significant excess capacity of 2 mbpd in 1985 led to a collapse in refiner margins, and a slowing or ceasing of

**Top ten Asian region refiners: 2006**  
(PROPORTION OF TOTAL DISTILLATION CAPACITY)



construction of new capacity. Refinery construction only re-commenced when demand caught up with supply, and refiner margins were more attractive.

Asian region refining capacity now exceeds capacity in Europe and North America. Within Asia, China accounts for 28 per cent, Japan 21 per cent, South Korea 11 per cent and India 10 per cent of regional refining capacity. In comparison, Australia is a very small player accounting for a little over 3 per cent of regional refining capacity.

Future refinery configurations in Asia will depend on changes in fuel demand characteristics, in particular the moves towards higher quality and lower sulphur fuels in the region.

However, there is uncertainty regarding the future supply balance of liquid fuels. While significant refinery construction and expansion is currently planned for Asia and the Middle East, these plans are being tempered by rapidly increasing construction costs and program delays.

## Asian export production

In general, Asian refineries serve their own domestic demand with only Singapore, South Korea and Taiwan having any significant export capacity. The Singapore refining complex is primarily oriented to exports. This is a key reason why Singapore is the regional hub for the liquid fuels market. The Jamnagar refineries in India have also been expanded to provide significant volumes for export. Other refineries in the region occasionally sell surplus production but do not view the export market as a major source of business; the Japanese refineries have traditionally been in this category.

In the past, the Chinese refining sector was a significant exporter of gasoline providing Australia's independent retail sector with a large proportion of their gasoline supplies. These supplies to Australia, which would no longer comply with Australian fuel quality standards, were generally lower quality, lower octane, high olefinic gasoline which was augmented in Singapore with the octane enhancer MTBE. China is now a net importer of gasoline following rapid growth in domestic demand.



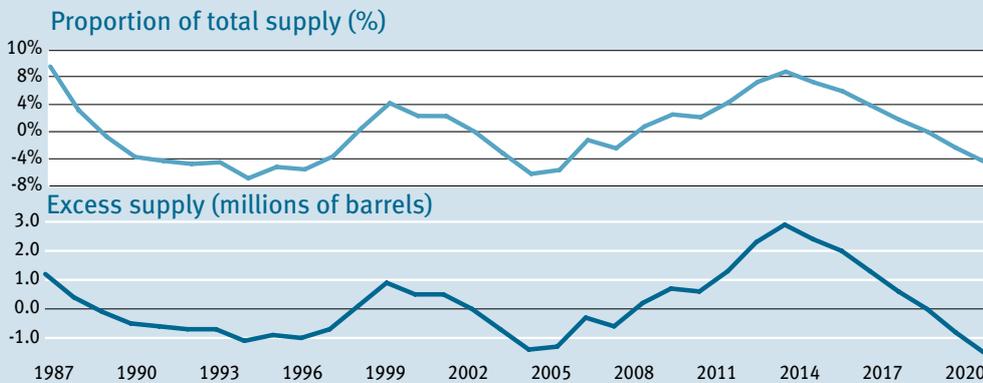
The majority of regional refining capacity is controlled by National Oil Companies (NOCs) or by companies with strong links to their host governments. Only 17 per cent of Asian region refining capacity is owned by the overseas affiliates of AIP members.

Shell and ExxonMobil each have around 6 per cent of total refining capacity in the Asian region with Chevron around 4 per cent and BP around 1.5 per cent.

Many of these refineries are operated in joint ventures with NOCs, so the actual level of control by AIP member company associates is significantly lower. These AIP member affiliated refineries are operated independently of Australian companies.

Given the diversity of ownership of refining capacity in the region it is clear that regional prices are set by market forces rather than by any group of companies.

## Asian excess supply capacity



## Cleaner fuels in the Asia-Pacific region

### Petrol regulatory outlook for the Asia-Pacific region

	2005	2006	2007	2008	2009	2010	2010+
Japan	E4			10 ppm S			
Hong Kong	E4			10 ppm S			
Singapore	Country specific			E4		10 ppm S	
Australia	E2	E3			E4		
NZ	E2	E3			E4		
Malaysia	E2				E4		
Thailand	E2			E3			E4
China	Country specific			E3			E4
India	E2/E3			E3			E4
Indonesia	Country specific			E2			E3

### Diesel regulatory outlook for the Asia-Pacific region

	2005	2006	2007	2008	2009	2010	2010+
Japan	E4			10 ppm S			
Hong Kong	E4			10 ppm S			
Singapore	E2	E4			10 ppm S		
Australia	E2	E4			10 ppm S		
NZ	E2	E4			10 ppm S		
India	E3			E4			10 ppm S
Malaysia	E2				E4		
Thailand	E3			E4			E4
China	E2			E3			E4
Indonesia	Country specific			E2			E3

Countries in the Asia-Pacific region are mandating cleaner fuels on different timelines. As demand for higher quality fuels increases, refineries in the region will produce these fuels as standard products rather than as boutique fuels for specific markets. This will result in increased supply availability of the cleaner fuels.

Euro standards (E2, E3, E4) relate mainly to the reduction of sulfur in petrol and diesel, although they also set standards for other product parameters such as benzene and other aromatics, olefins, cetane, density, lead and oxygen.

For sulfur levels in petrol: E2 sets the limit at 500 ppm, E3 at 150 ppm, and E4 at 50 ppm. For sulfur levels in diesel: E2 sets the limit at 500 ppm, E3 at 350 ppm and E4 at 50 ppm.



**The Australian refining industry is a small player in the international liquid fuels market. The ongoing viability of the Australian industry will be determined largely by international factors. In particular, competition in the Asian fuels market arising from changing demand for liquid fuels, and increased supply from new Asian refineries.**

## Australian liquid fuels demand and supply

Since 2000, demand for Australian petroleum products has grown by 2 per cent per annum. Gasoline and LPG demand grew for several years at around 1 per cent per annum, but since 2005 demand has been contracting, in part due to rising international petroleum product prices. Middle distillates such as diesel and jet fuel have grown at rates above 5 per cent.

Domestic sales decreased by 3.2 per cent in 2006 (by 1600 ML) to 48 800 ML.

These changes in liquid fuel demand are expected to continue with increasing use of diesel in commercial and industrial applications and continued expansion of diesel use in the passenger vehicle market. Alternative fuels are also expected to capture a small but increasing portion of the liquid fuel market. For example, LPG currently accounts for almost 10 per cent of total liquid fuel demand and biofuels are growing rapidly.

Domestic production fell by 6.7 per cent in 2006 to 38 100 ML. The lower level of domestic production was, in part, due to delays in construction work on some cleaner fuels projects.

Total domestic production is expected to grow only marginally with de-bottlenecking of refinery operations in future years.

Since 2000 there has been a major structural shift in the Australian fuels market with imports increasing from around 10 per cent of total

demand in 2000 to nearly 22 per cent in 2006. Total imports increased to 10 500 ML in 2006. Import levels were much larger for some key fuels (e.g. over 30 per cent of diesel was imported in 2006).

Australia is expected to continue to import an increasing proportion of liquid fuel demand. The actual level of imports will depend on growth in demand and the ability of the Australian refining industry to compete with Asian refineries.





## Asset value

At the end of 2006 the assets of the downstream petroleum industry were \$16.6 billion across the refining and marketing sectors. Asset values increased by \$2.2 billion from 2005.

The growth of assets was driven by the large investment since 2004 in the Cleaner Fuels Program. There has also been significant investment in the distribution sector and retail service stations to improve supply reliability and meet competitive retailing challenges.

## Debt position

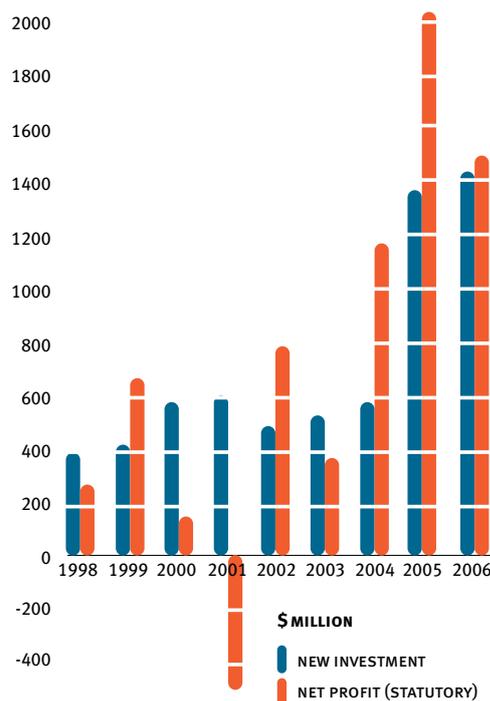
In 2006, total industry borrowings fell to \$5.65 billion which is above the average 1997–2006 net borrowings for the industry of \$4.9 billion. Strong cash flows from improved refinery margins provided a sound basis for the large investment program undertaken in 2006.

## Investment and profits

Due to its capital intensive nature, the downstream petroleum industry routinely requires large and ongoing investment in plant and equipment to continue safe and reliable operations. Major milestones in the Australian Government Cleaner Fuels Program meant a significant increase in capital expenditure in 2005 and 2006. Investment in plant and equipment doubled in 2005 to \$1.3 billion and continued in 2006 with a further \$1.45 billion in new investment.

As a proportion of net profits on a statutory basis, investment increased from 63 per cent in 2005 to 96 per cent in 2006. On an underlying profitability basis, the proportion of investment to net profits increased from 86 per cent in 2005 to 99 per cent in 2006.

These figures highlight the large and ongoing investments required to maintain the downstream petroleum industry. From 1997 to 2006 the industry invested over \$6.7 billion. In comparison, net profits over the same period were \$6.5 billion on a statutory basis and \$5.8 billion on an underlying basis.



- The Australian refining industry is part of a highly competitive global oil market. Profitability and ongoing viability will be determined by supply and demand in the Asia–Pacific refining industry.
- The Asian product market has moved from significant over-supply to tight supply driven by growing demand in China and India.
- Over the last ten years the Australian refining sector has invested over \$2 billion to meet the cleaner fuels standards.
- Demand growth for liquid fuels is changing from petrol towards diesel and alternative fuels.
- Australian refineries face significant challenges over the next decade including:
  - increased competition from new mega-refineries in Asia
  - implementation of climate change mitigation measures
  - strong demand for construction services and a shortage of skilled labour.
- Continued competitiveness of Australian refineries will depend on sound public policies based on efficient and competitive market principles:
  - an attractive investment climate to maintain refinery capacity and reliability
  - facilitation of infrastructure development, including streamlining approvals for port and terminal developments
  - technical skills development in the education system.

## 12 Profitability measures

The improvements in Australian industry profits in recent years reflect the impacts of historically high crude oil prices and tight refining capacity. These factors are illustrative of the large and cyclical fluctuations which are a feature of the downstream petroleum industry. The average returns over the period 1997–2006 indicate that on a longer term basis the returns for the industry remain low.

The overall picture for returns has improved significantly with increases in refiner margins and large stock gains driving profit increases over the last few years. This increase in profits and cash-flow has been accompanied by commensurate increases in investment.

In comparison to the years prior to 2003, where industry returns marginally exceeded the long term bond rate, returns since 2004 have been well above 10 per cent for both statutory and underlying profits. However, the downstream petroleum sector is a cyclical and volatile industry and future returns will largely depend on developments in the Asia–Pacific refinery industry, international crude oil markets and the course of the Australian economy.

For statutory returns, the major feature of profitability over the last couple of years was the large rise in crude oil prices in 2005 which led to stock gains of \$673 million. This raised the statutory return to 19.6 per cent in 2005. Stock

gains were more modest in 2006 at \$69 million and the statutory return fell to 13.7 per cent.

Increases in international refining margins have driven an improvement in profitability, with the underlying return increasing to 14.8 per cent in 2005. The performance was not matched in 2006, with returns easing to 13.3 per cent. The fall in returns could be attributed to lower demand, higher costs and delays in the construction program for cleaner fuels, and the increased asset base.

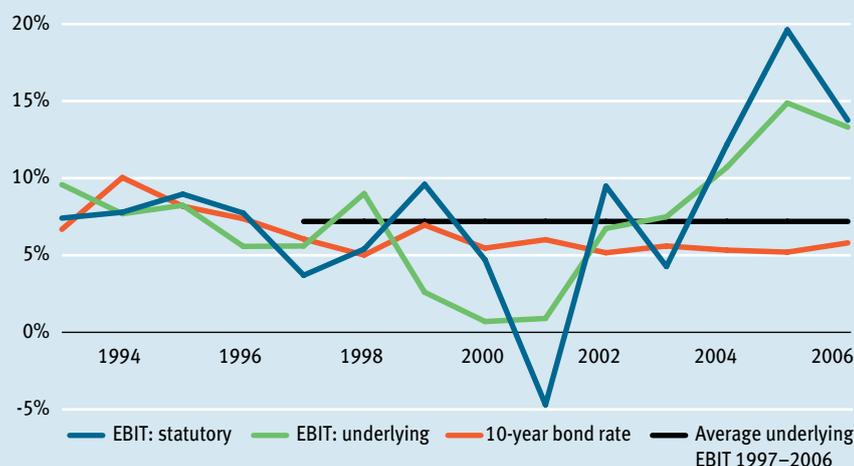
In 2006, the profit per litre of fuel sales on an underlying basis increased marginally to just over 3 cents per litre. The statutory net profit per litre decreased to 3 cents per litre in 2006 from a profit of above 4 cents per litre in 2005. Longer term, over the period 1997–2006, average returns are around 1.2 cents per litre.

A continuation of low average returns will challenge the affordability and attractiveness of future investments.

### Return on assets



EBIT on total assets: PER CENT



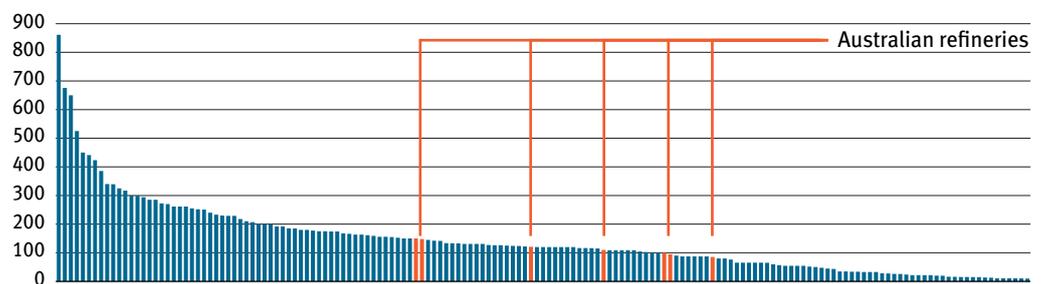
Post tax profit per litre of fuel sales: CENTS



Measures of profitability are presented as earnings before interest and tax (EBIT) on total assets for both statutory and underlying returns. The statutory return is reported in company accounts and complies with reporting requirements under relevant legislation. The underlying return removes the impact of stock gains and losses to derive a profit result not affected by the impact of movements in international crude oil prices. Removing the stock valuation effects from profitability measures provides a clearer picture of the fundamental economic performance of the industry.

The significant competitive pressures faced by Australian refineries is illustrated by the high level of products imported into northern Australia from nearby Asian refineries with direct and efficient access to this market.

**Asia-Pacific refinery capacity (THOUSANDS OF BARRELS PER DAY)**



Compared to refineries across Asia, Australian refineries suffer from substantial disadvantages in operating and capital costs that virtually preclude Australia from consideration for new refinery investment. The relatively small Australian refineries offer no economies of scale benefits and as an industrialised nation, Australia offers none of the capital or operating cost benefits available in many developing countries.

In addition, the taxation and investment regimes applying in Asia are highly attractive for new investment with the provision of taxation holidays, substantial investment allowances and investment facilitation. General government regulations in Australia are increasingly complex and involve higher

compliance costs, together with lengthy delays in gaining development approvals.

The significant disadvantages faced by Australian refineries present major challenges for governments. For example, fuel pricing, taxation and fuel standards are regulated by federal and state governments. Many environmental policies are regulated by state governments and in some cases by local governments. These policies increase the complexity of operations and raise the costs of doing business in Australia. Regional competitors do not face many of these issues.

In order to compete, the existing Australian refineries must operate extremely efficiently and reliably, and make the most of their geographic location and advanced fuel standards.

## Australian government policy

The downstream petroleum industry faces a complex policy environment with interactive and in some cases overlapping regulation by federal, state and local governments.

Government policies will have significant impacts on future refinery operating requirements and hence will impact critically on commercial viability. Government policies will also impact on investor perceptions of the longer term prospects for Australian refineries.

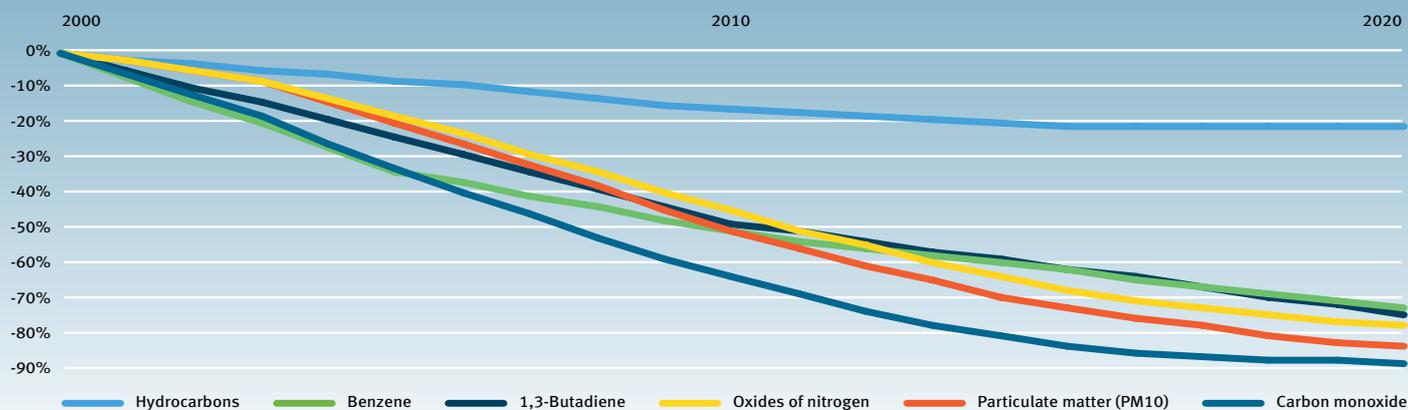
The key policy influences on the Australian refining industry are:

- the Cleaner Fuels Program
- liquid fuel supply reliability
- energy security
- alternative fuel mandates
- fuel and corporation taxation
- skilled labour training
- climate change policy
- environmental regulation.

In each of these areas, AIP and its member companies advocate policies which apply equally to all participants in the industry and which are based on sound science and supported by comprehensive economic analysis.

Actions in each of these policy areas will have the potential to affect the competitiveness of the Australian refining sector. Policy makers will need to consider all possible options if the competitive position of the refining industry is to be maintained. It should not be assumed that refiner margins arising from regional refining industry conditions will always enable Australian refineries to manage increasing policy constraints and the associated costs.

## Reduction in vehicle emissions from cleaner fuels



## Key messages

- The Australian Government's Cleaner Fuels Program is facilitating the introduction of advanced engine technologies. This program is delivering economic and environmental benefits through improvements in urban air quality, reductions in greenhouse gas emissions, and improvements in fuel efficiency.
- Cleaner fuels cost more to produce, require major refining industry investment and lead to higher greenhouse gas emissions from refineries.
- The introduction of new fuel quality standards means the relative environmental benefits of alternative fuels have reduced.
- For alternative fuels to compete in the market, they must be competitively priced, be reliably supplied and have consumer acceptance.
- Urban air quality improvements include reduced emissions of hydrocarbons and oxides of nitrogen (leading to significant reductions in smog) and reduced particulate emissions.

**AIP supports appropriate national fuel standards to facilitate the introduction of advanced engine technologies and so help address scientifically established environmental concerns.**

AIP has worked closely with the motor vehicle industry and governments to ensure that standards are:

- consistent across Australia
- predictable, so that participants in the market have sufficient time to implement and adjust to the new standards.

Long lead times are required to make the necessary engineering changes to refineries and consistent application of policy is essential to provide the framework for refiners to recover their increased costs.

Cleaner fuels cost more to produce because of additional capital requirements (e.g. new/revamped desulfurisation units). Operating costs at refineries and through the distribution system are also higher. Australian refiners have invested in excess of \$2 billion so far to implement the Cleaner Fuels Program. Product yields will generally be lower (e.g. due to lower benzene and higher octane requirements). Production of cleaner fuels is also more energy intensive (and therefore more carbon intensive).

The *Fuel Quality Standards Act 2000* provides the framework for the regulation of fuel quality standards for Australia and is based

on harmonising Australian fuel standards with European standards. The first round of changes in Australian fuel standards through to 2006 were comparable to Euro 4 standards for diesel and Euro 3 standards for petrol (although there were some variations in specifications for Australian conditions).

Further legislated fuel standards — 50 ppm sulfur premium unleaded petrol (PULP) (2008) and 10ppm sulfur diesel (2009) — will, when combined with the complementary engine technologies, address virtually all the outstanding national air quality issues attributable to vehicle emissions.

A further move to introduce 10 ppm sulfur petrol would be complex, expensive and increase refinery greenhouse gas emissions. AIP considers that the widespread availability of vehicle technology requiring this fuel should be clearly identified before considering such a move, noting that the vast majority of vehicles in Australia are unlikely to need the lower sulfur fuel and would not benefit from it. Any decision by government must be based on analysis of the full lifecycle costs and benefits.

Further reductions in hydrocarbon emissions are also being achieved in some urban areas through petrol vapour pressure controls and vapour recovery systems.



## Alternative fuels

Alternative fuels that are used or have been proposed for use in Australian motor vehicles include:

- Biodiesel blends
- Ethanol blends in petrol up to ten per cent
- Liquefied Petroleum Gas (LPG)
- Compressed Natural Gas (CNG)
- Liquefied Natural Gas (LNG).

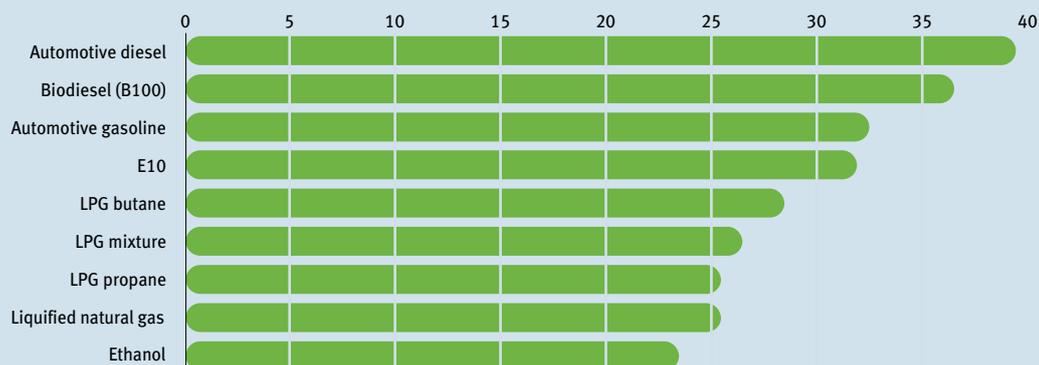
For any alternative fuel to enter the fuel mix in a sustainable manner it must be competitively priced, have a reliable supply and be acceptable to consumers. Governments have decided to support alternative fuels for a variety of policy reasons, such as environmental performance and regional development. AIP believes that such assistance must be transparent, particularly where it has an impact on long-term investment in the fuels market. The perceived environmental advantages of alternative fuels need to be judged against sound scientific evidence and the dramatic reduction in vehicle emissions enabled by the Cleaner Fuels Program and the introduction of new vehicle technology.

The Australian Government policy on the use of ethanol in petrol includes: a 10 per cent cap

on the level of ethanol in petrol; mandatory labeling of ethanol blends; and a future excise rate which reflects its energy content. A key driver for increased ethanol use will be enhanced consumer confidence. The industry is working closely with governments and other stakeholders to address barriers to greater use of biofuels in the retail and commercial fuels markets.

AIP member companies have well developed action plans to work towards delivering in excess of 350 ML of biofuels into the fuels market by 2010. The introduction of biofuels mandates in some states has done little to boost the prospects for biofuels, the major challenge continues to be the availability of competitively priced biofuels and appropriate infrastructure to meet mandated volumes.

### Energy content of automotive fuels: MEGAJOULES PER LITRE





## Key messages

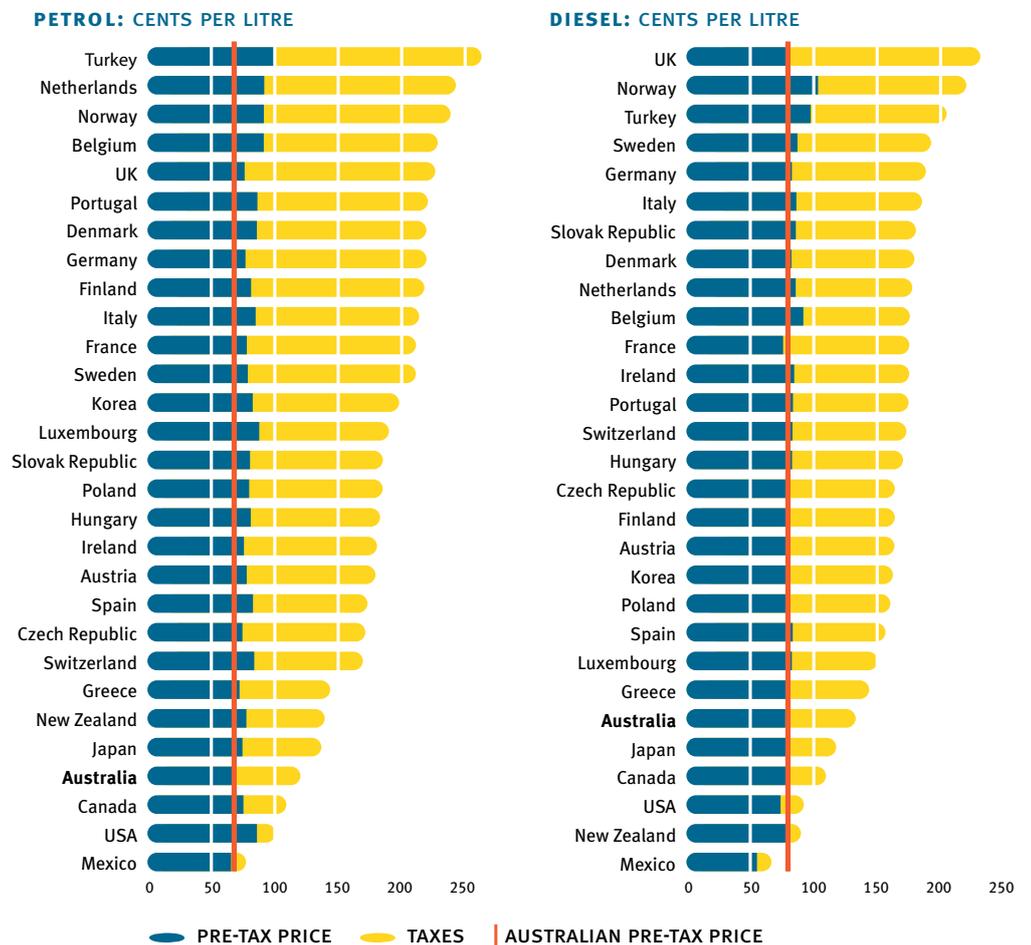
- The petroleum market is a highly competitive and dynamic global market.
- Market prices and benchmarks are highly transparent along the entire fuel supply chain—including at the international, wholesale and retail levels.
- The Australian refining sector is a price taker.
- Domestic prices are closely linked to relevant international prices.
- Australia has among the lowest pre-tax petrol prices in the OECD.
- Around 40% of the price of petrol is made up of tax (from GST and excise).
- Vigorous competition means that the profits made by oil companies are typically a very small proportion of the retail price (average oil company profit over the last 10 years is 1.2 cents per litre of fuel sold).

## Prices and taxes

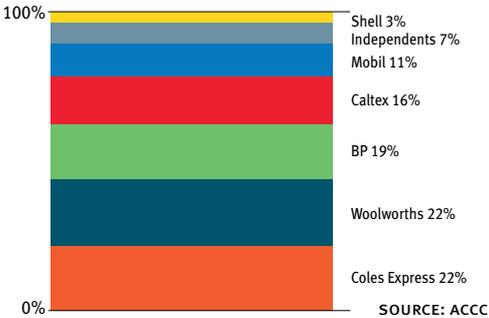
In 2006 and 2007 Australia had among the lowest petrol and diesel prices in the OECD both before and after tax. Retail fuel prices are highly competitive and apply to almost half of the fuel sold in Australia. The remainder of fuel sales are to commercial, industrial and agricultural consumers and most of this volume is subject to vigorous competition under regular commercial tenders. The impact of fuel taxes on individual consumers varies with the application of government measures such as the Energy Grants (Cleaner Fuels) Scheme.

On 1 July 2006 a new fuel tax credits system was introduced to substantially reduce the excise burden on business and households. Under the new system, all off-road business use of all fuels will become excise free over time and all fuel used in heavy vehicles received excise relief from 1 July 2006. The combination of high levels of efficiency in domestic refining and relatively favourable taxation treatment of diesel and petrol users gives the Australian economy a significant competitive advantage in the use of fuel compared with most OECD countries.

## Petrol and diesel prices and taxes in OECD countries: June quarter 2007

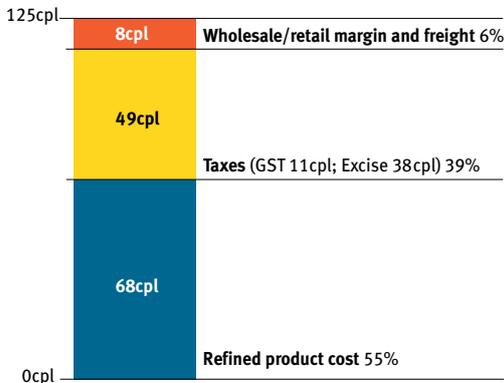


### Petrol retail market share: 2007 (VOLUME BY SITE BRANDING)



The supermarkets and independents control more than half of the retail petrol market.

### Components of national average retail petrol price: 2007



The components of the average retail petrol price highlight the proportion of the price received by fuel producers and fuel retailers. In 2007, the tax component (GST and excise) of the final price of petrol averaged about 39 per cent or 49 cents per litre.

Payments to the Australian Government in 2006 from fuel excise, GST on fuels and income tax payments by AIP member companies was \$15.8 billion. Fuel excise provided over 6 per cent of Australian Government taxation revenue in 2006.



## Relative price changes

### Percentage change in prices: 1980–2007



Since 1980, the increase in petrol prices paid by consumers has been less than the increase in the CPI and less than price increases for other significant household consumables, when taxes are excluded.

### Petrol prices over the past 30 years



## 18 Fuel price transparency

**Pricing of crude oil and petroleum products — both internationally and domestically — is highly transparent along the entire supply chain. Crude oil and petroleum products are sold internationally and domestically through a variety of term contract arrangements and in spot transactions. They are also traded on futures markets like NYMEX. These mechanisms play an important role in providing pricing information to markets.**

**International** price transparency is underpinned by price benchmarks or ‘markers’ for crude oil and petroleum products of a similar quality, which are convenient indicators of what is happening with prices in specific markets. The main marker crudes are: West Texas Intermediate (WTI–USA); Brent (Europe and Africa); Dubai and Oman (Middle East); and Tapis and Dubai (Asia–Pacific). Information on changes in the prices of these crudes is extensively reported on a daily basis.

For Australia, the crude oil marker is the Asia–Pacific benchmark called Tapis Crude Oil and the petrol marker is the Singapore price of Petrol (MOPS95 Petrol).

**Wholesale** price transparency in the petroleum market is assisted by the publication of Terminal Gate Prices (TGP) for petrol and diesel by all

AIP members. TGP is the price at which any person with the necessary safety clearances can purchase fuel from fuel supply terminals by the tanker load.

**Retail** price transparency is assisted by highly visible price boards at each service station so that customers can readily observe price changes.

**Overall market and price transparency in Australia** is assisted by data published by AIP and member companies. This includes a range of AIP factual material on petrol and diesel prices in Australia; extensive retail and wholesale market data across major Australian cities and towns on AIP’s website and on AIP member company websites; and AIP’s Weekly Petrol Prices Report [www.aip.com.au/pricing/weeklyreport.htm](http://www.aip.com.au/pricing/weeklyreport.htm)



### Price trends in 2007

These charts provide a snapshot of the volatile movements over 2007 in the key market indicators relevant to the price of petrol at the pump in Australia. There is a close relationship between international prices (MOPS95 Petrol) and domestic wholesale and retail prices.

- SINGAPORE PETROL PRICE (MOPS95 PETROL)
- CRUDE OIL PRICE (TAPIS)
- AUSTRALIAN TERMINAL GATE PRICE (TGP)
- AUSTRALIAN PUMP PRICE
- MARGIN

#### International market trends: 2007 CENTS PER LITRE



**The price of petrol in Australia is dependent on world market prices.**

Crude oil, petrol and diesel are bought and sold in their own markets. Each market is regionally based and reflects the supply and demand balance in that market.

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.

**Australian wholesale petrol and diesel prices are closely linked to Singapore prices.**

To meet Australian demand, around 25 per cent of fuel is imported, mostly from Singapore. Australian wholesale prices for petrol and diesel (called Terminal Gate Prices or TGPs) are closely linked to the Singapore prices of petrol and diesel — not Tapis crude oil prices. The Singapore price of petrol (MOPS95 Petrol) is the key petrol pricing benchmark for Australia because this represents the competitive alternative for supply to Australia.

The market price for MOPS95 Petrol plus shipping costs and Australian taxes represents almost the entire wholesale price of petrol — around 95 per cent of TGPs. The remaining 5 per cent of TGPs reflect insurance, quality premiums for Australian fuel standards, local wharfage and terminal costs and small wholesale marketing margins (where competitively possible).

**Retail (pump) prices can be volatile in some markets, reflecting intense local competition.**

Once fuel leaves the terminal gate (where TGPs apply), retail or pump prices vary across metropolitan and regional areas, reflecting local area factors and competition.

TGPs are typically around 95 per cent of pump prices in Australia. Pump prices also reflect land transport costs, marketing and administration costs, and the costs of running service stations like wages, rent and utilities. The ability to cover these costs depends on local area competition.

Retail prices in metropolitan areas also tend to follow a discounting cycle which historically has ranged up to 12 cents from peak to heavily discounted trough. Consumers clearly benefit by purchasing heavily discounted petrol at the low point in the cycle.

**Country pump prices are generally higher and more stable than metropolitan prices due to differing competitive and economic characteristics.**

Prices are more stable in regional areas because there is a general absence of discounting. Prices can vary greatly between regional towns, reflecting differences in local competition, freight and handling differences, as well as different operating margins depending on fuel volumes and convenience store turnover.

Retail prices in regional areas are largely set by independent owner/operators (including those who sell fuel supplied by one of the major brands under license).

## The Singapore wholesale price lag

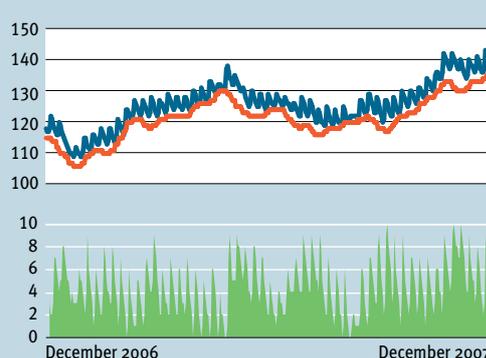
Generally, there is a short time lag of 1–2 weeks between changes in Singapore prices and changes in Australian wholesale prices. Importantly, this time lag occurs whether prices are going up (when the lag slows price rises to consumers) or prices are going down (when the lag delays price falls).

The lag is a result of using a rolling average of Singapore prices as part of the wholesale pricing methodologies of companies — very similar to that used by the ACCC when wholesale prices were regulated by government. The pricing methodology is called import parity pricing (IPP). The use of rolling averages smooths day-to-day price volatility.

**Wholesale market trends: 2007**  
CENTS PER LITRE



**Retail market trends: 2007**  
CENTS PER LITRE



The ‘margin’ shown in these charts is the difference between two market prices or benchmarks and is used to highlight trends within a specific market or market segment. It is a ‘gross margin’ and does not represent profits in the market nor take account of the range of relevant costs.

**The downstream petroleum industry is committed to producing progressively cleaner fuels and providing them to Australian customers reliably and at competitive, market determined prices.**

**AIP member companies support policy outcomes that effectively address climate change risks while minimising risks to business in order to deliver sustainable environmental outcomes to Australia.**

Inclusion of liquid fuels in the AETS will mean that AIP member companies will have an obligation to acquire some 115 million emissions permits on behalf of fuel users (around 23% of the total number of emissions permits available in Australia in any one year).

The cost of these permits will be about \$3.4 billion if emissions permits are valued at \$30 per tonne of CO<sub>2</sub>. This is equivalent to 160 per cent of 2006 downstream petroleum industry profits, or the current value of typical volumes of crude oil and petroleum product stocks on hand.

From a consumer perspective, emissions permits valued at \$30 per tonne CO<sub>2</sub> are equivalent to an additional direct cost of 8–9 cents per litre on the retail price of petrol and diesel.

## Australian emissions trading scheme

AIP member companies are working closely with the Australian Government to assist with the development of a comprehensive and sustainable suite of policies to address climate change concerns.

The design and implementation of a comprehensive Australian emissions trading scheme (AETS) which includes liquid fuels poses significant challenges. No other trading schemes have developed a template for efficiently imposing a carbon price on all relevant liquid fuels where there are millions of individual fuel users and greenhouse gas emitters.

AETS design features should ensure that:

- the relevant carbon price applies to all liquid fuels entering the Australian market, whether produced locally or imported
- there is transparency of the carbon price
- there are no barriers, other than normal market competition, to price pass-through to final fuel consumers
- the design of the scheme does not distort the choice of business models for the delivery of fuels to Australian consumers
- business and government administrative costs are minimised
- business risks associated with the acquisition of emissions permits are minimised and able to be managed effectively.



## Impacts of carbon prices

**Australian petroleum refineries are energy intensive operations, whether measured in terms of total energy consumed in their operation, or energy costs as a percentage of operating costs (excluding raw materials costs).**

The introduction of the AETS is expected to increase direct and indirect petroleum refining costs in Australia.

Since almost all liquid fuels imported into Australia come from countries which are unlikely to impose a carbon price on their

refinery operations in the foreseeable future, Australian refiners will be placed at a commercial disadvantage to their overseas competitors. These additional costs will not be recovered from consumers. If the costs are not offset under the AETS, then industry profits will decline. In the case of Australian refiners, this amounts to around \$190 million per annum (or 0.6 cents per litre of fuel sales) if emissions permits are valued at \$30 per tonne of CO<sub>2</sub>. This is equivalent to 33 per cent of average industry profits over the past ten years.

## Complementary measures

A range of complementary measures may be needed in the transport sector to achieve significant reductions in greenhouse gas emissions from liquid fuels over the timeframe envisaged by the government. Past experience confirms that fuel price rises of the order of 10–15 cents per litre have not had a sustained impact on liquid fuel use. For example the petrol price spike of 13 cents per litre in the month following Hurricane Katrina in 2005 resulted in a 6 per cent reduction in fuel demand, which was subsequently restored as consumers became accustomed to higher fuel prices. Higher fuel prices have not resulted in a significant and sustained shift towards the purchase of smaller, fuel efficient cars.

Complementary measures in the transport sector to be considered by governments include:

- fuel quality requirements for new generation engine technologies, subject to a full lifecycle analysis of costs and benefits
- the role of alternative liquid fuels
- improvements in fuel efficiency for small to medium petrol and diesel fuelled vehicles, and the introduction of hybrid and electric vehicles
- improved fuel efficiency of heavy transport vehicles
- accelerated fleet turnover to more fuel efficient vehicles
- driver education programs and incentives to encourage more efficient use of vehicles
- improved public transport as an alternative to private motor vehicle use.

In each case, full consideration needs to be given to assessing the benefits and costs of these measures to ensure that climate change benefits will be realised across the full fuel lifecycle, and that all other non-climate-change costs and benefits are identified. Before introduction of any of these potential measures, stakeholders will need to be assured that there are overall net economic benefits from adopting them, and that the measures do not undermine the effects of the AETS.

- Climate change presents a significant risk to economies, societies and the environment. AIP member companies support actions to advance climate science to improve understanding and therefore reduce the risks from future impacts.
- A broad-based approach is required to emissions abatement recognising that there are many pathways to reduce greenhouse gas emissions. These include improved energy efficiency, development and deployment of new and innovative technologies, enhanced public awareness and supportive policy frameworks. Practical adaptation to the unavoidable impacts of climate change is also a critical part of an effective response.
- A national approach to climate change policy is needed in Australia to ensure that the most effective and appropriate frameworks are put in place.
- Policy decisions by governments must be based on sound scientific and economic analyses that recognise the risks, costs and benefits to the economy generally, as well as to the downstream petroleum industry. The future viability of Australian refineries will be dependent on maintaining the international competitiveness of Australian refined products.
- Cooperative international action by governments and industry is required to achieve sustainable longer term climate change mitigation, recognising the global nature of climate change.



## Key messages

AIP and its member companies are committed to safe and environmentally sound practice in their operations. AIP member companies in Australia share the general community concern for conservation of the environment, and seek to protect air, water and soil from contamination through their operations. In doing so, their aim is to:

- treat with care all materials that may cause pollution
- achieve a zero accident rate
- maintain open communications with governments and local communities
- support market mechanisms for conservation and wise use of our valuable energy resources.

Some of the programs contributing to these objectives are the AMOSC oil spill response centre, and the lubricants waste management and recycling program.

## Oil spill response

Each of the companies involved in production of crude oil and in refining and distribution of petroleum products has major programs in place to minimise the risk of a marine oil spill. Company personnel are also trained to respond to any oil spill so as to minimise any environmental impact. These petroleum industry activities form part of Australia's national oil spill response arrangements coordinated by the Australian Maritime Safety Authority (AMSA).

Additional industry expertise and resources are provided through the Australian Marine Oil Spill Centre (AMOSC) at Geelong (Victoria). AMOSC was set up in 1991 as a wholly owned subsidiary of AIP. Its roles are:

- provision of equipment and personnel on a 24-hour basis to respond to a major oil spill
- provision of oil spill response training
- provision of advice on spill equipment.

## Waste management and recycling

Lubricants are not completely consumed in use and result in waste oil that needs to be collected and recycled. AIP members have adopted a product stewardship role for their products and are actively supporting the collection and recycling of waste oil and its packaging.

The Australian Government has introduced a product stewardship scheme for waste oil to support recycling, funded through an excise on sales of lubricants. AIP is also a signatory to the National Packaging Covenant. AIP on behalf of its member companies has established a collection and recycling program for used plastic oil containers across Australia.

## Health Watch

Since 1980 AIP has sponsored the development and operation of an epidemiological study called Health Watch which tracks the health of over 19 000 present and past employees of the Australian petroleum industry. The information from the Health Watch study is important in identifying factors within the industry that may be a risk to the health of the industry workforce and ways in which these risks may be addressed.

Health Watch has always been conducted independently, first at the University of Melbourne and then, from 1998, at the University of Adelaide. In 2005 the study was transferred to the Monash Centre for Occupational and Environmental Health, a leading international centre for epidemiological programs and collaborative research at Monash University. AIP is continuing to support Health Watch because it is highly valued by the petroleum companies and their employees and is an internationally respected study. The study also provides a robust scientific basis for the community to understand the health impacts of exposure to petroleum products.

The results of the latest Health Watch report (the 13<sup>th</sup> report) were most encouraging. They clearly show that petroleum industry employees represented in Health Watch have better health than the general community.

- The death rate for both men and women in the petroleum industry is significantly lower than in the general Australian population (once age differences are taken into account).
- The death rate for men in all major disease categories is also significantly lower than in the general Australian population. This includes death from diseases like heart

disease, cancer and respiratory disease and deaths from external causes such as accidents or violence.

- The latest analysis shows that the risk of leukaemia of all types is no greater than in the general population and has fallen compared to previous Health Watch reports. This is true even of acute non-lymphatic leukaemia, which has in the past been associated with exposure to benzene. The industry has taken significant steps to reduce employee exposure to benzene and to petroleum products in general.
- Higher reported rates of melanoma (skin cancer) are unlikely to be caused by any workplace factor and the death rate from this cancer is the same as that for the general population.
- Where conditions relating to exposure to asbestos were reported it was concluded that such exposure was likely to have occurred in refineries before 1970 while in other cases the condition resulted from exposure before entering the petroleum industry.
- The latest study shows lower rates of bladder cancer and prostate cancer compared with previous reports.
- Higher than expected rates of kidney cancer were reported for tanker drivers, but the risk is lower than in previous reports. However, the small number of cases does not allow meaningful analysis of possible contributing factors. This will continue to be monitored.
- The latest analysis also shows that smoking has a powerful influence on ill health and mortality and quitting smoking noticeably reduces the risks.

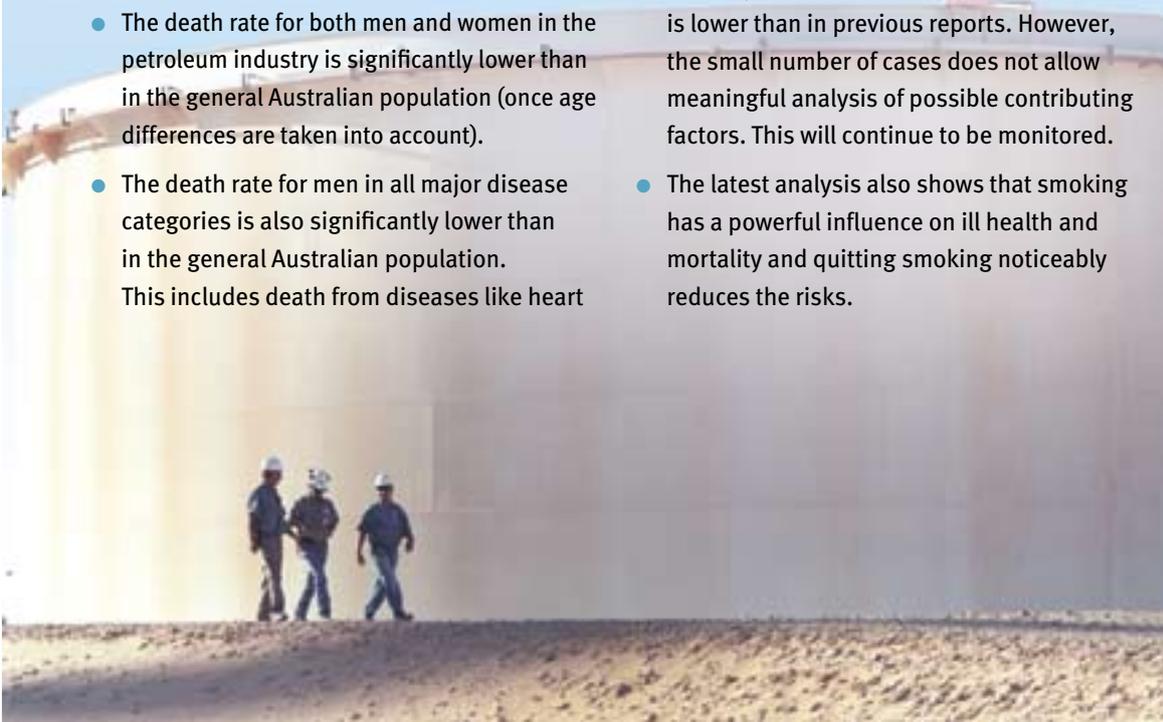
## Fuel for Aboriginal communities

Petrol sniffing is a major concern in remote Aboriginal communities.

Since the early 1990s Comgas, a form of aviation fuel suitable for automobiles, has been available in many Aboriginal communities. While Comgas was very low in aromatics, it had a high lead content.

At the beginning of 2005 BP began production of a new form of unleaded fuel, Opal, which contains low levels of aromatics. This fuel is the first of its kind in the market place and is available from all suppliers to the communities under the Petrol Sniffing Prevention Program.

Since 2005 the Australian Government has extended financial assistance to an increasing number of remote communities to facilitate the more widespread availability and use of Opal fuel. AIP member companies continue to work closely with federal, state and territory governments to help tackle petrol sniffing in Aboriginal communities.





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