

State of the industry 2009



The upstream oil and gas industry contributes significantly to Australia's energy security, jobs and wealth. This paper and the findings on the upstream petroleum sector highlight the importance of these resources cannot be underestimated. Australia's primary energy sources will continue to be coal 41% and renewable energy sources will continue to grow. However, for at least the next 20 years, oil, gas and coal will continue to be Australia's energy sources. The oil and gas industry continues to make a significant contribution to the

A status report on *Platform for Prosperity*— a strategy for maximising the value of Australia's oil and gas resources



Upstream Oil and Gas Industry Strategy

OBJECTIVES

To ensure the value of Australia's oil and gas resources to the Australian people is maximised, petroleum energy security delivered and long-term sustainability of an Australian oil and gas industry assured.

VISION

In 2017 the upstream oil and gas industry is recognised as a vibrant, innovative, safe and responsible industry, producing reliable, clean energy and substantial wealth for Australia.

TARGETS

In the decade to 2017:

- Oil and condensate production as a proportion of liquid fuels consumption is, on average, maintained at the 2006 level of 57 per cent or better.
- LNG production capacity increases from 20 million tonnes a year in 2008 to at least 50 million tonnes a year.
- Natural gas use for industrial purposes and as a competitive feedstock for resources processing doubles.
- In a competitive electricity market, 70 per cent of all new electricity generation capacity installed in Australia is gas fired.

BENEFITS TO AUSTRALIA

- A potential quantum improvement in the balance of trade—an extra \$20 billion a year by 2017.
- Lower greenhouse gas emissions—180 million tonnes per annum of carbon dioxide equivalent avoided globally by 2017 (equivalent to more than one quarter of Australia's projected greenhouse gas emissions in 2017).
- Greater energy supply security.
- Increased revenue to governments—billions of dollars a year. A single new LNG project for example, could pay \$40 billion (nominal dollars) in tax and royalties over a typical project life.
- A more skilled workforce and increased employment in the oil and gas sector and service industries (up to 52,000 new jobs at the peak).
- Increased regional development, particularly in WA, Queensland and the NT.
- Develop Australia as a leading gas research centre.
- Reduced water usage in electricity generation—gas-fired electricity uses one half to one sixth the water needed for coal-fired electricity.

Preface

State of the industry 2009 provides a snapshot of Australia's upstream oil and gas industry, highlighting recent developments, changes in its operating environment and key trends. This report also reviews factors limiting the industry's performance and actions being taken to address the impediments to growth identified during the development of the Upstream Oil and Gas Industry Strategy and publication of a Strategic Leaders' Report (SLR) in 2007.

Prepared by APPEA with the assistance of the Australian and state and territory governments, Geoscience Australia, CSIRO and other major stakeholders, the SLR identified the opportunities and challenges facing the Australian oil and gas industry, the issues that could prevent the opportunities from being fully realised and changes that could be adopted by governments, the industry and other stakeholders to address those issues. It shared a vision for the future of the industry and targets for the industry to aspire to over the ten years to 2017.

State of the industry 2009 updates the Strategic Leaders' Report to take account of changes in the industry and externally since 2007. It also reports on progress towards the implementation of options proposed in the SLR for addressing seven high value-adding priorities. As at the end of 2008 a number of major initiatives have moved forward or have been fully implemented while several other high-value options remain under discussion.

Further information about the Upstream Oil and Gas Industry Strategy and copies of the Strategic Leaders' Report are available on the APPEA website: www.appea.com.au

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1 Summary

A number of major changes have occurred in the industry's operating environment since the development of the Upstream Oil and Gas Industry Strategy in late 2006 – early 2007. Most prominent has been the global financial crisis and rapid downturn in the world economy. Consequences have included a major fall in world oil prices from a peak of almost US\$150 per barrel in July 2008 to less than one quarter of that by year-end. This, after five years of rapid increases in industry costs, is squeezing margins and industry profitability and reducing oil and gas demand.

Aside from the economic environment, the election of new governments nationally and in Western Australia has created a wave of policy changes and reviews in addition to actions for addressing impediments to investment and growth in this industry and elsewhere. Of particular relevance have been the steps by government to respond to community concerns about climate

change and to reduce uncertainty about the costs and nature of future greenhouse policies and programs. Government has also recognised the need to ensure that Australia's tax regime is sufficiently competitive to attract increased investment in the downstream gas industry, including LNG. Approvals processes and regulation have also come under scrutiny with reviews initiated nationally and in Western Australia.

As these review and change processes are further developed and brought to a conclusion, governments have the opportunity to put in place a policy framework that will trigger the step-change increase in oil and gas exploration and development activity envisaged by the Upstream Oil and Gas Industry Strategy. The benefits to be gained in the form of increased employment and wealth creation for Australians and the secure supply of clean energy at home and abroad are very substantial.

Table 1: Key statistics, 2008

Value of production (2007-08)	\$29.6 billion (up \$6.3 billion on 2006-07)
Taxes and royalties (2007-08)	\$8.1 billion (up \$1.9 billion)
Direct employment	More than 20,000
Petroleum trade:	
Exports	\$22.4 billion (up 41 per cent)
Imports	\$35.5 billion (up 49 per cent)
Balance of trade	\$13.1 billion deficit (\$8.4 billion deficit in 2007)
Production:	
Oil and condensate	168.5 million barrels (1.3 per cent below 2007)
LNG	15.7 million tonnes (up 3.7 per cent)
Conventional gas	918 billion cubic feet (up 3.5 per cent)
Coal seam gas	143 billion cubic feet (up 39 per cent)
Exploration:	
Wells drilled	108 (down 3 per cent)
Metres drilled	274,400 metres (up 15.6 per cent)
Expenditure	\$3.4 billion (up 49 per cent)

The policy framework will need to include greenhouse policies that recognise the greenhouse benefits of gas and ensure that Australia's LNG producers are not competitively disadvantaged by programs such as the Carbon Pollution Reduction Scheme. Other elements include measures for attracting increased exploration in the many yet-to-be explored frontier areas of Australia and an approvals system that delivers best practice environmental outcomes at least cost and risk.

The policy framework will also need to include a capital taxation regime that is internationally competitive with that provided to large-scale gas projects overseas. This is now even more critical than before as a result of the reduced availability and higher cost of capital resulting from the global financial crisis. In seeking ways to stimulate economic recovery, governments should note that few other industry sectors have so many prospective major projects at such an advanced stage of planning each capable of attracting billions of dollars in investment and supporting thousands of construction jobs. Few other fiscal measures could help attract such a high ratio of private funds attracted to public funds foregone, particularly since the proposed depreciation changes would amount to a deferral of only a small proportion of the large, long-term tax revenues generated by the new investment in LNG projects. As well as promoting investment and jobs, a more attractive taxation regime for gas projects would also help provide a long-term solution to other high priority policy objectives in relation to energy security and greenhouse gas emissions.

To illustrate the potential benefits that could be achieved from a pro-investment policy framework, the Strategy proposed a number of targets to be achieved over the decade to 2017. As indicated in Chapter 3 of this report, progress towards the targets has to date been limited. Australia's oil and condensate production has declined in every year since 2000 including a fall of 1.3 per cent in 2008. The ratio of production to liquid fuels consumption has not stabilised as proposed by one of the targets but has continued to fall to a multi-decade low of 54 per cent in 2008. As a result Australia's petroleum trade deficit increased by \$4.7 billion to a record \$13.1 billion in 2008, despite a \$3.7 billion increase in LNG exports. A lack of oil exploration success and new oil projects to succeed those recently commissioned or currently under development will see Australia's liquids production as a

proportion of its liquid fuels consumption continue to decline over coming years.

A major expansion of Australia's gas industry could also deliver substantial economic and environmental benefits, including the avoidance of some 180 million tonnes per annum of global greenhouse gas emissions by 2017. A target to increase LNG production capacity to 50 million tonnes per annum by 2017 (compared with 20 mtpa in 2008) is achievable and the number of greenfields LNG project proposals has grown (in Queensland, Western Australia and the Northern Territory). In most cases though, their economics remain challenging and projects that have been moving towards a go-ahead decision in late 2009 or early 2010 may be affected by the reduced availability of capital and softening gas demand caused by the global economic downturn.

Within Australia, gas use is growing but not at rates implied by the targets calling for a doubling of gas usage for industrial purposes and a major increase in gas-fired electricity generation. Previously bullish growth projections in some parts of the Australian gas market are being reduced as a result of falling investment in new mining and gas-based processing projects. The electricity generation target (70 per cent of new electricity generation capacity to be gas fired) cannot be achieved without the removal of tax- and subsidy-related distortions in the electricity market.

Even so, good progress is being made in a number of the Strategy's priority areas, particularly in the areas of safety management and skills development and training. Through the CEO Leadership Forum, a range of measures are being introduced to further improve the safety performance of what is already one of Australia's safest industries. A range of training programs have also commenced to help meet the industry's long-term skilled labour requirements and to improve opportunities for under-represented groups in the oil and gas workforce, including females and Indigenous Australians. Progress on most of the other key priorities should accelerate as outcomes are delivered from a number of government policy processes now underway.

The uncertain global economic outlook and increased pressures on capital availability and cost make it even more important than before, that the industry and governments continue to work together to advance the Strategy's key priorities.

2 Changing investment environment

During the two years since the release of the Strategic Leaders' Report the investment environment facing Australia's oil and gas industry has changed significantly. The volatility in global financial markets and subsequent reduction in world economic growth has reduced the availability of capital and increased its cost. By late December 2008 oil prices had fallen to less than one quarter of peak levels and remain subdued. Expectations of recession or markedly lower growth among the world's major economies have affected gas demand growth in Australia (particularly that associated with new or expanding mining and processing industries) and could affect LNG demand growth.

Changes in governments nationally and in Australia's largest petroleum production state (Western Australia) have resulted in a number of policy changes and new priorities. Many have or will deliver improvements to the investment environment but some have raised new uncertainties and risks.

These additional challenges add weight and urgency to the task of implementing the Upstream Oil and Gas Industry Strategy. It is now more important than ever that options proposed in the Strategy for improving the industry's international competitiveness and its contribution to the Australian economy, are implemented as quickly as possible. Industry and government commitment needs to be sustained to meet the long-term challenges presented by an

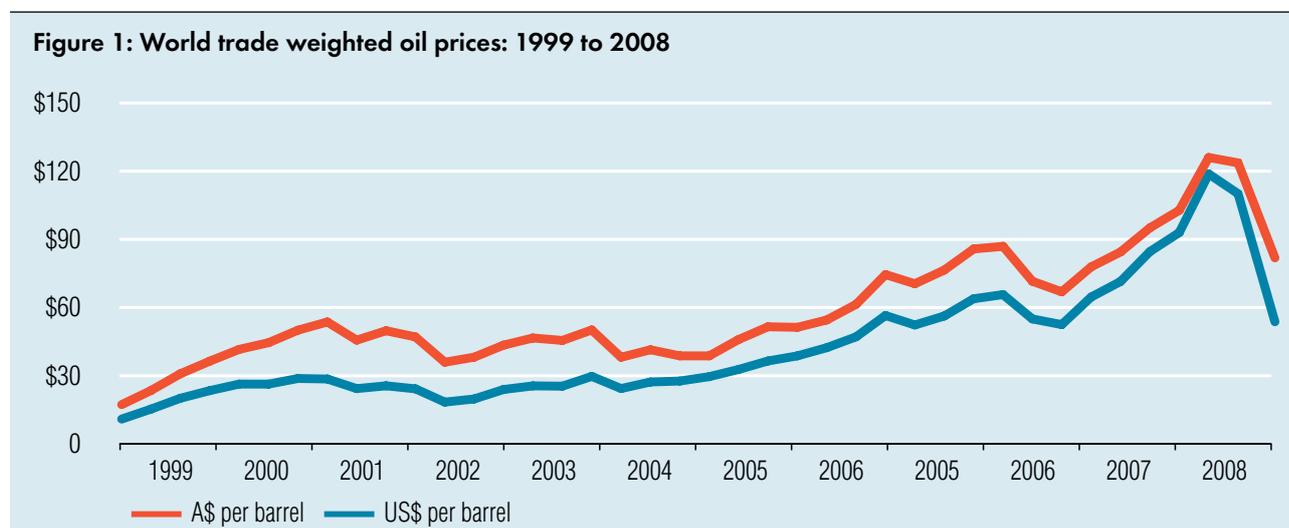
increasing deficit between liquid fuels consumption and production and opportunities generated by Australia's large gas resources.

2.1 Prices

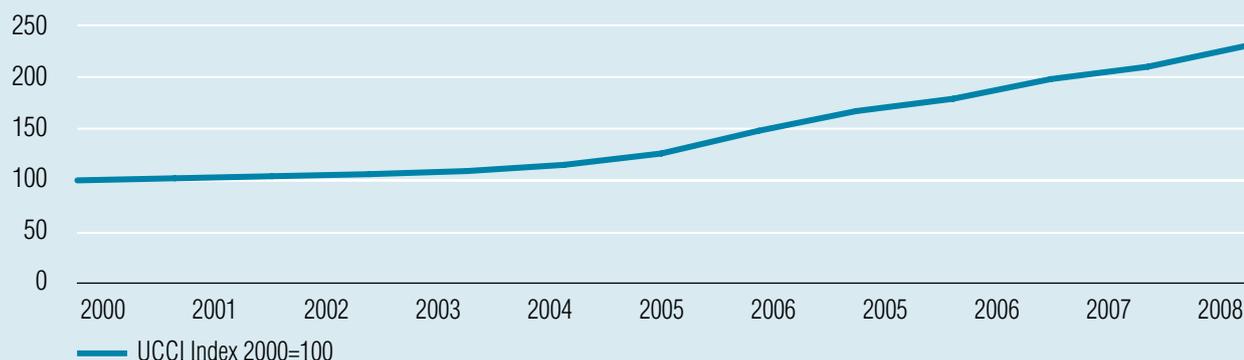
The upwards trend in oil prices that commenced in early 2002 accelerated during 2007 and the first half of 2008. World trade weighted oil prices averaged around US\$119 per barrel during the June quarter in 2008 with prices increasing rapidly towards the end of the period. West Texas Intermediate for example, reached a peak of US\$147 per barrel in July 2008. Fears of global economic recession however, led to a rapid fall in oil prices during the second half of 2008 with trade weighted prices in the final quarter averaging just US\$56.50 per barrel. Prices fell further in early 2009.

Gas prices in many parts of the world (including Western Australia but not the eastern states) also increased in recent years, thereby assisting the economics of investment in gas exploration and development. The rapid fall in oil prices during the second half of 2008 flowed through to forward contract prices and spot prices for LNG. Lags in oil-linked LNG pricing mechanisms mean that the impact on LNG prices within existing contracts will take longer to flow through.

Figure 1: World trade weighted oil prices: 1999 to 2008



Source: Australian Mineral Statistics, ABARE

Figure 2: Upstream Capital Costs Index

Source: Cambridge Energy Research Associates

2.2 Costs

The rapid increase in industry costs, noted in the Strategic Leaders' Report has continued over the past two years. Cost indices compiled by Cambridge Energy Research Associates indicate that the average cost of developing oil and gas projects around the world has more than doubled over the period from 2004 to 2008. Costs in Australia increased even more than the global average.

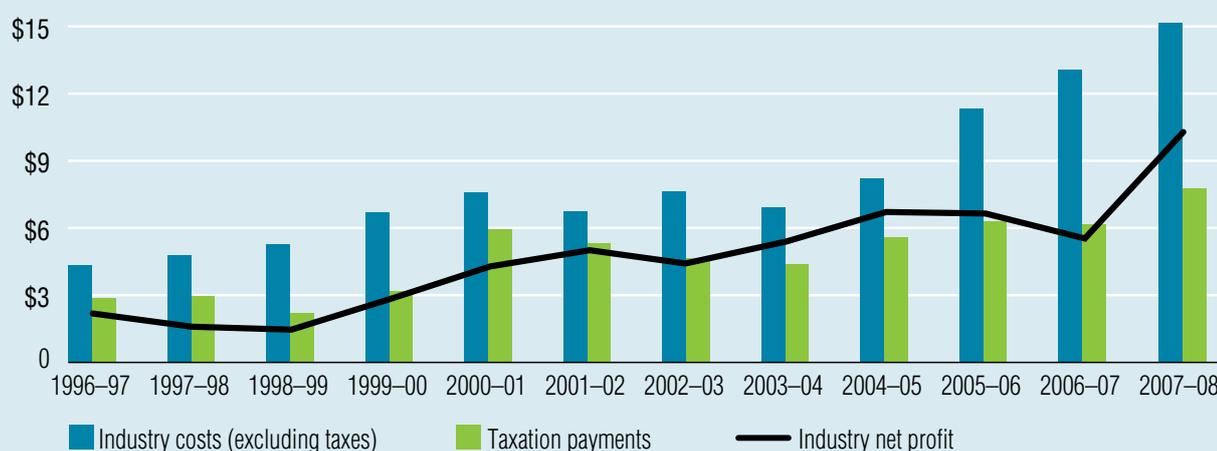
There are signs though of some easing of cost pressures in the future as a result of the downturn in the local and global economies. Global steel prices have fallen significantly, although this has been partly offset by the fall in the Australian dollar. Reduced construction activity and demand for skilled labour elsewhere in the economy could also ease the pressure on labour costs.

2.3 Profitability

As oil prices rose during the period up to mid 2008, so too did industry returns but to nowhere near the same degree. With most of Australia's gas production sold under long-term contracts (to

domestic and overseas buyers), average realised gas prices did not increase as rapidly, or to the same extent, as oil prices. The rising exchange rate also reduced Australian-dollar denominated returns. Compared with an almost seven-fold increase in US dollar oil prices from the December quarter in 2001 to the June quarter in 2008, average prices per barrel-of-oil-equivalent (boe) realised by the Australian upstream industry increased by just 87 per cent, from A\$42.89 per boe in 2000-01 to A\$80.24 per boe in 2007-08 (APPEA Financial Survey).

APPEA's survey also provides further evidence of the extent of cost increases faced by Australia's oil and gas industry and the effect this has had on profit growth. Over the past five years industry costs (excluding taxation payments) more than doubled, from \$6.9 billion in 2003-04 to around \$15 billion in 2007-08. Over the same period taxation payments increased from \$4.4 billion to around \$8 billion. From 2003-04 to 2006-07 net profits were relatively flat with rising revenue offset by rising costs and tax payments. Only in 2007-08 did revenue growth temporarily leap ahead and deliver a significant increase in industry profitability. This spike in profitability however, is likely to be short lived as a result of the fall in world oil prices during the latter part of 2008 and early 2009.

Figure 3: Upstream oil and gas industry financial performance, 1996-97 to 2007-08 (\$billion)

Source: APPEA Financial Survey

2.4 Financial crisis and recession

The decline in oil prices since mid 2008 was largely a consequence of the tightening in global credit markets and the expectation that many of the world's largest economies are entering recession or as in the case of China and other developing countries, a period of significantly reduced growth. The full effects of the global financial crisis and its recessionary impacts on global economic growth are still to be determined but Australia's upstream petroleum industry will not escape unscathed. Increased uncertainty and risk causes companies to give priority to strengthening balance sheets and improving efficiency. Although in a relatively sound financial position, the upstream petroleum industry is capital intensive and not immune from increased costs of risk and debt resulting from the changes in global financial conditions.

Smaller companies report that equity and debt funding for exploration has virtually disappeared. If sustained, this will significantly affect onshore and shallow water exploration.

Competition for capital and its cost have increased while lower oil prices combined with continuing high costs, have reduced cash flow. LNG projects are capital intensive so may be impacted by the financial crisis.

Other factors potentially impacting on the Australian gas industry are the extent to which additional gas resources become available elsewhere, the effect on production costs of a carbon emissions trading scheme or other greenhouse gas abatement measures and global marketing developments such as the creation of the Gas Exporting Countries Forum. The GECF has become a formal organisation with members planning to coordinate investment programs to avoid overproduction. Its 15 members (including Algeria, Indonesia, Malaysia, Nigeria and Qatar) represent a large proportion of the world's LNG exporters.

The LNG market is currently growing at its slowest pace in decades as the global economy slows. Global LNG production is estimated to have increased by under two per cent in 2008, the lowest rate of growth since 1980-81 (see www.livemint.com/2008/12/03231942/LNG-output-seen-rising-at-slow.html). Growth should recover as economic conditions improve, however it may take a long time to return to the growth rates previously envisaged.

Gas demand growth in Australia could also be reduced, particularly if a number of the proposed energy intensive magnetite and other resources projects proposed for development in Western Australia do not proceed or are deferred. Alcoa for example, decided in November 2008 to defer indefinitely the \$3 billion expansion of the Wagerup alumina refinery. The reduction in projected investment in minerals projects has reduced the upward pressure on gas prices in Western Australia.

2.5 Policy framework

It is acknowledged that governments elected since the development of the Upstream Oil and Gas Industry Strategy, are committed to providing a supportive policy framework for investment in oil and gas exploration and development. Governments have strongly supported the Strategy objectives and consideration of options for achieving them. As noted in Section 4 of this report, a number of initiatives have been implemented or are underway to improve Australia's competitiveness for oil and gas investment. The shortcomings in Australia's approvals and regulatory processes for example, have been acknowledged and reviews being undertaken should deliver a more efficient and streamlined system within the next few years. Some jurisdictions are introducing new measures for encouraging investment in frontier exploration and several governments are strongly supporting a range of new training programs to alleviate skilled labour shortages.

The priorities and options proposed by the Upstream Oil and Gas Industry Strategy are relevant to a number of broader policy review processes initiated by the Australian Government since its election in November 2007. These include:

- a review of Australia's Future Infrastructure Requirements undertaken during 2008 by Infrastructure Australia (see www.infrastructureaustralia.gov.au)
- a review of the National Innovation System undertaken by an Expert Panel chaired by Dr Terry Cutler (report released in September 2008) and the subsequent development of a White Paper on Innovation (see www.innovation.gov.au/innovationreview/Pages/home.aspx)
- the Garnaut Climate Change Review of Australia's policy response to climate change (see www.garnautreview.org.au/domino/Web_Notes/Garnaut/garnautweb.nsf)
- the development of an Australian emissions trading scheme with a green paper released in July 2008 and a white paper released in December 2008 (see www.climatechange.gov.au/whitepaper/foreword.html)
- the Review of Australian Higher Education chaired by Professor Denise Bradley with a report released in December 2008 (see www.deewr.gov.au/HigherEducation/Review/Pages/default.aspx)
- the National Review of Taxation being undertaken by Dr Ken Henry and expected to report by the end of 2009 (see <http://taxreview.treasury.gov.au/Content/Content.aspx?doc=html/home.htm>)
- a National Energy Security Assessment developed by the Department of Resources, Energy and Tourism (see www.ret.gov.au/energy/energy_security/national_energy_security_assessment/Pages/NationalEnergySecurityAssessment.aspx)
- the development of an Energy White Paper during 2009 commencing with the release of discussion papers including a paper on Realising Australia's Energy Resources Potential (see www.ret.gov.au/energy/facts/white_paper/Pages/default.aspx).

In these and all other reviews or changes to policies and programs, care needs to be taken to ensure that changes do not seriously damage Australia's international competitiveness for oil and gas investment or reputation for low sovereign risk.

The industry acknowledges the desire of governments and the community to introduce policies and programs to reduce greenhouse gas emissions. The Strategy includes a proposal for the introduction of an emissions trading scheme (option 4.3.2). It is important though, that the proposed Carbon Pollution Reduction Scheme does not reduce the competitiveness of Australia's gas industry by imposing costs that are not borne by competitors in other countries. Modelling undertaken by APPEA and individual project proponents indicates that the effects of even a modest carbon cost on Australia's LNG industry would, if not also borne by our competitors, be quite severe and result in substantial lost investment. Mechanisms need to be included within the scheme to ensure that impediments are not added to an industry that could make a substantial contribution to reducing the growth in global greenhouse gas emissions.

Other greenhouse-related policies, such as the increase in the renewable energy target to 20 per cent by 2020, also have the potential to distort energy markets and increase the cost of meeting national greenhouse gas reduction targets.

A reputation for low sovereign risk has long been one of Australia's main competitive advantages for oil and gas investment. This is especially important for long-life, capital-intensive gas projects requiring stable and predictable regulatory and fiscal terms over a number of decades. Therefore, unanticipated changes to long standing taxation arrangements, such as the May 2008 announcement about condensate excise, can have wider implications and potentially increase investor's assessment of risk and of the minimum rates of return needed to attract investment.

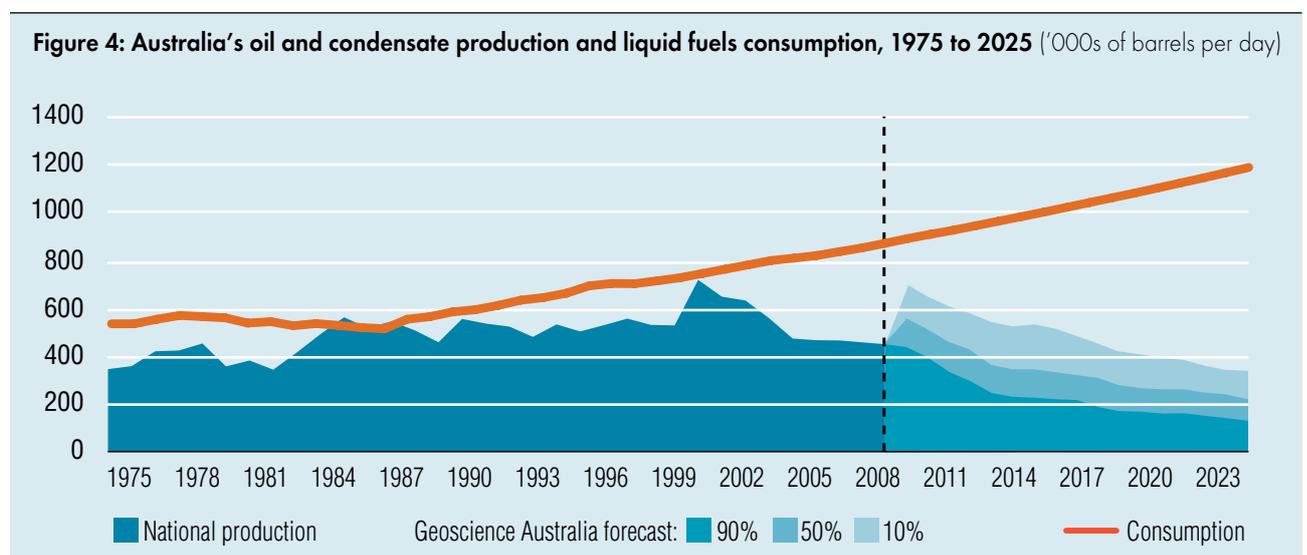
3 Progress towards targets

Oil and condensate production as a proportion of liquids fuels consumption is, on average, maintained at the 2006 level of 57 per cent or better.

3.1 Liquids production

As indicated in Figure 4, Australia's oil and condensate production has declined every year since the year 2000, from 715 thousand barrels per day (kbd) to 461 kbd in 2008 (an aggregate decline of 35 per cent). A similar diagram, published in the Strategic Leaders' Report in 2007 (as Figure 10), anticipated a short but significant spike in oil and condensate production to 653 kbd in 2007 and 608 kbd in 2008 (at the 50 per cent probability level and based on Geoscience Australia projections published in 2006). These higher production rates have not been achieved due to facilities issues and greater than expected decline in some producing fields. Oil and condensate production may temporarily increase in 2009 but without major new discoveries, will return to the long-term downwards trend. The ratio of production to liquid fuels consumption declined to 56 per cent in 2007 and 54 per cent in 2008.

The decline in production in 2008 is disappointing given the significant number of new project start-ups over recent years. The US\$760 million Stybarrow oil project commenced production in November 2007 (production capacity of 80,000 barrels a day or 80 kbd) and the Puffin oil project in the Timor Sea commenced production in October 2007 (at an average rate of 5 kbd). The Vincent oil project (with a capacity of 100 kbd) commenced production in August 2008 and the North West Shelf Venture's Angel project was commissioned in October



Source: ABARE, Geoscience Australia, APPEA

2008 (with a capacity of 310 PJ per annum of gas and 50 kbd of condensate). Vincent and Angel capital costs were A\$1 billion and A\$1.6 billion respectively.

Elsewhere in the country Santos (through its Cooper Oil Program) and several small to mid tier companies have been successful at finding small oil fields in the Cooper Basin and quickly bringing them into production through the use of existing infrastructure.

Oil projects currently under construction include:

- The Apache-operated Van Gogh oil project being developed at a cost of A\$600 million and expected to commence production during 2009 (capacity of 63 kbd).
- The BHP Billiton operated Pyrenees oil project costing A\$2 billion and expected to commence production during the first half of 2010 (capacity 96 kbd).
- The Montara oil project in the Timor Sea (including development of the Skua, Swift and Swallow fields) operated by PTT Exploration and Production Public Company Limited, Thailand's national petroleum company. Proved and probable reserves are 39.9 million barrels and the project is estimated to cost US\$700 million and produce first oil in the third quarter of 2009.

Towards the end of 2008, Woodside and its joint venture partners announced their decision to proceed with the North West Shelf Oil Redevelopment Project at a cost of A\$1.8 billion. The project will include a floating, production, storage and offtake facility to replace the ageing Cossack Pioneer and extend production from the North West Shelf oil fields to beyond 2020.

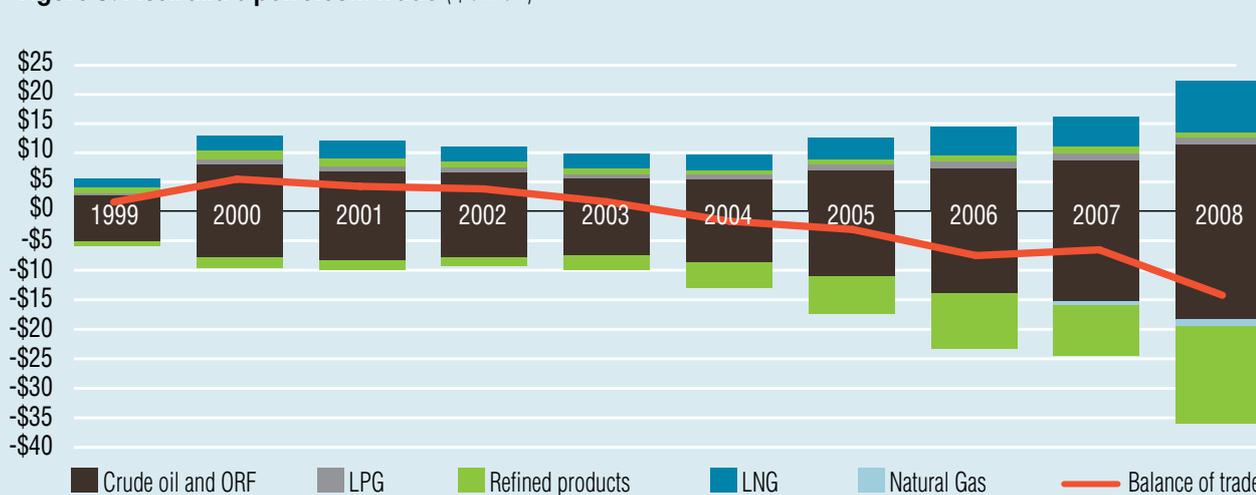
The only notable oil project currently under consideration for development is the Crux condensate recycling project in the Timor Sea, operated by Nexus Energy. Proved and probable condensate reserves are 75.2 million barrels. Subject to the finalisation of funding arrangements and equity participation, the project could provide a welcome boost to Australia's liquids production within the next few years.

Looking further ahead though, there have been very few significant oil discoveries in recent years to support the next generation of oil field developments. Exploration for oil is still largely directed towards mature oil provinces with discoveries becoming smaller and smaller. Not enough exploration is occurring to test unproven oil plays in frontier areas that hold the greatest potential for a major discovery. In addition, production from most of the new or about to be commissioned projects mentioned above is expected to drop away quickly. Australia's liquids production therefore, is expected to decline rapidly after 2009. It generally takes at least five years to appraise and develop a major oil discovery so unless several major new fields (or ideally a new oil province like the Exmouth Sub-basin) are discovered within the next few years, the Strategy target of maintaining the liquids production to consumption ratio at the 2006 level, will be difficult to meet.

Beyond 2014, the commissioning of one or more greenfields LNG projects with condensate-rich gas, could help to partially reverse the decline in liquids production. In addition to gas reserves of 12.8 trillion cubic feet, the Ichthys field for example, has condensate reserves of 527 million barrels making it the largest liquid hydrocarbon accumulation found in Australia since the Bass Strait oil fields in the 1960s (*Minister welcomes new giant oil and gas fields, The Hon Martin Ferguson AM MP, 20 May 2008*). If the Ichthys LNG Project proceeds as planned, it could add 100 kbd of condensate to Australia's liquids production by 2015 (see www.projectconnect.com.au).

As indicated in Figure 5, the petroleum balance of trade has continued to deteriorate with imports exceeding exports by a record \$13.1 billion in 2008, despite markedly lower oil prices in the second half of the year. This is \$4.7 billion higher than the petroleum trade deficit of \$8.4 billion in 2007. The latest two years of data further support the statement in the Strategic Leaders' Report that the liquids trade deficit (excluding LNG) could double from \$13.7 billion in 2006 to \$28 billion or more by 2017.

Figure 5: Australia's petroleum trade (\$billion)



Source: Australian Mineral Statistics, ABARE

3.2 LNG capacity

LNG production capacity increases from 20 million tonnes a year in 2008 to at least 50 million tonnes a year in 2017.

Commissioning of the North West Shelf Venture's 5th LNG train in August 2008 and the expected commencement of production from the Pluto project in 2010 will increase Australia's LNG production capacity to 23.6 million tonnes per annum.

To achieve the target, an additional 26 mtpa of capacity will need to be constructed and commissioned by 2017. In addition to possible brownfields expansions of the NWS, Pluto and Darwin LNG projects, at least 11 greenfields projects with initial capacity totaling more than 60 mtpa are being proposed for development over the next five to seven years.

In the north-west these include:

- Greater Gorgon project operated by Chevron (15 mtpa)
- Pilbara LNG project operated by BHP Billiton
- Wheatstone LNG project operated by Chevron (5 mtpa)
- Ichthys area project and LNG plant at Darwin operated by Inpex (8 mtpa)
- Browse LNG development (Torosa, Calliance and Brecknock fields) operated by Woodside with production capacity of up to 15 mtpa
- Prelude LNG project operated by Shell (3.5 mtpa)
- Sunrise LNG project in the Timor Sea operated by Woodside (5.3 mtpa).

In Queensland, four new LNG projects near Gladstone were actively progressed during 2008:

- Santos and Petronas (3-4 mtpa expandable to 10 mtpa)
- BG Group (3-4 mtpa initially, expandable to 12 mtpa)
- Origin Energy and ConocoPhillips (up to 4 trains of 3.5 mtpa each)
- Arrow Energy and Liquefied Natural Gas Limited (1.5 mtpa).

In addition, LNG Impel, a subsidiary of Galveston LNG, announced in May 2008 plans for an open-access LNG plant of up to three trains with capacity of 0.7-1.3 mtpa.

The proposed Queensland LNG projects would be the first coal seam gas (CSG) to LNG projects in the world. The involvement of several major international and Australian petroleum companies provides the necessary financial, technical and marketing capacity to enable developments to proceed.

At first glance therefore, it would appear that the Strategy's target of 50 mtpa capacity by 2017 will be easily achieved. A variety of challenges though, will need to be confronted in moving projects to the production stage.

Capital costs for upstream facilities and liquefaction plants have increased by a factor of two to three over the past five years with a typical 10 mtpa greenfields project in the north-west likely to cost in excess of \$20 billion. Wood Mackenzie has estimated that over the three years from early 2005 to early 2008, upstream capital costs per tonne of LNG production capacity doubled and liquefaction capital costs per tonne of capacity more than trebled (*The Outlook for Australian LNG*, Deutsche Bank Energy Seminar, March. See www.woodmac.com).

The outlook for Australia's LNG industry has also been impacted by the recent turmoil in financial markets, the outlook for reduced global economic growth (including in the key LNG growth markets of China, Japan and the USA) and the strong competition from other countries seeking to develop or expand their LNG industries.



Source: CERA Energy Analytics, January 2009

Indeed recent analysis by Cambridge Energy Research Associates (CERA) shows that Australia is one of the highest cost locations for new LNG projects supplying the Asia-Pacific market. As indicated in Figure 6 proposed Australian LNG projects mostly lie at the right-hand (highest cost) spectrum of proposed LNG developments.

Greenfields LNG projects will generally take three to five years to build. So to achieve the Strategy target of 50 mtpa installed capacity by 2017, construction of projects with a combined capacity of 26 mtpa will need to commence over the next five years. Without a marked improvement to its competitive position, Australia may well struggle to capture this volume of sales contracts and attract the capital (at least \$50 billion) needed to underwrite these projects.

3.3 Industrial gas usage

By 2017, natural gas use for industrial purposes and as a competitive feedstock for resources processing doubles.

To meet this target, gas consumption in the manufacturing industry would need to increase at an average annual compound rate of 7.2 per cent per annum over ten years.

According to statistics on final energy consumption published by the Australian Bureau of Agricultural and Resource Economics, gas consumption in the manufacturing industry increased by 4.2 per cent in 2006–07 (to 412 petajoules or 1129 terajoules per day). The main contributors to growth were in the production of basic non-ferrous metals (gas consumption up 3.4 per cent) and cements, lime, plaster and concrete (where gas consumption doubled). Offsetting a part of the increase in these sectors was an 8.7 per cent fall in the use of gas in the production of basic chemicals.

Gas consumption data for 2007–08 is not yet available and it is difficult to draw trends from just one year of data. It is clear however, that the rate of growth of gas consumption in manufacturing will need to increase if the Strategy target is to be achieved.

In November 2008, a report prepared by Economic Consulting Services for a group of the largest gas consumers in Western Australia, suggested that the gas market in that state (941 TJ per day in 2007) could almost double by 2015 as a result of growth in the state's mining and resources processing industry. This includes expansions of three large iron ore producers and two gold mines and the development of 11 new iron ore projects, eight gold projects and four nickel projects. The fall in commodity prices and restrictions on the availability of capital however, mean that these projections are unlikely to be realised. As noted previously, Alcoa's proposed Wagerup expansion was the first casualty. Since then, iron ore production has fallen in response to declining steel production in China and Japan and numerous announcements have been made about mine closures and project deferrals including the closure of a number of nickel mines and the deferral or collapse of new projects such as the Mt Weld rare earths project and Windimurra vanadium project.

On the supply side of the gas business, a number of new domestic gas projects have been developed, are under construction or are moving towards development in order to meet longer-term growth in gas demand. In Western Australia, Apache Corporation and Santos are developing the Reindeer offshore gas field and Devil Creek onshore gas plant to increase gas

supply to the West Australian domestic market. The Devil Creek gas plant is designed to supply up to 220 terajoules per day from 2011.

Subject to demand, the Macedon field operated by BHP Billiton could also be developed to supply around 170 TJ per day. In the longer term Apache's Julimar/Brunello fields and the Gorgon project could also supply the West Australian market. Latent Petroleum has commenced drilling for the Warro gas project in the onshore Perth Basin. This is Western Australia's first tight gas project (gas that is found in low permeability rock and must be extracted with specialised equipment) and gas production could commence in 2010. Other tight gas projects could follow.

In the eastern states market, the rapid growth of the coal seam gas (CSG) industry, noted in the Strategic Leaders' Report, has continued. In the year to 31 December 2008, CSG production in Queensland and New South Wales increased by 39 per cent (to 403 TJ per day) to account for more than 20 per cent of the south-east Australian gas market. Reserves have also increased rapidly and as noted above, are sufficient to support the development of a number of LNG projects as well as future growth in the domestic gas market.

Several new conventional gas projects are also being developed in the Bass Strait to meet increased gas demand in southern Australia, including:

- the Longtom gas project being developed by Nexus Energy to commence production in 2009
- the Henry gas project operated by Santos to commence production in late 2009
- the Turrum Project operated by Esso Australia with oil production expected in 2011, first gas sales expected from 2015
- the Kipper gas project operated by Esso Australia, expected to commence production in the first half of 2011.

Long-term gas supply security in the Northern Territory is also being improved through the development of the Blacktip project by ENI Australia. Gas production of 68 TJ per day is expected to commence in 2009, ultimately increasing to 113 TJ per day.

3.4 Gas-fired electricity generation

In a competitive electricity market, 70 per cent of all new electricity generation capacity installed in Australia over the decade to 2017 is gas fired.

It is important to note that there are two components to this target:

- the achievement of a competitive electricity market without tax- and subsidy-related distortions (as proposed in option 3.1.1)
- that 70 per cent of all new generation capacity installed over the decade to 2017 be gas fired.

It will not be possible to achieve the market share component without first providing a truly competitive market. That is, an electricity market without subsidies, mandated targets or tax-related distortions. Gas would then compete strongly for most power generation projects over the next decade. The introduction of an emissions trading regime or other form of carbon pricing would also strengthen the competitive position of gas- over coal-fired generation, at least until carbon capture and storage technologies are commercially available.

The announcement however, by the government that a target of 20 per cent of all electricity generation is to be sourced from renewables by 2020, would if supported by mandated requirements and subsidies, make it difficult for gas to compete. Indeed, it has been suggested that at least half of all new generation capacity installed between now and 2020 would need to be based on renewables if the 20 per cent target is to be achieved (*'2020 Vision', Ernst & Young, November 2008*).

Therefore, although the following discussion looks at the mix of generating capacity installed since the commencement of the Strategy, the real focus of attention needs to be on the reforms needed to achieve a truly competitive electricity market. That is, a market that meets the energy needs of the community in the most economically and environmentally efficient manner possible. Only then can the 70 per cent target for gas be achieved.

Analysis undertaken by CRA International shows that the combination of an emissions trading scheme (ETS) with a 20 per cent renewable energy target is significantly less efficient than an ETS alone in achieving a given level of emissions abatement.

To reach an emissions abatement target of 67 million tonnes CO₂e in 2020 for example (equivalent to 12 per cent of Australia's 2000 emissions), a combined ETS and 20 per cent renewable energy target would by 2020:

- cost Australia \$1.8 billion more a year than a pure ETS policy in terms of economic welfare (GNP) losses
- cost Australia \$1.5 billion more per year than the ETS in output (GDP) losses
- result in the loss of an additional 3600 full time equivalent jobs
- reduce gas-fired electricity generation by 16 per cent or 12,620 GWh a year compared with an ETS
- add another 6 per cent to electricity prices compared with prices under an ETS.

"A mandated renewable energy target is less efficient at achieving a given environmental outcome because it forces higher cost renewable energy into the electricity generation mix at the expense of exploiting lower cost emissions abatement opportunities elsewhere in the economy. Contrary to the popularly held belief that such mandated targets generate jobs, the overall effect on the economy is the generation of less jobs than otherwise would have occurred and a loss of output in the economy as a whole compared to the outcome with a well designed emissions trading scheme."

Implications of a 20 per cent renewable energy target for electricity generation, CRA International, November 2007.

Generation capacity commissioned since 2007

Statistics published by the Energy Supply Association of Australia indicate that during 2007 and 2008 around 2898 megawatts (MW) of new electricity generation capacity was commissioned in Australia. Of the total, 34 per cent (998 MW) is coal fired, 33 per cent (969 MW) is gas fired and 32 per cent (910 MW) is derived from renewables (mostly wind). A small 21 MW oil-fired plant in Broome provides the remainder.

Kogan Creek (750 MW) in Queensland and Bluewaters I (208 MW) in Western Australia accounted for most of the increase in coal-fired capacity. Western Australia is also home to most of the new gas-fired power generation, including the NewGen Kwinana power project (320 MW), Stages I and II of Alinta's Wagerup Cogeneration project (175 MW each) and a second unit at Alinta's Cogeneration project at Alcoa's Pinjarra refinery (140 MW).

Of the nine renewables projects commissioned in 2007 or 2008, six were wind projects (in Tasmania, South Australia and Victoria), while New South Wales hosted two biomass projects and a solar project.

Almost 4700 MW of new generation capacity is currently under construction and is expected to be commissioned during 2009. Gas is the predominant fuel input (82 per cent or around 3850 MW) with coal-fired power stations and renewables accounting for 13 per cent and five per cent respectively of the remainder.

Major gas-fired power stations currently under construction include:

- Delta Electricity's Munmorah project in New South Wales (660 MW)
- Origin Energy's Uranquinty project near Wagga Wagga in New South Wales (640 MW)
- TRUenergy's Tallawara power station in New South Wales (400 MW)
- Origin Energy's Darling Downs Power Station in Queensland (630 MW)
- Wambo Power Venture's Braemar Stage II in Queensland (450 MW)
- Babcock & Brown Power/ERM Power Neerabup project in Western Australia (330 MW).

Combining the two data sets indicates that more than 63 per cent of new electricity generation capacity commissioned during 2007-09 will be gas fired. Although a good performance against the target of 70 per cent, it is unlikely to be sustained over the longer term unless the electricity market is freed from tax- and subsidy-related distortions. As noted above, achievement of the 70 per cent, second part of this Strategy target is very much dependent on the achievement of the first.

4 Progress on high value-adding priorities

This chapter reviews progress during 2008 towards addressing the seven high value-adding priorities identified in Section 2 of the Strategic Leaders' Report (SLR).

Within each priority, the key options with the greatest impact and requiring policy changes or new initiatives are restated (as per Chapter 6 of the SLR). Background information about the nature of the priority and recent evidence of its continuing significance is then provided. Actions to date are reviewed and finally,

consideration is given to the anticipated way forward in the further development and implementation of the key options.

Of the remaining options, some have been fully implemented while others have been allocated a lower-priority status. The remainder are being progressed by APPEA's policy committees through established avenues of communication with governments and other stakeholders.

4.1 An improved fiscal framework for gas projects

OBJECTIVE

To remove the competitive disadvantage facing investors in Australian gas projects resulting from atypically long depreciation write-off periods for company tax.

KEY OPTIONS

- 2.11 Implement key adjustments to the company tax regime to reduce the distortionary impact of income tax on the economics of gas projects. Under the existing provisions, gas developments generally incur a tax liability prior to generating a risk-adjusted return on invested funds. Reform could be achieved through the application of a five-year write-off under the depreciation regime. Such a reform would also have the opportunity of achieving significant greenhouse-related benefits by encouraging the development of a suite of new gas-based projects.

BACKGROUND

The Strategic Leaders' Report clearly enunciated the case for improving the economics and relative competitive position of Australian gas projects.

- To remove a market distortion and impediment to international competitiveness in that depreciation write-off periods of up to 15 and 20 years for gas project infrastructure are much longer than the less than ten year periods generally available to gas projects overseas.
 - To enhance Australia's energy security by increasing gas supply diversity.
 - To maximise the contribution gas can make to cost effectively reducing Australian and global greenhouse gas emissions.
 - To make a long-term investment in the maintenance and growth of future tax receipts from the oil and gas industry.
- The deferral of relatively modest tax receipts in the early years of a project life would be more than offset by the much larger returns received for many years to follow. Modelling reported in the Strategic Leaders' Report indicated that a two-train LNG project could deliver \$40 billion in income and resource tax payments to governments over a 27 year project life.
- To maximise the value of Australia's gas resources to the Australian community. Australia's known conventional and coal seam gas resources are large and increasing year-by-year as more discoveries are made. But they cannot yield jobs, income and tax revenue until they are developed. Project delays reduce value and discourage further exploration.
 - To help offset some of Australia's impediments to petroleum investment such as high construction costs, geographic isolation of resources, low oil prospectivity and lack of established infrastructure.

Despite a modest improvement in international gas prices over recent years, the economics of proposed greenfields LNG projects in Australia remain challenging. The benefit of increased project revenues has been offset by rapidly rising costs. As a result, some projects have been delayed and studies are continually being undertaken to find ways to improve project economics. An increase in the size of the Gorgon project from 10 mtpa of LNG production to 15 mtpa is an example.

Further evidence of the need to improve Australia's fiscal terms for gas projects has been provided by two recent reports by Wood Mackenzie and PricewaterhouseCoopers.

Wood Mackenzie undertook a study for a number of APPEA member companies in late 2008 to comment on the differences between oil and gas projects and to specifically highlight the challenges that confront gas projects in Australia. The report was a follow-up to one conducted in 2005. Key findings included:

- gas projects continue to achieve lower prices than comparable oil projects
- the structure of gas projects are such that even if the prices achieved are the same as for oil, the present value of oil projects for an investor may still be more than double that of gas projects on a per barrel-of-oil-equivalent basis
- lead times between discovery and project go-ahead decisions for gas developments in Australia continue to grow
- while the economics for oil and gas projects are fundamentally different, the same tax terms apply to both. This considerably disadvantages gas investments. Federal income tax causes particular challenges
- the trend of overseas jurisdictions offering special terms for gas projects has continued.

PricewaterhouseCoopers has also undertaken a comprehensive global analysis into key elements of the incidence of taxation on business activities, as well as the impact of tax administration on corporate activities. The review, conducted as part of the World Bank's 'Doing Business' project, covered 181 countries and measured the following:

- 'ease of paying' tax ranking
- the number of tax payments made during a year
- time required to comply
- the total tax rate.

Australia performed relatively well in the first three measures (ranking 68th, 33rd and 25th respectively), but rather poorly when measured on a total tax rate basis, where Australia ranked 127th. This result is even worse when Australia is compared with other gas producing countries. Under this scenario, Australia ranks almost last.

Table 2: Total tax rate (as a percentage of commercial profits) – gas producing countries

Country	Overall ranking
Qatar	3rd
UAE	4th
Saudi Arabia	6th
Oman	15th
Nigeria	39th
Trinidad & Tobago	43rd
Malaysia	53rd
Indonesia	72nd
Brunei	73rd
Norway	88th
Papua New Guinea	89th
United States	92nd
Egypt	109th
Australia	127th
Algeria	167th

Source: PricewaterhouseCoopers, 'Paying Taxes 2009: The global picture' (www.pwc.com)

The reduced availability and higher cost of capital resulting from the global financial crisis has increased the relative importance of this priority and of ensuring that Australia's tax treatment of capital is competitive with that available to gas projects overseas. Adoption of the proposed depreciation changes for gas projects would have a significant impact on project economics and on international investors' assessments of Australia's investment attractiveness. Few if any other industry sectors have so many major projects at such an advanced stage of planning each capable of attracting billions of dollars in investment and supporting thousands of jobs. Few other measures to stimulate the domestic economy could offer such a high ratio of private funds attracted to public funds invested and deliver such large, long-term economic benefits at no long-term cost to government revenue, other than the deferral of a small proportion of the tax revenues generated by the investment.

"Changes to the taxation settings, like many other cost or technical factors, may not alone lead to changes in project decisions. However, modified terms can improve the overall framework and they also represent one of the limited number of financial variables that are within the control of governments. The lower returns, longer lead times and generally higher risks associated with gas projects lend themselves to potentially greater economic improvements through taxation changes."

APPEA submission to the Senate Select Committee on Fuel and Energy, August 2008.

ACTION TO DATE

A pleasing development during 2008 was the restatement by the incoming Minister for Resources of the ALP's pre-election commitment to review fiscal terms for gas projects and downstream gas processing and the commencement of processes for the implementation of that commitment. In particular, these matters are to be considered by the National Review of Taxation due to report to government by the end of 2009. APPEA has provided detailed submissions to the National Tax Review, with the key recommendation for gas

projects being the introduction of a three-year company tax depreciation regime.

The need for fiscal changes for gas projects has also been raised in other submissions and discussions with government, including input into the development of the National Energy Security Assessment and reviews of infrastructure requirements and funding undertaken by Infrastructure Australia and the West Australian Parliament.

WAY FORWARD

As the National Tax Review progresses, the industry will continue to provide submissions and make representations to government that explain and emphasise the need for improvements to Australia's fiscal terms for gas projects. This theme will also be carried forward in APPEA representations to other relevant policy review processes such as the development of the government's Energy White Paper. Given the lengthy discussion and extensive

analysis that has already occurred, early consideration of the gas industry's circumstances by the National Tax Review is being sought leading to a recommendation that depreciation terms for gas projects be improved.

Discussions between industry and government will continue in 2009 to ensure that the various resource taxation regimes encourage positive investment decisions by project proponents.

"Ken Henry's review of the taxation system will include an assessment of the barriers to investment in large-scale downstream gas processing projects in Australia, the particular hurdles faced by remote gas developers, and consideration of the future policy framework for new sunrise industry investment in Australia's gas sector, including new LNG and Gas-to-Liquids.

New gas projects such as Gorgon, Browse, and Sunrise are struggling to get off the ground and it is therefore time to even up the playing field for investment."

Speech to CEDA's 2008 State of the Nation Conference,
The Hon. Martin Ferguson AM MP, Minister for Resources and Energy, 5 June 2008

4.2 An improved framework for exploration

OBJECTIVE

To obtain a comprehensive understanding of Australia's petroleum potential particularly in frontier areas with little or no exploration to date.

KEY OPTIONS

- 1.1.5 Expand support for onshore pre-competitive geoscience initiatives so as to stimulate greater interest in onshore frontier basins. Develop a package of measures for increasing exploration. Measures could include:
- 1.2.1 ■ A broader definition of 'frontier acreage' which includes conceptual definitions of 'frontier' – including geographical or geological criteria – and increase the availability of incentives to a greater number of areas onshore and offshore.
 - 1.2.2/ ■ Mechanisms additional to existing permit and fiscal terms that will encourage petroleum exploration in remote
1.2.3 and frontier areas (such as increased company tax write-off rates for exploration expenses).
 - 1.2.4 ■ States/NT to review and improve incentives for onshore frontier exploration.
 - 1.2.6 ■ Systems such as flow through shares to improve access to capital for junior participants in both onshore and offshore exploration.
 - 1.4.1 ■ Develop processes for faster cycling of acreage.

BACKGROUND

An improved framework for exploration continues to be a priority and essential to achieving the Strategy's targets. As indicated in Figure 7, exploration activity has not increased in recent years. Expenditure has risen but this has been due to increasing costs, not higher levels of activity.

As indicated in Table 3, the take-up rate of exploration areas offered by the Commonwealth is still relatively high due to factors such as a resurgence of interest in gas, the availability of geoscientific data for the areas on offer, increases in oil prices and the availability of risk capital. In recent years though and despite rising oil prices, the percentage of areas granted has eased a little from 90 per cent in 2005 to 74 per cent in 2007.

Increased interest in Australia's exploration acreage is also reflected in higher levels of data loans from Geoscience Australia

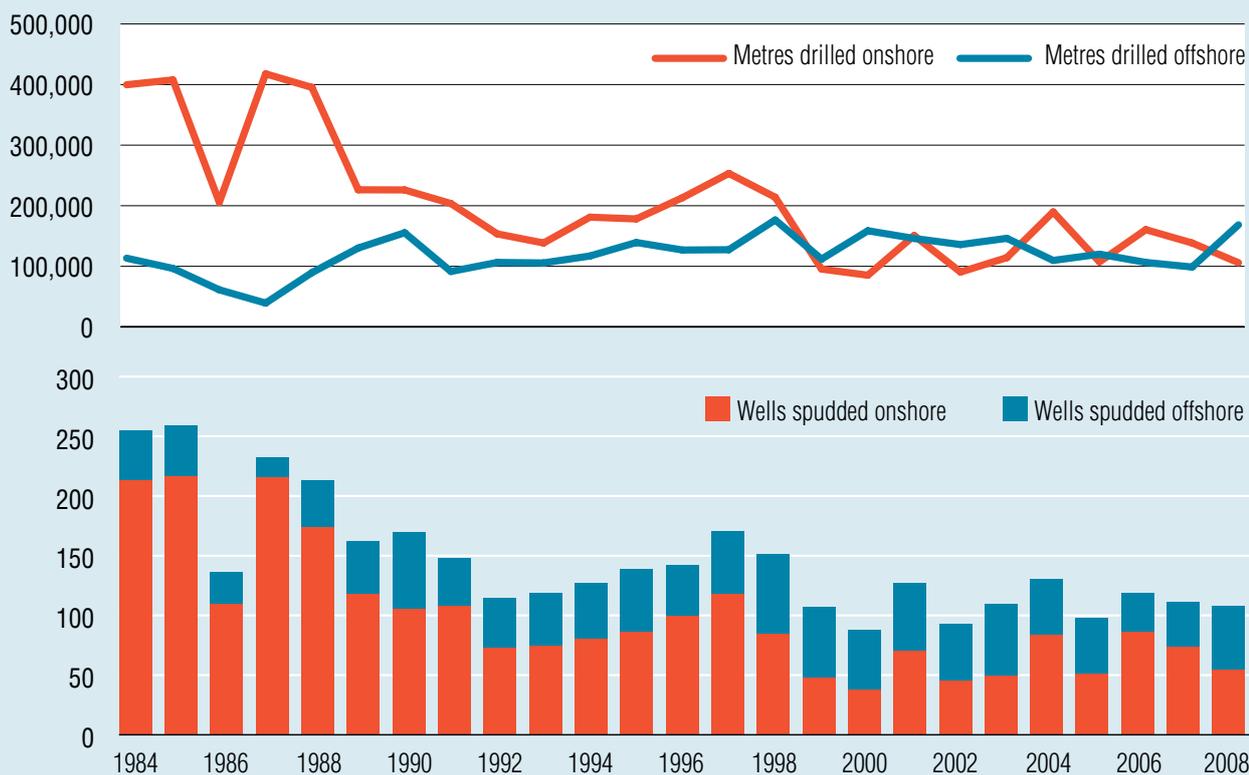
(Table 4). This has been made possible by a government initiative in 2003 (the New Petroleum Program) to invest \$61 million over four years, to both re-master existing seismic data (\$10 million) and acquire and interpret new data in support of offshore acreage releases. As a result, Geoscience Australia has been able to provide data to industry more easily, at lower cost and more quickly than was previously possible. This work continues in the current Offshore Energy Security Program (2006–11).

Over recent years a number of major independent and national oil companies such as Hess Corporation and the China National Offshore Oil Corporation (CNOOC) have taken up exploration acreage and commenced significant exploration programs.

Table 3 Petroleum acreage releases within Commonwealth jurisdiction, 2001 to 2008

Year	Number of areas released	Designated frontier areas	Number of designated frontier areas granted	Number of areas granted	% of areas granted	World oil price: trade-weighted average (US\$)
2001	42	–	–	31	74	21.59
2002	41	–	–	18	44	23.67
2003	35	–	–	17	49	27.25
2004	31	6	3	25	81	34.41
2005	29	5	4	26	90	49.58
2006	36	6	4	31	86	61.95
2007	34	6	6	25	74	68.30
2008	35	7	^a	^a	^a	94.60

– Zero. ^a Areas released in April 2008; bids received/to be received in October 2008/ April 2009. Source: Geoscience Australia, unpub. data.

Figure 7: Australian wells spudded and metres drilled, 1984 to 2008

Source: APPEA

Exploration activity among established players like Woodside, Santos, Shell, Chevron, Apache and ENI has also increased resulting in a number of sizeable gas discoveries in offshore north-west Australia (including Wheatstone, Iago, Jansz/Jo, Prelude, Thebe and Julimar/Brunello).

Even so, most of the areas being awarded are located around established petroleum provinces and very few wells continue to be drilled in offshore or onshore frontier areas.

Table 4: Data loans from Geoscience Australia repository, 2001 to 2008

Year	Data volume (terabytes)	Surveys	Wells
2001	11.7	388	<50
2002	12.5	325	<50
2003	19.3	488	<50
2004	10.2	485	<50
2005	24.3	600	150
2006	33.0	1120	1050
2007	139.0	1800	1200
2008	171.0	1660	1170

Source: Geoscience Australia, unpub. data

Table 5: Exploration wells drilled, 1996 to 2008

Year	Offshore		Onshore
	Frontier	Immature	Frontier
1996	1	2	2
1997	0	6	5
1998	0	15	5
1999	0	11	3
2000	1	15	2
2001	1	14	1
2002	2	4	1
2003	4	7	1
2004	1	6	3
2005	2	3	4
2006	1	7	1
2007	0	14	4
2008	3	18	4
Total	16	122	36

Source: Geoscience Australia, unpub. data.

Exploration targets

The Strategic Leaders' Report included five targets for exploration-related activity over the decade to 2017. These can be summarised as:

- increasing Australia's share of global exploration expenditure
- a three-to-four fold increase in drilling in frontier areas
- a doubling of oil reserves as at 2006 and discovery of at least one new oil and gas province
- increasing Australia's gas reserves
- becoming one of the top five most attractive investment locations.

The target for frontier drilling is for 40 wells to be drilled in offshore frontier areas and 100 wells drilled in onshore frontier basins (excluding drilling for coal seam gas) over the decade to 2017. With just three offshore wells and eight onshore wells drilled in the past two years, a marked increase in activity will be needed if the target is to be achieved.

Likewise the discovery of at least one new oil and gas province has yet to materialise and there have been no major oil discoveries since 2006 to help achieve the target of doubling oil reserves. Geoscience Australia has estimated that Australia's proven and probable oil reserves at 1 January 2006 totalled 1691.5 million barrels. Therefore, the target will require the discovery of not only another 1700 or so million barrels to match the 2006 reserves, but also the discovery of reserves to replace those that will be produced between 2006 and 2017. Oil production from 2006 to 2017 inclusive is estimated to total around 1300 million barrels (Geoscience Australia's P50 projections in Figure 4). Hence, some 3000 million barrels of oil will need to be discovered over the next ten years. Some of this may be met by increases to reserves in fields already discovered and further discoveries in proven and producing basins, but it is clear that this target can only be achieved by the discovery of at least one new large oil province. This again reinforces the need to attract much more exploration to frontier areas.

Better progress is being achieved against the target of expanding Australia's gas reserves. Known 2P reserves of conventional gas as at 1 January 2006 have been estimated to total 152 trillion cubic feet, 12 tcf or 8.7 per cent higher than a year earlier (*Oil and Gas Resources of Australia 2005, Geoscience Australia, September 2008*). The level of coal seam gas reserves continues to rise and it has been estimated that these could total around 70 tcf with possible resources as high as 200-250 tcf.

Data is not readily available on global petroleum exploration expenditure to enable an assessment to be made as to whether Australia's share is increasing or decreasing. A number of surveys however, are conducted by various organisations to compare countries relative attractiveness for oil and gas investment.

These take into account investors' perceptions of factors such as prospectivity, government take, regulatory processes, sovereign risk, construction costs and access to infrastructure and to markets. One of the most comprehensive surveys is conducted annually by the Fraser Institute in North America. Its 2008 Global Petroleum Survey canvassed the views of 396 respondents in over 250 petroleum companies to rank 81 jurisdictions according to scores assigned to each of 16 factors affecting petroleum exploration and development investment decisions. The 2007 petroleum exploration and development budgets of companies participating in the survey totaled \$160 billion or more than one third of estimated global upstream petroleum expenditures. The investment factors are then aggregated into a number of composite indices to present results along common themes and an All-Inclusive Composite Index (see www.fraserinstitute.org/commerce.web/product_files/Global_Petroleum_Survey_2008.pdf).

Taking all factors into account, countries with the highest investment barriers included Bolivia and Venezuela. Thailand, Denmark and parts of the USA were considered to have the lowest barriers to investment with Australia ranking 7th out of 81 jurisdictions. This is an improvement on the previous year when Australia was considered to have the 9th lowest barriers to investment out of 54 jurisdictions. So at least according to the Fraser Institute, Australia's attractiveness for petroleum investment is improving and is not far from being in the top five locations globally.

While good progress is being made towards achieving some of the targets, greater attention needs to be given to addressing impediments to frontier exploration.

The availability of geological data remains a key ingredient to decisions about where to explore. The 2008 Global Petroleum Survey found that 57 per cent of respondents view Australia's geological database as a factor that encourages investment. While that might seem to provide a competitive advantage, many other jurisdictions were ranked more highly including many parts of North America, the North Sea and Europe.

The extent of future frontier exploration is also likely to be affected by the global financial crisis. Junior explorers in particular are finding it very difficult to access debt or equity capital, a situation made worse by their inability to immediately benefit from tax deductions for exploration expenditure. The cost of capital and premiums for risk have increased, thereby reinforcing the need for improved terms for exploration and increased support for pre-competitive geoscience research.

ACTION TO DATE

The industry and government agencies have been discussing a portfolio of incentives to enhance exploration in frontier basins. The industry has proposed:

- a 175 per cent corporate tax uplift for exploration activity undertaken in frontier basins
- a reconnaissance-type of title that will allow industry to undertake geological and geophysical assessment of vast, unexplored frontiers, prior to refining the area under a permit bidding scheme
- improved titling timeframes and efficient turnover of acreage
- increased pre-competitive geoscience funding for Federal, state and NT geosurveys to facilitate new data acquisition and world-class data management systems.

An APPEA/Geoscience Australia report on the importance and relevance of pre-competitive geoscience was released in early 2008. Written by Dr Trevor Powell, the report was well received by the national, state and territory governments. APPEA has used the report to emphasise the importance of such funding but unfortunately, not all jurisdictions have responded with increased funding or new programs. Geoscience Australia is in the second year of a frontier data acquisition program under the previous government's Energy Security Initiative and a number of the state geological surveys have maintained onshore geoscience programs, such as the PACE program in South Australia, the Northern Territory's Bringing Forward Discovery initiative and the Smart Exploration program in Queensland.

Within the Royalties for Regions program, Western Australia recently announced that it is establishing a new five-year Exploration Incentive Scheme with measures to include:

- subsidies for companies drilling in greenfields areas
- completion of the state's 400 metre line-spacing airborne magnetics and radiometrics survey coverage, including the Canning and Eucla Basins
- stratigraphic drilling in sedimentary basins
- high-tech geoscience and mineral mapping to reveal the 3D structure of Western Australia at depth.

The industry would welcome similar initiatives in other jurisdictions, especially to help maintain Australia's attractiveness for exploration and level of exploration activity during the downturn in the global economy. Increased investment in the collection of valuable pre-competitive geoscience information would encourage increased exploration and prepare for a resurgence in energy demand once the global economy improves.

Similarly, a national approach to data management would improve the access to, and use of, data by governments and industry. A national virtual data library that houses all onshore and offshore data would improve the chances of understanding Australia's prospectivity for hydrocarbons.

To help improve access to capital among junior explorers, a comprehensive Flow Through Share model has been provided to the Australian Government based on the existing franking credit system. It recommends that the ability to pass on exploration deductions to investors through a Flow Through Share scheme should apply to all exploration in recognition of the challenges faced by junior explorers and the need to maintain a robust industry base.

WAY FORWARD

A package of incentives for frontier exploration needs to be agreed and implemented as a matter of priority. The Energy White Paper also needs to include a long-term policy commitment, supported by further measures as required, to substantially increase frontier exploration so as to obtain a more complete understanding of Australia's offshore and onshore petroleum potential.

As well as continuing its representations to individual jurisdictions, the industry will seek a commitment from the Ministerial Council on Mineral and Petroleum Resources to increased geoscience funding in all jurisdictions.

The industry will also continue to provide information and evidence supporting the case for the inclusion of a Flow Through Share scheme, covering all exploration undertaken by eligible entities in Australia and aiming to help address the capital impediments faced by junior exploration companies.

The 2009 Federal Budget announced the extension of the Designated Frontier Areas incentive to apply to the acreage release in 2009. Industry has maintained that this incentive is limited in application as it only applies in conjunction with Petroleum Resource Rent Tax and has called for a review of this incentive. The government has undertaken to review this incentive as part of the Energy White Paper and the National Review of Taxation due in late 2009.

4.3 More consistent and more efficient approvals and regulatory regime for petroleum exploration, development and operations

OBJECTIVE

To reform numerous aspects of the approvals and regulatory framework to:

- enhance Australia's international competitiveness for petroleum exploration and development
- provide shorter and predictable approval times
- be transparent and have objectives-based processes
- ensure uniformity across jurisdictions
- eliminate duplication.

KEY OPTIONS

- 7.1.1 The Australian Government to commission the Productivity Commission (PC) to undertake an extensive review of the regulatory system for petroleum activities across all jurisdictions (Commonwealth, state and territory) that includes:
- a benchmark of the Australian petroleum regulation system with globally competing provinces, including the United States, Canada, the United Kingdom, Norway, Indonesia and Brazil
 - ensuring that the Prime Minister's Taskforce Principles for Good Regulation are adopted
 - a consideration of opportunities for streamlining and removing a number of areas of duplication in petroleum regulation, whilst ensuring that governments are able to continue to regulate industry on the issues that matter to them to provide public assurance
 - implementing clear timeframes for approvals retained under the new system to further reduce the potential delays to projects arising out of regulatory requirements.

BACKGROUND

A common theme emerging from many of the surveys comparing risks or attractiveness of petroleum investment around the world is that approvals processes and regulation are frequently cited as the worst aspect of doing business in Australia. Of the 16 factors affecting investment decisions considered by the 2008 Global Petroleum Survey, the two most frequently cited deterrents to investment in Australia were regulations and processes associated with Aboriginal land claims (50 per cent of respondents) and environmental regulation (43 per cent). In the 2008 World Risk Survey undertaken by the *ResourceStocks* magazine, green tape and land claims were cited as the highest risks facing resources investment in Australia.

As stated in the Strategic Leaders' Report, the length and complexity of the multi-jurisdictional approvals regime is reducing Australia's competitiveness for investment.

A number of APPEA members have reported that it often takes significantly more time to gain an approval in Australia than in many other jurisdictions, such as onshore United States or Gulf of Mexico. As a result they are increasingly choosing to invest their exploration budgets overseas rather than wade through Australia's regulatory maze. Of the 22 junior oil and gas companies exhibiting at the Good Oil Conference in Fremantle in September 2008, more than half (13) were promoting only overseas projects.

Inefficient regulatory processes significantly increase staff costs incurred by petroleum companies and regulating agencies. Regulators are often further hamstrung by shortages of appropriately skilled and experienced personnel. Delays to approvals can have a significant impact on costs and project economics if they result in a delay to the start-up of the associated exploration activity or production facility.

Up until recently industry's concerns about approvals processes did not attract a great deal of media or community attention. That changed however, when in September 2008 INPEX announced that it would process gas from the Ichthys field in Darwin instead of in the Kimberley in order to meet the project's schedule (*INPEX announces Northern Territory Location for Ichthys LNG Facility, Media Release, 26 September 2008*). This was clearly based on an assessment that greater certainty around approvals and start-up dates would more than outweigh the cost of building an 850 kilometre pipeline. Nevertheless, the project is incurring a significant additional cost that would not have been necessary had a more efficient approvals process been in place.

The costs generated from approvals inefficiencies not only reduce returns to developers (and hence make it harder to attract investment) but also reduce tax payments to governments and returns to the community from the development of its gas resources.

“Delays and uncertainties with approvals have recently resulted in:

- **several millions of dollars in rescheduling costs and delays of up to two years in drilling or seismic acquisition**
- **downtime worth millions of dollars waiting for marine pest inspections and clearances on critical vessels and infrastructure**
- **a relatively minor delay in Customs approvals to import vessels that may contain asbestos, that amounted to a cost of almost \$10 million.”**

APPEA submission to the Productivity Commission
Review of the Regulatory Burden on the Upstream Petroleum (Oil and Gas) Sector, September 2008

ACTION TO DATE

In April 2008 the Assistant Treasurer asked the Productivity Commission to review Australia’s framework for upstream petroleum regulation and consider opportunities for streamlining regulatory approvals, providing clear timeframes and removing duplication between jurisdictions. The commission released an Issues Paper in July and members of the industry, including APPEA, provided written submissions, hosted site visits and provided briefings to commission staff.

The commission released a final report on 30 April 2009 that noted that current regulatory arrangements for the upstream petroleum industry are complex, impose unnecessary regulatory burdens and increase costs. The commission agreed with some submissions that a 50 per cent reduction in approval times is a reasonable objective and that:

“an ‘across the board’ one year reduction in total approval time for major projects—which many participants considered feasible—could generate future national income gains in the billions of dollars each year”.

Review of the Regulatory Burden on the Upstream Petroleum (Oil and Gas) Sector, Research Report, page xxvi. Productivity Commission, April 2009.

The commission’s recommendations are wide ranging and include measures to:

- improve cross jurisdictional approvals processes
- improve consistency by enhancing the role of the Environment Assessors Forum
- streamline heritage processes
- develop transparent policy principles for environmental offsets
- review legislation to ensure it complies with best practice principles
- clarify the role of local government
- develop improved approvals tracking systems
- establish a lead agency in each of the states and territories
- establish a new national offshore petroleum regulator.

Many of the regulatory principles and options for reform proposed in the Strategic Leaders’ Report are reflected in the commission’s recommendations.

Over the past year several other reviews of approvals processes in Western Australia have been completed or initiated. In October the Minister for Mines and Petroleum released a report undertaken by the Auditor General into Improving Resource Project Approvals.

In February 2008, the previous West Australian Government also initiated a wide-ranging review of the state’s environmental impact assessment processes by a reference group chaired by the head of the Environmental Protection Authority, Dr Paul Vogel. As a result, a number of reforms identified by APPEA and other industry participants have been adopted and implemented by the EPA. These include the application of a risk-based approach to environmental assessment, rationalisation of the levels of environmental assessment, new administrative procedures aimed at streamlining the assessment process, increased use of parallel processing and a shift from prescriptive management measures to an outcomes-based approach.

In November 2008 the new West Australian Government initiated a new approach for improving the state’s exploration and development approvals process. A new working group was formed, chaired by Peter Jones, a former Resources Minister in the administration of Sir Charles Court and with members drawn from the minerals and petroleum industry, including APPEA.

WAY FORWARD

With the release of the Productivity Commission's final report to Australian governments in April 2009, industry and governments will begin an assessment and implementation of agreed regulatory reforms identified through the review. The industry working group reviewing the West Australian approvals process is also expected to finalise its report during 2009.

In the early months of the year APPEA and the industry will need to be active in responding to draft recommendations from both reviews and influencing outcomes in the final reports. Thereafter, the focus of activity will shift from identifying what needs to be done, to implementing the agreed changes.

Formal processes will need to be developed for example, for consideration of the Productivity Commission recommendations by the national, state and territory governments and for the development of implementation strategies. Given that many of

the proposals relate to cross-jurisdictional issues it may take some time for governments to agree a way forward and ultimately to agree on the changes. It will be important that a national interest-based approach is maintained and that the momentum for reform is not stalled by sectional interests.

Similarly, it will be important that the industry in Western Australia make the most of the opportunity now available to markedly improve West Australian approvals processes by providing input into the industry working group and working with the government to implement agreed outcomes.

Offshore petroleum regulations are expected to be available for industry comment from mid 2009. These are being prepared in response to a 2007 report by the Department of Resources, Energy and Tourism containing 54 recommendations for streamlining and removing duplication from petroleum regulation.

4.4 Harnessing the environmental benefits of gas

OBJECTIVE

To maximise the contribution that gas could make to reducing Australian and global greenhouse gas emissions.

KEY OPTIONS

- 4.3.2 Consider the introduction of a market mechanism—for example, a national emissions trading system, linked to an international regime that places a price on carbon—to incorporate the economic, environmental and social costs and benefits of energy resources in a way that does not increase costs for trade-exposed industries.
- 3.1.1 As part of the consideration of market mechanisms, review and reform energy taxation and renewable energy programs so as to remove tax- and subsidy-related distortions and ensure competitive neutrality between gas and other fuels.

BACKGROUND

As noted in the Strategic Leaders' Report, achievement of the Strategy's targets for increased gas use within Australia and increased LNG exports could reduce global greenhouse gas emissions by around 180 million tonnes of carbon dioxide equivalent a year by 2017 when compared with a coal alternative. This is equivalent to more than one quarter of Australia's projected greenhouse gas emissions in 2017.

To achieve these goals will require the provision of a supportive policy framework that removes or avoids market distortions and enables Australian gas to compete on equal terms with other energy sources both domestically and internationally. Greater public focus on climate change and increasing activity by

governments to develop new policies and programs to reduce greenhouse gas emissions, mean that the importance of this priority has increased since the Strategy was developed two years ago.

Although progress has been made, the greenhouse benefits of gas and the abatement potential of Australia's large gas resources are still not widely understood or consistently reflected in government policy making. Coal and renewable energy programs are attracting government funding and support while in some cases gas continues to be disadvantaged in the market by a range of tax- and subsidy-related distortions.

These include:

- lower resource taxes on coal than on gas
- electricity price caps (while recent changes have been made in Victoria and are being assessed as part of the Australian Energy Market Commission's *Review of Energy Market Frameworks in light of Climate Change Policies*, price caps remain in place in most jurisdictions)
- protection afforded to existing coal-fired electricity generation under the Australian Government's Carbon Pollution and Reduction Scheme
- the preferential treatment of renewable technologies under the expanded Renewable Energy Target.

As a result, a major focus for the industry and APPEA during 2008 has been to ensure that new measures such as the introduction of a higher, long-term target for renewable energy use and an emissions trading scheme do not competitively disadvantage the Australian gas industry.

The provision of adequate social and economic infrastructure is also an important factor affecting the growth of the gas industry and its ability to contribute to local and global greenhouse gas abatement. A part of the increasing level of investment by governments in infrastructure needs to be directed to the expansion of basic infrastructure such as roads, ports and medical and educational facilities in places like Karratha and Exmouth in Western Australia and to support new gas hubs like Gladstone in Queensland and potentially the Kimberley region of Western Australia.

Community and government concern about energy supply security and energy prices has also grown over the past year. Oil (and petrol) prices reached record levels in mid 2008 and gas prices in Western Australia have increased due to rising costs of supply. Disruptions to production by the North West Shelf Venture in January 2008 and from the Varanus Island gas production facility in June 2008, highlighted the need to increase Western Australia's diversity of gas supply.

Rapid expansion of coal seam gas reserves and production in Queensland and New South Wales has had a dramatic impact on the eastern states gas market. Instead of the gas shortages being predicted five to ten years ago, there are now sufficient reserves of conventional gas and coal seam gas to not only support long-term growth in the eastern states market, but to also support a significant LNG export industry.

This does not mean that eastern states gas prices will automatically increase to those applying in export markets. Future gas prices will be contingent on a range of variables, including the number and size of LNG projects that eventually proceed, the amount of new CSG and conventional gas that is brought on-stream to meet local and export demand and changes in production costs, taxes and charges (including carbon costs). Thus, there is potential for domestic gas prices to increase although gas will still need to be competitive with coal for power generation. Increased gas supply diversity should also increase gas-on-gas competition and maintain pressure on prices.

ACTION TO DATE

APPEA has continued to provide input into government greenhouse policy development processes and to promote changes and actions that enhance the competitive position of gas. In particular, a major focus during 2008 was in providing submissions and briefings on the two major policy development processes initiated by the Australian Government in 2007. These are the Garnaut Climate Change Review and the development of the Carbon Pollution Reduction Scheme. APPEA provided written submissions to both and consulted extensively with government agencies and members of parliament about the need to ensure that the LNG industry is not competitively disadvantaged. In particular, APPEA proposed the inclusion in the CPRS of a Cleaner Global Contributor (CGC) mechanism whereby the CPRS would recognise the role of products like LNG that reduce global greenhouse gas emissions.

The CPRS White Paper released in December did not adopt APPEA's CGC mechanism but did amend the rules for determining the extent of assistance to be provided to emissions-intensive trade-exposed industries. As a result LNG production is likely to be eligible for assistance for a nominal 60 per cent of

carbon permit costs. Further analysis will be needed to assess the impact of the White Paper's proposals on the international competitiveness of Australia's LNG industry and its capacity to reduce global greenhouse gas emissions.

APPEA submissions and representations on the Garnaut Climate Change Review and CPRS also promoted other Strategy options concerning domestic gas market development and greenhouse gas emissions. A number of these, including proposals for the development of a global approach to greenhouse emissions (option 4.1.1), a consistent national approach (option 4.2.1) and a flexible portfolio of emission abatement options (option 4.3.1), were broadly adopted in one or both of the policy reports.

Efforts to address certain other tax- and subsidy-related distortions though, have met with limited success. In particular, the government's commitment to ensure that 20 per cent of Australia's electricity supply comes from renewable energy sources by 2020, is inconsistent with the market-based, least-cost approach to greenhouse abatement underpinning the CPRS.

Modelling undertaken by independent economic consultants, Concept Economics, concluded that the Carbon Pollution Reduction Scheme as proposed in the Green Paper would have a severe impact on Australia's LNG industry. In a situation where Australia unilaterally commits to a reduction in greenhouse gas emissions of 20 per cent by 2020 (on the way to a reduction of 60 per cent by 2050), output from the LNG industry would be 37 per cent lower in 2020 and 54 per cent lower in 2030 than what it would be without the CPRS. In 2030, Australia's real GDP would be 5.4 per cent lower and consumption and employment would be 6.5 per cent and 2.0 per cent lower respectively. The impacts are still significant in a scenario where emissions in 2020 are the same as those in 2000 (on the way to a reduction of 60 per cent by 2050). In that situation it is estimated that by 2030 LNG output would be around one third lower and real GDP, consumption and employment would be 1.1 per cent, 0.9 per cent and 0.3 per cent lower than would have occurred without the CPRS (for further details see www.appea.com.au).

The changes to assistance levels for trade-exposed industries included in the CPRS White Paper will reduce the impact of the CPRS on the LNG industry. Even so, without offsetting measures, Australia's LNG industry will still face increased costs and be competitively disadvantaged compared to LNG projects overseas.

The gas industry has however, benefited from the Queensland Gas Scheme that requires 13 per cent of Queensland's electricity to be sourced from gas-fired generation. In June 2008 the Queensland Government extended the scheme to a target of 18 per cent in 2020. Most notably however, it also confirmed that the target will be transitioned into an emissions trading scheme as soon as practicable. The same sunset provision needs to apply to other market interventions, such as the renewables target.

The case for increased gas development was also furthered through the National Energy Security Assessment developed by the Department of Resources, Energy and Tourism.

A high level of cooperation between industry and government resulted in the development of greenhouse gas storage legislation that will ensure that the rights of existing petroleum titleholders in Commonwealth waters are protected while facilitating greenhouse gas storage. APPEA was similarly involved in greenhouse gas storage legislative developments in South Australia, Victoria and Queensland and will in 2009 focus on engagement with governments on the development of the regulations and guidelines that will underpin the legislation.

The infrastructure needs of an expanding oil and gas industry in Western Australia's north-west and a new LNG industry in Queensland were also brought to the attention of government through submissions and representations to Infrastructure Australia and other organisations. In Western Australia, infrastructure support is being considered through the State Infrastructure Strategy and explicit work has been undertaken in relation to projects such as the Kimberley Precinct Study.

The West Australian Government, in consultation with the industry, is working on a number of measures to increase gas supply diversity and security. These include a consideration of recommendations from the Joint Working Group on Natural Gas Supply, retention lease policy, approvals developments and initiatives to support the development of 'tight gas'. On 27 December 2008 the West Australian Government also announced that it will introduce legislation to regulate the make up of gas in the state's gas pipeline network and subsequently broaden (from 1 January 2012) gas characteristics for the domestic market. This will provide a wider range of gas fields with the opportunity to supply the domestic market.

WAY FORWARD

A number of actions will be pursued in 2009 to follow-up on concerns with the CPRS White Paper and to ensure that legislation and regulations for the CPRS are aligned as closely as possible with the Upstream Oil and Gas Industry Strategy's vision and targets and APPEA's endorsed greenhouse policy.

APPEA will also maintain a high level of representation on other greenhouse policy issues and policy processes affecting the gas market, including:

- the 20 per cent renewables target
- the removal of tax- and subsidy-related distortions in the energy market so as achieve competitive neutrality between fuels

- input into the development of an Energy White Paper
- the implementation of greenhouse gas storage legislation and regulations by Australian and state and territory governments
- the need for increased infrastructure funding to support gas industry growth
- measures to increase gas supply diversity and security (particularly in Western Australia).

4.5 Continuously improving environmental and safety performance and increasing community awareness of the industry's performance and values

OBJECTIVE

To increase community and government understanding of the industry's environmental and safety performance and values so as to maintain its 'licence to operate' and attractiveness as an employer.

KEY OPTIONS

None, although a range of important initiatives are being progressively implemented through established government and/or industry consultative processes, to improve performance and add value from current as well as future operations.

BACKGROUND

While oil prices and financial conditions can change quickly and dramatically, the need to maintain and continuously improve upon high standards of performance in environmental and safety management does not. Regardless of short-term fluctuations in the world's markets, the community and governments require our industry to provide a safe workplace and to minimise our impact on the environment. This is a long-term trend that will not disappear.

This was illustrated in several ways during 2008:

- strong objections by the local community and the environment movement to the establishment of an LNG hub on the Kimberley coastline
- increasingly stringent environmental conditions being placed on environmental approvals for major petroleum projects
- restrictions on key infrastructure like ports, affecting their ability to expand to meet industry needs
- ongoing debate about development on the Burrup Peninsula and the extent that environmental and heritage values are affected by industrial development
- restrictions and concerns surrounding the treatment and use of water co-produced with coal seam gas
- community concern about the development of LNG facilities near Gladstone
- governments' increasing focus on safety as a result of disruptions to gas production in Western Australia during 2008.

As pointed out in the Strategic Leaders' Report the oil and gas industry has an excellent track record of operating in and protecting sensitive environments and is committed to continually improving its performance and achieving positive environmental outcomes. Similarly, the petroleum industry has long been one of the safest industries in Australia.

As demonstrated by the issues that arose during 2008 however, this track record of performance and commitment is not well understood by significant parts of the community and even within parts of government.

The challenge for the industry therefore has two parts to it—to continually improve performance but also to keep informing its stakeholders about that performance. The Industry Strategy aims to help meet both elements of that challenge by proposing options for improving the industry's environmental and safety performance and options for improving the communication and cooperation between the industry and governments. The former includes, for example, actions by the industry to drive safety improvement through a new CEO Safety Leadership Forum. It also includes the sponsorship of research and the development of procedures to minimise the risk of oil spills and the effects of seismic data acquisition on the marine environment. Options for increased government/industry cooperation include the further development of a risk-based approach to regulation and to decision making based on the best available science.

ACTIONS TO DATE

Safety management

The CEO Safety Leadership Forum established in August 2007 has continued to meet regularly to identify and implement a range of measures for improving safety within the oil and gas industry. Priorities during 2008 included:

- introduction of a common safety training standard for all new workers to the industry. This is intended to ensure a consistent and reliable standard in core safety skills and behaviours in an environment of skills shortages where many new entrants to the industry are inexperienced
- development of a national safety training model based on the identification and demonstration of safety competencies and required outcomes, flexibility in recognising existing training as long as it achieves the outcomes required by industry and demonstration of competencies both in the training facility and in the workplace
- commencement of a six month trial of three leading safety indicators by APPEA members to identify and resolve reporting issues
- development of a program on Safety Leadership in the Australian Cultural Context—a groundbreaking and innovative approach to understanding how to work within the Australian culture and how to leverage its strengths
- development of a new 'Sharing Good Practice' website and a new program to assist supervisors and frontline managers to be more effective safety leaders
- development and implementation of several processes for better performance benchmarking and information sharing.

In December 2008, the Australian and West Australian governments announced a joint independent inquiry into safety regulation of the offshore petroleum industry. The inquiry is to consider a number of safety issues that arose during 2008, the effectiveness of regulating agencies and options for improving the regulatory regime and the safety and integrity of petroleum operations and facilities. The Independent Review Team is expected to report in May 2009.

Environmental management

APPEA has continued to implement the options identified by the Strategic Leaders' Report to improve the performance of the industry and the communication of that performance.

After extensive consultation with regulators, NGOs and community stakeholders, APPEA finalised and released the latest edition of the APPEA Code of Environmental Practice. This latest edition represents the first significant revision to the code in a decade. For 30 years, APPEA's Code of Environmental Practice has served two very important roles: firstly in providing a leadership mechanism on environmental performance for all APPEA members; and secondly, by sending a clear message to all stakeholders about the industry's own expectations for environmental performance.

There are a number of key new areas of emphasis in the code, including focus on:

- the importance of planning
- continuously assessing risks and practicable opportunities to improve performance outcomes
- early, fit for purpose consultation in accordance with the Ministerial Council on Mineral and Petroleum Resources Principles for Community Engagement
- the importance of greenhouse considerations
- biosecurity management
- decommissioning considerations.

Industry and government have also actively worked to improve the application of risk-based regulation across the industry. This has included:

- the release of a discussion paper to develop a nationally consistent policy framework for decommissioning facilities
- the development of new, transparent policy principles for the application of environmental offsets to petroleum projects
- the finalisation of seismic exploration guidelines to minimise the effects of seismic operations on large cetaceans
- the development of new guidelines to manage the risk of introduction of marine pest species as a result of the activities of the oil and gas industry.

In addition, APPEA hosted the National Oil and Gas Environment Conference with a record number of delegates hearing from a broad spectrum of presenters over three days. Key themes from the conference focused on the new issues faced by onshore development in Queensland new science being undertaken by the industry and new regulations affecting the operation of the industry.

The work of the Environmental Assessors Forum has also continued with a focus on improving the regulation and operational performance of the industry. This included the release of Guidelines for the Development of an Environment Plan and new work programs to improve consistency in regulation.

WAY FORWARD

Safety management

The CEO Safety Leadership Forum will continue to set the agenda for the identification and implementation of measures to improve safety performance. Priorities for 2009 are expected to include:

- continue development work on the training model for new entrants. The next step is to develop the assessment tools and independent verification processes to ensure rigour and confidence in the delivery of improved skills and behaviours
- by early 2009 have training providers ready to start developing or refining training based on the competencies in the new entrants model
- implement a further suite of leading indicators based on the trial commenced in 2008
- commence a new project on process safety, ageing facilities and hydrocarbon releases in response to a rising trend in offshore hydrocarbon releases and concerns about the maintenance of safety on ageing facilities
- further development of safety information and services available from APPEA's web site including fact sheets on fatigue and contractor management
- in response to recommendations from the independent review of the National Offshore Petroleum Safety Authority undertaken in 2008, work collaboratively with NOPSA to deliver education and training to a range of industry players on the effective development and implementation of a safety case
- implement further improvements to performance benchmarking and information sharing processes including alignment of Safety Incident Guidelines with international equivalents and introduction of a new requirement for high potential incidents to be reported to APPEA so as to enable learnings to be shared.

The upstream oil and gas industry will need to respond as appropriate to any findings or recommendations arising from the independent review into the effectiveness of regulation of upstream petroleum operations conducted jointly by the Australian and West Australian governments.

Environmental management

Priorities in 2009 will include:

- an international workshop hosted by the Australian Government on addressing the remaining gaps in research on seismic sound and marine life issues
- development of a National Representative System of Marine Protected Areas for the South West, North West and Northern Bioregions
- finalisation of nationally consistent policies for decommissioning of offshore oil and gas facilities
- the development of Ministerial Council on Mineral and Petroleum Resources Guidelines on the use of environmental offsets for the oil and gas industry
- providing input into the independent review of the operation of the *Environment Protection and Biodiversity Conservation Act*
- improving the funding arrangements for environmental research initiated by the oil and gas industry to ensure that strategic research priorities are being addressed and that dollars invested in research result in improved policy and regulatory outcomes and a better understanding of industry operations
- publication of a new summary of recent industry research to update the previous collation published in 2005.

4.6 Improving and better coordinating research and development

OBJECTIVE

To establish a coordinated national framework for petroleum research, development and demonstration with the aim of reducing exploration costs and risks, enhancing oil recovery and remote gas development, reducing the industry's environmental impact and establishing Australia as a leading gas research centre.

KEY OPTIONS

- 8.1.1 To coordinate research efforts, establish a national framework for research and the development and application of technology.
- 8.1.2 Further develop and refine currently available technology roadmaps using the results of the review and analysis of the state of research and development in Australia and particular local needs undertaken as part of option 8.1.1.
- 8.2.1 The oil and gas industry to consider the funding needed to support the priorities identified in the national research framework and develop a world-class petroleum technology sector.

BACKGROUND

As indicated in the Strategic Leaders' Report, the ongoing development and expansion of Australia's petroleum industry is heavily dependent on the development and application of new technology. As exploration and development moves into deeper water and more remote areas, new technology solutions are needed to better understand Australia's geology, reduce exploration risk and reduce development costs, particularly of gas fields located hundreds of kilometres offshore Australia's north-west coast.

The current environment of lower oil prices and reduced availability of capital means that the development and application of new technology is even more important than before and must make an even greater contribution to maintaining industry growth and competitiveness.

The Strategic Leaders' Report suggested that Australia could become a major regional centre for petroleum technology and a global centre for gas extraction and use. As indicated in the above key options, it proposed the development of a national framework for petroleum research and development activities and roadmaps to address key priorities. Funding requirements and the respective roles of public and private funding will also need to be re-assessed.

Industry workshops held during 2007 concluded that whilst the CSIRO and Australian universities are well placed to provide strategic, long-term petroleum research, there is only limited capacity in Australia for short- to medium-term development and application of technology.

ACTION TO DATE

Further consideration of the options has revealed that industry participants would prefer collaborative approaches to R&D that are industry driven, accommodate high degrees of flexibility for individual company participation in projects, require technology users to work closely with technology providers and researchers and that secure government funding.

In September 2008 the government released the report of the Review of Australia's National Innovation System undertaken by an expert panel chaired by Dr Terry Cutler. It includes a number of recommendations of relevance to the oil and gas sector.

Similarly the Energy White Paper's consideration of R&D issues combined with the Cutler review, may promote the industry's vision for oil and gas innovation.

Meanwhile, the Ministerial Council on Mineral and Petroleum Resources has commenced the Earth Resources National Innovation Strategy review. This will also provide an opportunity for the industry to highlight its needs for R&D and technology.

To assist the collaborative process between research organisations and members of the oil and gas industry, the UK Industry Technology Facilitator (ITF) is seeking industry support for the establishment of a branch office in Australia. As in the UK, this will enable petroleum companies to jointly sponsor research projects undertaken by one or more research providers and should provide a close link with research undertaken through the UK ITF.

WAY FORWARD

Implications from the Energy White Paper to be released in 2009 and opportunities it presents for furthering the R&D interests of the oil and gas industry will need to be considered.

4.7 Implementing a national petroleum skills and vocational training plan

OBJECTIVE

To ensure that all oil and gas companies and subcontractors are able to meet their geoscience, engineering and skilled labour requirements for activities in Australia in a timely and cost-effective manner.

KEY OPTIONS

Measures to increase female, Indigenous and mature-age workforce participation:

- 9.2.4 ■ Provide incentives to encourage employees approaching retirement to remain as supervisors to technical trainees and/or mentors to recent graduates.
- 9.2.5 ■ Increase industry information sharing and collaboration about Indigenous training and employment programs so as to make greater use of a source of local labour that is largely untapped and to support the implementation of Australian Technical Colleges—for example, in the Pilbara and Darwin—that will have a strong Indigenous focus.
- 9.2.6 ■ Develop and implement programs for attracting greater female and Indigenous participation in the industry.

Increase support for vocational education and training:

- 9.2.7 ■ Extend the Process Plant Operators VET in Schools program introduced in Western Australia during 2006, to other states and territories.
- 9.4.4 ■ Companies to support increased vocational education training in schools in petroleum-related disciplines (such as the Process Plant Operators VET in schools being piloted in Western Australia) by accommodating student trainees.

BACKGROUND

Despite the weakening in the world economy, skills shortages are still a major issue for Australia's oil and gas industry. This industry faces long-term shortages in the disciplines of petroleum engineering, geoscience and chemical engineering. It is also very short of technical personnel in oil and gas plant process operations and maintenance. These are not skills that workers from other industry sectors can easily acquire.

Skills shortages in the construction trades may ease, hence reducing the pressure on construction costs for new gas projects. The skills, education and training strategy being implemented under the Upstream Oil and Gas Industry Strategy is however, directed towards addressing petroleum-specific skills shortages such as in engineering and plant operations, not general trades.

Hence it is important that the programs initiated over recent years to address skills shortages in the oil and gas industry be maintained. The number of advertisements for skilled positions in the oil and gas industry has not decreased noticeably and the average age of the oil and gas industry's workforce is continuing to increase. Up to 50 per cent of staff in some specific operational skill-set areas are due to retire in the next five years, thereby adding to the skills shortages already being experienced.

Operators and contractors therefore need to continue to be encouraged and assisted to invest in training to meet long-term labour requirements. Any short-term lull in activity should be used to assess longer-term requirements and implement strategies to meet those requirements.

Community and government concern about the welfare of Indigenous Australians has also increased in recent years. Governments have increased spending and introduced new programs and the business sector has responded with initiatives such as the Australian Employment Covenant that aims to provide jobs for 50,000 Indigenous Australians, plus an equal number of 'mentors' to support them during their training and induction into the workforce. APPEA is aligned with that initiative and while a number of oil and gas companies have been expanding their Indigenous training and employment programs, an industry-wide approach is warranted. Hence a key part of the skills and training plan included in the Upstream Oil and Gas Industry Strategy is to help companies in this area by developing training programs for Indigenous Australians and by increasing the opportunities for information sharing and collaboration.

ACTIONS TO DATE

During 2008 APPEA completed a National Skills Shortage Strategy (NSSS) Project to develop a workforce planning and skills development model for the oil and gas industry with funding provided by the Department of Education, Employment and Workplace Relations (DEEWR). Key elements of the project included the development of:

- an Indigenous Oil and Gas Work Preparation Training Program in the Northern Territory. Seventeen mature-age trainees (including seven females) graduated from the initial ten week course and have either obtained employment or are likely to be offered a job in early 2009
- an all-female oil and gas process plant operator/maintainer course (dual Cert I process plant skills/engineering and Cert II process plant operations) at the Australian Centre for Energy & Process Training (ACEPT) in Kwinana. Fifteen women successfully completed the first course and several were offered employment during their work experience placements
- an employment, training and apprenticeships program for year 11 and 12 students in Western Australia. In 2008 thirty year 11 and 12 students, including a specifically targeted Indigenous group in each year level, have been offered employment or apprenticeships. The next student intake planned for 2009 will enroll in the new Process Plant Operations (Maintenance/Engineering) pathway. The broader skills profile will increase work experience opportunities during training and will ultimately enhance the employment prospects of the participants
- a pilot e-learning unit at ACEPT being offered under the Goal 100 Program run by Whyalla TAFE. In the initial program, 25 trainees were enrolled in a pilot PMA08 e-learning unit titled 'Read Dials and Indicators' and some were successful in obtaining work experience at Santos' oil and gas processing plant at Port Bonython. It is planned to offer an increased number of e-learning PMA08 units to trainees during 2009
- also in South Australia, an oil and gas driller training course is planned to commence early in 2009 for ex-Mitsubishi and Electrolux workers.

Opened in February 2008, ACEPT completed a very successful first year of operation with 37 graduates (including 15 females and eight Indigenous Australians) receiving Certificates I and II in Process and Plant Operation and Engineering at the inaugural graduation ceremony in December 2008. The centre provides oil and gas training to school and community-based students, with specialist courses for Indigenous and female apprentices and trainees. The programs integrate training and work placements to enhance students' learning. The centre will broaden its programs in 2009, while developing new qualifications and extending industry involvement.

With the NSSS Project completed, APPEA and its members will be seeking to collaborate with the federal Department of

Education, Employment and Workplace Relations (DEEWR) to develop sustainable models to address skills needs and gaps in the oil and gas industry. A key focus of the 2009 activity is 'innovative, one off' projects that support or increase participation in the workplace by:

- women returning to the workforce (particularly single mothers)
- mature-age new entrants to the oil and gas sector, plus those already in the workforce wanting to update their skills
- Indigenous Australians.

APPEA will seek funding from the DEEWR Workplace Innovation Program (WIP). If successful, funding will deliver an APPEA Oil and Gas Employment Participation Project (AOGEPP) that will focus on:

- identifying shortcomings in the training sector for the oil and gas industry with a particular focus on the emerging coal seam gas industry in Queensland
- developing and implementing pilots to identify outcomes and learnings, and demonstrate how those outcomes and learnings will lift the standards of training and how they will be dispersed and communicated across the oil and gas industry.

APPEA is also in consultation with DEEWR on a partnership project via the new Indigenous Employment Panel to pilot two field-based case studies with industry to identify the business drivers that influence sustainable indigenous employment and provide a model for rolling out similar projects across the oil and gas industry. If successfully funded, this project will contribute to the Australian Government's commitment to halving the gap between Indigenous and non-Indigenous employment outcomes within a decade.

APPEA is also working on the development of a minimum three-year project to provide information on natural gas to primary and secondary schools and to the community in general. The project will be developed in conjunction with an organisation such as Kids Media that can assist with aligning information with school curriculums. The main part of the project will be developed through a website with information from each part of the gas industry—upstream, transmission, distribution, retail and manufacturing—with APPEA providing the input for the upstream sector. A flyer will also form part of the project for distribution to communities at field days for example.

Work on the development of a skills supply and demand analysis as proposed in Option 9.2.3 has continued. Central TAFE in Western Australia has agreed to provide access to their data collection and retrieval system.

Members of the industry continue to offer academic scholarships, graduate programs, sponsorship support for the annual national ACS Career Adviser seminars and in kind contributions to ACEPT.

In late 2008, an expert panel chaired by Professor Denise Bradley AC released a report on the Review of Australian Higher Education concluding that Australia is falling behind other countries in performance and investment in higher education. The report recommended major reforms to the financing and regulatory frameworks for higher education to help address the professional skills shortages being faced by many industries including the upstream oil and gas industry. The Australian Geoscience Council for example, commented that

implementation of a number of the report's recommendations would help address a chronic deficiency in the number of geologists, geophysicists and other geoscientists produced by Australian universities. The report also included recommendations for improving access to higher education and outcomes for under-represented groups including Indigenous Australians that are closely aligned with the vocational education and training strategy being implemented by APPEA.

WAY FORWARD

Activity in 2009 will be centred on the WIP and IWP projects as described above. Work will also be undertaken on a project to develop alternative pathways for employees through the vocational education and training system (leading to a diploma and advanced diploma).

Other activities planned for 2009 include:

- development of a project that will provide trained and paid Indigenous mentors for future training and employment programs (in consultation with the Aboriginal Economic Development unit in the Western Australian Department of Commerce)
- discussions with Indigenous Lands Councils and the development of shared training opportunities between the pastoral and petroleum industries
- conducting further all-mature-age, all-female training courses at ACEPT
- providing ongoing support for the year 10 student-focused Western Australian Schools Information program and conducting another Energy Challenge in Darwin and possibly also in Adelaide (depending on the outcome of a pilot program conducted during 2008).



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