

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

The Australian energy sector and energy policy are heavily influenced by the country's natural circumstances and general market approach to economic issues. Australia is the world's sixth-largest country, roughly 80% larger in land mass than the EU-25 countries together. With a population of 20 million people, it has the lowest population density in the OECD. The country is rich in mineral resources, including coal, oil and natural gas. As an island nation, it has no land boundaries and is a substantial distance from most of its major trading partners. From 1993 through 2003, Australian gross domestic product grew at an average annual rate of 3.9%, while unemployment fell to a 27-year low in November 2004 with a rate of 5.2%. The generally light-handed government approach to the economy is reflected in the energy sector. Energy policy is also influenced by Australia's federal structure with six states and two territories¹.

Like all IEA countries, Australia strives to achieve the three E's of energy policy: Economic efficiency, Energy security and Environmental sustainability. The federal government's June 2004 energy White Paper explains the strategy to meet these objectives and is a commendable document developed in a transparent manner that gives predictability to all stakeholders. Regarding economic efficiency, Australia fares well. It has some of the lowest prices in the IEA for electricity, coal and gas. For example, industrial electricity prices are 38% below the IEA average and household prices are 31% below the average. There is a great deal of choice at the retail level, allowing many customers to select their preferred supplier. In addition, Australia successfully exploits its domestic fuel resources in the international market. The coal, oil and gas industries employ 120 000 people and provide more than AUD 24 billion² annually in export revenue, equal to about one-fifth of the country's total export revenue.

Australian energy security is sound. Security is enhanced substantially by the endowment of domestic fuels (albeit with declining oil production), extensive energy delivery infrastructure and good access to world markets. In 2003, net oil import dependence reached 14% and government forecasts project this figure will rise to 37% in 2010 and 46% by 2020. However, the fluid market

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1. Throughout this report, the terms "government", "federal government" or "Commonwealth government" will refer to the national government based in Canberra. Governments at the state or territory level will be explicitly denoted.
 2. On average in 2004, one Australian dollar (AUD) = USD 0.734. As of 6 June 2005, AUD 1 = USD 0.765.

in crudes and products means this should not pose an undue threat. The government's energy White Paper rates energy security as "high". Nevertheless, recognising the importance of this issue, the government has called for a biennial review of Australia's energy security outlook. Significant indigenous coal and natural gas resources also play an important part in enhancing Australia's energy security.

It is with the third E of energy policy, environmental sustainability, that Australia faces its greatest challenge. Regarding the issue of climate change, Australia's emission intensity is very high. Australian emissions of CO₂ from fuel combustion per unit of GDP are the second-highest in the IEA, behind the Czech Republic, and 43% above the IEA average. This is due to the widespread use of coal and the country's generally high energy intensity which results in part from the presence of numerous energy-intensive industries. Under the Kyoto Protocol, Australia's target was to limit greenhouse gas (GHG) emissions to 108% of 1990 levels by 2008 to 2012. While a signatory to the Protocol, the government has decided not to submit it for ratification. The government recognises the importance of reducing GHG emissions but does not believe Kyoto is an effective international instrument, specifically because many large emitters will not be obliged to reduce their emissions. However, the government has committed to continued engagement and participation in international post-Kyoto efforts to curb global emissions.

Despite not ratifying the Protocol, the government has stated its intention to meet its Kyoto target. According to government projections released in December 2004, the country is on schedule to do so. Australia will be able to meet its target largely as a result of reductions realised in the land use and forestry sectors where emissions are projected to be cut by 85%. By contrast, emissions from other sectors have grown by 30% from 1990 to 2002. From 1990 to 2008-2012, emissions from the energy sector are expected to grow by 43%. Further emissions reduction from land use changes will not be possible and energy emissions will come to increasingly dominate the mix. As a result, the country will have to substantially change future energy supply and/or demand behaviour if it wants to keep overall emissions at moderate levels that are likely to be consistent with a future global climate change mitigation programme.

Australia is taking a technological approach to curbing climate change and is seeking to develop new technologies to provide economic energy with reduced emissions. The government has recently announced a number of new substantial energy research and development (R&D) and technology commercialisation programmes which focus on developing partnerships with industry and the research community. It has also decided not to develop an emissions trading programme at this time. This decision was driven largely by the fact that the country is already on track to meet its Kyoto target and the concern that Australia's international competitiveness would be adversely affected, given that most of its competitors in the Asia-Pacific region have no

obligations to limit their emissions. At the same time, a number of States are considerably more enthusiastic about trading and developing plans of their own.

Australia's focus on technological solutions to climate change has certain advantages. Although it carries the risk that technological solutions will not be forthcoming, it also recognises the long-term nature of this issue and the need for massive changes in energy patterns that new technologies can achieve. However, even if such technologies are found – and in the Australian context, this would likely be carbon capture and storage as well as other clean coal and hydrogen-based technologies – a carbon price signal will probably still be needed to facilitate their implementation. A trading system is an effective means of introducing a price signal and fits in well with the country's overall market approach. The state and territory governments have established a working group to develop the parameters of a multi-jurisdictional emissions trading scheme to be considered. The government is encouraged to periodically appraise the costs and benefits of a national emissions trading scheme in light of international developments of further global and domestic climate change frameworks.

Improved energy efficiency offers an important, immediately available tool for cutting GHG emissions. Australian energy intensity is quite high with primary energy per unit of gross domestic product (GDP) 35% above the IEA average. This is largely due to the country's vast spaces, large reserves of low-cost black and brown coal, predominance of energy-intensive industries and low energy prices. Traditionally, energy policy has focused on the supply side but greater attention is now being paid to the benefits of demand restraint. The June 2004 energy White Paper states that energy efficiency can increase both GDP and employment. The National Framework for Energy Efficiency (NFEE) has been established and the Productivity Commission (PC) will complete a year-long inquiry into the benefits of energy efficiency in August 2005. The Australian energy sector stands to benefit from greater government efforts to improve energy efficiency throughout the economy.

The transport sector could particularly benefit from efficiency efforts. Transport energy use accounts for 40% of final consumption and is projected to grow by 2.0% annually over the period 2001/02 to 2019/20. Despite this, transport appears to be receiving less attention than other sectors. The current fuel efficiency standards are at the lower end of IEA countries and are voluntary without any penalties. Vehicle taxation does not favour more efficient vehicles. The White Paper reform of the excise tax for fuels will substantially lower the overall tax burden, decreasing government revenue in this area by up to AUD 1.5 billion over ten years and could lead to an increase in transport consumption. If the Australian government wants to deal with the overall energy efficiency of the economy, it should address transport energy use more forcefully.

Although the use of renewable energy in Australia is relatively modest, the country has a successful renewable support scheme and some of the lowest prices for renewables in the IEA. Renewable energy development is influenced by the predominance of accessible, well-located, inexpensive fossil fuels and an approach to climate change that is based on securing least-cost abatement opportunities. Nevertheless, government activity supporting renewable energy has risen in recent years. The Mandatory Renewable Energy Target (MRET) system mandates that electricity retailers and wholesale buyers acquire renewables certificates equal to a certain percentage of their electricity sales, likely to be around 3.5% in 2010. MRET has resulted in substantial new capacity in a wide range of different technologies, particularly wind, solar and hydro. Costs for the certificates are below what other IEA countries are paying as part of a renewables "premium" over conventional fuels. While the government has chosen not to expand the MRET target at this time, additional policies could be considered to support the further development of the country's world class renewable energy resources and technologies. In addition, the benefits of renewables use in areas that may be profitable in an Australian context, such as off-grid power and summer electricity peaks, should be further explored. The Solar Cities initiative is likely to advance this possibility.

Electricity plays a pivotal role in Australia and is important for international competitiveness, industrial employment and economic development. It also has a great consequence on the environment as 50% of Australian energy-based GHGs come from power generation. Australia was one of the pioneers in energy sector microeconomic reform and should be commended for its vision and implementation of a liberalised market. The country now has one of the most transparent and competitive electricity markets in the world and could serve as a model for other countries. Electricity prices are low by international standards on both retail and wholesale levels with some of the lowest electricity prices in the IEA and the world. Although electricity security is sound, it will continue to be monitored as in all IEA countries.

Current reforms are moving the electricity sector towards more of a national rather than state-level governance. These reforms include the creation of the Australian Energy Market Commission (AEMC, the national rule-making body) and the Australian Energy Regulator (AER, the national rule-enforcing body) as well as the improvement of the decision-making for investments in inter-state transmission infrastructure. These moves are welcomed and encouraged. Greater inter-state trade enhances security and diminishes market power. Growing constraints on interconnections and greater divergence of prices between regions indicate that the existing infrastructure is becoming constrained. The proposed new rules on the methodology for assessing the cost-effectiveness of inter-state transmission upgrades are welcomed but will need to be further fleshed out. Other areas for improvement include encouraging greater demand-side response and elimination of all appearances of conflict of interest where there is state ownership of electricity assets.

Coal plays a major role in providing Australia with low energy prices and sound energy security. In 2003, it accounted for 43% of TPES and 77% of all electricity generation. The most pressing short-term concern for the industry is a constrained export infrastructure in these times of high prices and demand; however, several major expansions are planned. While infrastructure expansion is largely the responsibility of industry, the federal government can nevertheless work with the states to help in a number of important ways, including the review of Environmental Impact Statements (EIS) in a timely manner, providing leasing for rail tracks, making any state-owned land available for appropriate development and facilitating a dialogue with the governments of purchasing countries to co-ordinate their offtake with the domestic supply chain.

In large part because of coal's high carbon content, Australia's GHG emissions intensity is one of the highest in the world. Electricity from coal-fired plants has more than twice the CO₂ emissions per unit than electricity from gas-fired combined-cycle plants. A number of collaborative efforts between private and government stakeholders have formed to develop technologies that can curb coal emissions, primarily carbon capture and storage. These initiatives, such as COAL21 and the AUD 500 million Low Emissions Technology Demonstration Fund (LETDF), are commendable and will provide the best opportunities for coal's future. However, any co-operative efforts will need to be reinforced with additional funds from the interested parties to expedite the technology development. It is notable that a number of these programmes, such as the LETDF, leverage significant industry funding (at least an additional AUD 1 billion), are based on co-operative industry-government-researcher partnerships. Without the development of a suitable technology to curb high emissions from coal combustion, Australia will only be able to embrace serious climate change mitigation plans with substantial economic costs.

The Australian natural gas sector has experienced major reforms and structural change since the mid-1990s with the separation of formerly integrated companies and the introduction of third party access (TPA) to transmission and distribution pipelines. There has been significant investment for expansion and integration of the gas transmission network, which has enhanced competition and security of supply. In 2003, natural gas accounted for 20% of primary supply although its production and use are expected to expand dramatically with a 184% growth in production between 2003 and 2020 and a 97% growth in domestic use. Most of the gas reserves are located in the north-west of the country, far from demand centres and are most likely to be exploited as liquefied natural gas (LNG) projects. Although competition in the global LNG market is fierce, Australia offers several advantages compared with other LNG suppliers, mainly political and economic stability and proximity to Asian demand centres. Upstream competition has started to emerge, mainly in the south-eastern part of the country.

Despite a progressive move towards more competition, the market is still immature and highly concentrated. A limited number of producers and customers dominate the market. The government has started a major reform to improve consistency of regulation and efficiency of the rules, and to create a national gas market. The most pressing regulatory and policy issues in the gas sector are to proceed with the review of the gas access regime, to facilitate upstream competition and to promote the development of gas hubs. The impact of differing federal and state taxes, charges and royalties may affect the competitive position of gas versus coal and could warrant further study.

Oil accounts for about one-third of Australian primary energy supply. The country has substantial domestic production, which has stayed at a relatively constant level since 1990. The government, through the Australian Bureau of Agricultural and Resource Economics, projects that domestic oil production will remain flat in the coming years and that increasing oil demand will cause import reliance to rise, reaching 37% in 2010 and 46% in 2020. More conservative forecasts from Geoscience Australia predict a steady downturn in Australian oil production over the next two decades as existing fields mature and new discoveries are limited. Given the liquidity of global and regional crude and products markets, this does not necessarily pose a security of supply problem. The government is interested in keeping Australia an attractive investment destination for oil exploration and production. It considers the country's oil resources to be under-explored and would like to see greater activity to exploit domestic oil. The efforts being made to encourage more activity such as a tax uplift and government geoscience pre-competitive surveys appear to be sound, particularly given that these actions are targeted on the so-called "frontier areas", which remain largely unexplored. The success of these measures in attracting investment will only be seen in some years and thus, against the background of high oil prices, it seems prudent for the government to take a step-wise approach towards any further tax or other concessions.

While Australia does not generate electricity from nuclear power, it does have substantial uranium reserves and is a major global uranium exporter. In 2002, total Australian economically demonstrated uranium resources were estimated at 702 000 tonnes, with the majority of the resources located in South Australia, the Northern Territory and Western Australia. Continuing stable uranium exports from Australia contribute to global security of supply.

Australian energy policy has placed a great deal of emphasis on the promises of further energy technology developments, particularly in their treatment of climate change mitigation. As such, energy R&D will be particularly important for the country. The White Paper takes a commendable approach to R&D by looking at the overall innovation process, including not only R&D but also concept identification, commercialisation/demonstration and uptake. There is also effective collaboration among the many stakeholders, including public-private partnerships such as Cooperative Research Centres (CRCs). In general,

the R&D targets and objectives are consistent with overall energy policy. In the past there have been difficulties gathering adequate information on government energy R&D spending. Recent efforts to develop statistics or data in the energy sector, including profiles of various technologies, will help Australia to develop a clearer picture of energy R&D innovation, to realise trends of energy R&D funding since the mid-1990s by sector and to compare Australia's funding with other IEA countries. These efforts are encouraging and should be strengthened. Assessing the performance by a set of indicators or benchmarks is important to maximise the cost-effectiveness of energy R&D programmes. In particular, care should be taken that the energy R&D programme and its product technology are designed specifically to meet the country's overall energy policy goals.

RECOMMENDATIONS

The government of Australia should:

General Energy Policy

- ▶ *Maintain the momentum of the collective government effort demonstrated in producing the White Paper in order to ensure a timely implementation on all levels of the measures and initiatives announced in the White Paper.*
- ▶ *Strengthen the efforts towards creating a National Energy Market, particularly in the gas sector, with the establishment of a national energy regulator (AER). This becomes more important if a carbon price signal is created that will enhance the demand for gas.*
- ▶ *Implement the plan to undertake biennial energy security reviews and continue the work of the Energy Group to maintain energy security; ensure that this work is widely discussed by all the relevant players of government and industry, particularly in light of guaranteeing security in the reformed market sectors.*
- ▶ *Consider stepping up demand-side energy policies to curb growth in energy demand by outlining an ambitious national energy efficiency strategy in order to approach best practices in other IEA countries.*
- ▶ *Look for new opportunities in climate change mitigation policy responding to evolving international and domestic circumstances through further development of the national climate change strategy engaging key stakeholders, in particular industry and state/territorial governments.*

Energy and the Environment

- ▶ *Reappraise as required the costs and benefits of a national emissions trading scheme, particularly in light of developments regarding further international and domestic climate change frameworks and technology advancements. Ensure that all stakeholders are kept abreast of these developments in order to keep supply and consumer decision-makers fully informed.*
- ▶ *Ensure consideration of the environmental consequences in future decisions on energy tax reform.*

Energy Efficiency

- ▶ *Develop a co-ordinated energy efficiency strategy that aims to realise all the benefits of improved efficiency such as emissions mitigation, increased productivity and hence competitiveness, the advantages of delaying infrastructure investments to gain technology advancements, and enhanced energy security.*
- ▶ *Consider targets for improved energy efficiency on a national or sector-specific basis and the appropriate means of achieving them.*
- ▶ *Address means of curbing peak electricity demand, for example through more cost-reflective pricing in meeting summer peaks and/or more stringent efficiency standards for peak energy consumers such as air-conditioning.*
- ▶ *Develop stronger means of improving energy efficiency in the transport sector, in particular through vehicle taxation and fuel efficiency standards.*
- ▶ *Consolidate the different levels of energy efficiency programmes to simplify them for users and/or improve their effectiveness.*

Renewable Energy

- ▶ *Maintain an efficient market-oriented approach to renewables development such as the Mandatory Renewable Energy Target (MRET), while also supporting the most promising renewable energies that still need additional assistance.*
- ▶ *Exploit those renewable energies where Australia enjoys a relative cost advantage over other countries.*
- ▶ *Continue to give a long-term perspective to the renewable industry, by assessing the effect of government support programmes (and their expiration schedules) and responding if renewables development is not consistent with the goal of making renewable energy an important part of the long-term strategy.*

- ▶ *Maintain focus on cost reduction of renewables technologies and on energy needs where renewables may be more cost-effective, such as remote area power generation and summer electricity peaks.*

Electricity

- ▶ *Continue taking measures of transparency, openness and competition as tools for creating a low-priced reliable electricity sector.*
- ▶ *Encourage the process of integrating the markets, with the view to strengthening a fully competitive market with full contestability for all consumers.*
- ▶ *Implement plans for improved decision-making on new interregional transmission investment to enhance reliability, check market power and improve system-wide economic efficiency.*
- ▶ *Accelerate the process of further streamlining and simplifying the regulatory framework with the aim of a more nationally focused regulatory regime.*
- ▶ *Monitor closely the market response to growing generation needs and be prepared to take appropriate action to achieve security of supply; further incorporate the Annual National Transmission Statement (ANTS) into the Statement of Opportunities (SOO) with more concrete suggestions in recognition of transmission's ability to address regional needs.*
- ▶ *Consider the effects of mixed ownership in the generation sector between state and private actors; ensure there is a level playing field between all participants.*
- ▶ *Address the issue of how the market could more efficiently and reliably meet peak demand. Encourage market actors to increase demand-side participation, in order to make electricity demand more responsive to price signals.*

Coal

- ▶ *Work in close co-operation with states and industry to alleviate the bottlenecks in the coal supply value chain, particularly those associated with transportation needs in the immediate and longer term.*
- ▶ *Support the development of the necessary technologies for the next generation of coal use as part of a larger effort to consider how the expanding future use of coal in domestic and international environments can accommodate future carbon constraints.*
- ▶ *Co-ordinate activities between coal producers, electricity companies, government and researchers to address the challenges facing coal's future*

given its high carbon content, particularly in garnering sufficient funds to develop emission-cutting technology.

- ▶ *Anticipate the effects of higher energy prices owing to coal's high carbon content.*

Natural Gas

- ▶ *Strengthen the development of a national energy/gas market with better interconnectivity of the grid and more consistency of rules across jurisdictions; complete the gas market development plan jointly developed with the industry; actively promote the development of hubs/spot markets; and increase transparency in the market (e.g. market share information and prices).*
- ▶ *Complete the Gas Emergency Response Protocol as soon as possible, making clear the roles and responsibilities of governments, market participants and customers.*
- ▶ *Establish a clear, transparent and stable framework for a gas access regime that enables cost-effective access at the transmission level, gives enough incentives for new greenfield pipelines and ensures uniformity of approach nationally; quickly respond to the Productivity Commission Review on the Gas Access Regime.*
- ▶ *Promote further upstream competition, for example by reviewing the upstream fiscal regime for onshore and offshore fields in order to incentivise exploration and production offshore and create internationally, as well as across jurisdictions, competitive conditions; by reviewing joint marketing policy and facilitating separate marketing where feasible; and by reviewing/monitoring conditions for access to upstream facilities.*
- ▶ *Continue to encourage the development of LNG exports in the face of global competition, with particular attention to resolving boundaries and royalty issues with East Timor.*
- ▶ *Review the effects of differing taxes, regulations and changes on the competitive position of gas versus coal in energy markets.*

Oil

- ▶ *Continue to review and adapt the upstream regulatory regime in close co-operation with the oil industry.*
- ▶ *Assess whether the announced fiscal measures and the upstream taxation provisions have the intended impact of increasing exploration and production activities and, if necessary, propose new measures.*

- ▶ *Continue to work with industry and other stakeholders to reform legislation governing retail activity in light of the substantial changes that have taken place in the motor fuels market.*
- ▶ *Monitor closely its emergency stockholding position to ensure it continues to comply with IEA obligations, especially in light of the changing domestic refinery industry and the expected growth of oil imports.*

Energy Research and Development Innovation

- ▶ *Maintain and refine the approach taken in the White Paper to look at the innovation process overall.*
- ▶ *Maintain and further develop effective collaboration among stakeholders, including public-private partnerships.*
- ▶ *Ensure regular reviews of the technology assessments and consistency between government support for energy R&D innovation, the technology assessments and the goals of general energy policy.*
- ▶ *Develop improved mechanisms for data collection of overall energy R&D funding, the allocation of that funding and communication of this information to international partners.*
- ▶ *Continue to provide energy R&D innovation support which is both substantial and responsive at different stages of the projects, and which is consistent with the goals of the White Paper in particular and other national research priorities.*
- ▶ *Develop improved mechanisms for assessing the performance of R&D projects conducted by the government and public-private partnership.*
- ▶ *Ensure actions or measures under international technology agreements to help Australia achieve its aspirations as a leader and "fast follower" in technology development.*