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'Low-emissions coal – coal's future depends on it'

The importance of coal to Australia

The increase in the export price of coal this year is likely to add about \$US25 billion to the value of Australian exports.

The increase in price alone, in one year, of this one commodity – our largest export commodity – is likely to contribute more than two and a half times the total value of exports of all merchandise to the United States of America.

That's one important reason why analysts are not anticipating a downturn in the Australian economy as the United States plays dice with recession.

Rapid growth in the Asian developing economies is being fueled by coal. China, India, Indonesia and others would be running into serious energy and metal supply constraints without the ready availability of coal. Nearly 70 per cent of China's energy comes from coal, and exceptional proportions of India's energy, and of the growth in Indonesia's. Coal therefore

plays a role in the boom in Australian exports of other goods and services to Asia. Much of this coal comes from local sources in Asian economies, and increasing proportions from Australia.

At home, coal has made Australian electricity cheaper, to business and to households, than in most other countries.

The Garnaut Climate Change Review's modelling in progress suggests that, under business as usual, without concern for new climate change mitigation in other countries or Australia, the relative importance of coal to Australians' rising living standards will increase strongly through the twenty first century.

So coal is set to play a big role in future Australian prosperity...so long as we can deal effectively with an inconvenient truth.

On a Balance of Probabilities.

In New South Wales, it may be useful to say something about the scientific basis of the inconvenient truth—although the Minister for Mineral Resources knows the subject well...

Australia's and the world's mainstream science says that the earth has been warming; that

the release of greenhouse gases into the atmosphere by humans is the main cause; and that if humanity continues with business as usual it will run into dangerous climate change that may threaten established and valued patterns of life.

I see myself as a skeptic on these matters. A true skeptic, who forms views on the basis of the evidence, and not on faith. The true skeptic's position contrasts with that of people of faith, who hold firmly to the view that there is no human-caused climate change, whatever the evidence.

I sympathise with romantic hopes, that concern for climate change is a figment of some excited imagination. Sometimes, as I come to grips with the diabolical nature of the climate change policy problem, I find such hopes attractive.

Regrettably, these hopes have no foundations outside the logic of faith.

Someone who is not educated in the science is bound to weigh the authority of the expert. There is no doubt about the weight of opinion in relevant parts of the science community. There are some credible alternative views, but these are distinctly in a minority. The points of dissent are not usually with the postulated physical relationships between concentrations of greenhouse gases and global warming—unlike the dissent of those who cite them with faith but not precision. They are about the strength of those relationships and the relative

importance of greenhouse gases and various natural sources of climate change.

Like Galileo, the dissenters may turn out to be right, against the weight of expert opinion. That would be wonderful. But on a balance of probabilities, looking at the weight of scientific opinion, they are wrong.

The skeptic continues to test the evidence, and to assess the changing weight of expert opinion.

It is tempting to review the evidence long enough to remove all doubt about the precise impact of climate change, before taking any mitigative action.

Unfortunately, we do not have time to wait. The economic analysis of the Review has established that, if the mainstream scientific opinion is sound, “business as usual” is taking us into dangerous climate change at a more rapid rate than earlier analysts had presumed.

In the language of the financial markets, humanity currently holds an option on avoiding dangerous climate change, that is running quickly towards its expiry date. The option is in the money in the current knowledge market. It would be nice to wait until we knew with certainty the final value of the underlying asset that we were buying at the strike price. But if we delay, the option will expire, and lose its value.

That is why the international community, now with Australia as part of that community, is working towards the mitigation of dangerous climate change. This work may or may not eventually realise the objectives of action. But climate change mitigation is now an important influence on the future of coal, at home, and abroad, and increasingly in the Asian economies that are centrally important to Australia's future prosperity.

The Garnaut Climate Change Review

The Review has been working since last July. It was initially supported only by the States and Territories. We have had a strong Secretariat based in the Victorian Department of Premier and Cabinet. Specialist support has been made available by several States, with the Queensland Treasury providing great strength in general equilibrium modelling.

The Review became a joint Commonwealth-State effort in January this year. The Commonwealth's substantial contribution of resources has been nowhere more important than in the joint modelling exercises involving the Australian Treasury. The Garnaut Review and the Treasury are undertaking joint assessment of the costs of various degrees of Australian mitigation.

In addition, the Garnaut Review will itself go one step further. It will assess the benefits in climate change avoided of various levels of effective climate change mitigation. This is

pioneering work, with all of the challenges of methodological innovation. The Draft Report to the Federal, State and Territory Governments, due in the middle of the year, will provide a flavour of the modelling results. It will do this alongside assessments of benefits of mitigation that are not amenable to quantification within general equilibrium models. A Supplementary Draft Report at the end of August will comprehensively present the results of the joint modelling with the Australian Treasury, and the additional modelling on the avoided costs of climate change. The public discussion of the Draft and Supplementary Draft Reports will inform the Final Report, due at the end of September.

The Review has already benefited greatly from more than one thousand submissions following the Interim Report in February, including over four hundred on the Emissions Trading Scheme design.

The Review and the coal sector

Here I will introduce the Review's thinking on some likely impacts of climate change mitigation on the coal sector. I will discuss some drivers for a fundamental transformation of the energy sector in Australia. Within this energy transformation, the development and deployment of technologies that dramatically reduce the emissions from coal combustion will be absolutely critical to a viable, let alone prosperous, coal industry for this country.

Whilst today I am focusing on the prospects for the coal sector in a carbon-constrained economy, this is not to downplay the importance to mitigation of other energy supply sources, demand side initiatives

and other industry sectors. Some of my comments regarding Research, Development and Innovation, and infrastructure, apply as much to specific forms of renewable energy as they do to coal-fired power.

Why is coal important to the climate change story for Australia?

Australia's response to climate change, both internationally and domestically, will be inextricably intertwined with the role of the coal industry. The combustion of coal represents a major portion of greenhouse gases whether it is used for industrial processes or power generation. In Australia's case, it is well known that emissions from the stationary energy sector represent more than 50% of our GHG emissions and that this proportion is growing.

The structure of the stationary energy sector, and electricity generation in particular, provides an obvious point on which to focus any mitigation policy. The deep cuts in emissions that are needed--60% as an early step, and more in the context of an effective global agreement involving all major including developing country emitters--will only be reached if a major transformation towards near zero emissions in this sector is achieved by mid-century.

Current market dynamics

The last decade or so has witnessed a remarkable transformation in Australia's stationary energy sector. The sector had been characterized by publicly-owned, vertically integrated monopolies, operating in individual states with little or no interaction between fuel sources. It has been transformed into one operating within a highly competitive, increasingly national market with increasing private sector participation, considerable regional interconnection, sophisticated financial structures and flexible fuel substitution. This transformation has delivered choice for customers and an attractive

climate for investors, whilst maintaining and increasing the level of supply security.

Power generation based on black and brown coal for base load supply, transmission interconnection for flexibility and additional security and gas-fired plant to meet the growing demand for peak and intermediate demand have underpinned the transformation.

In the last few years, the dynamics of this relatively benign environment have been challenged by concurrent emerging forces, quite independently of any mitigation of greenhouse gas emissions:

- A major escalation in capital costs across sectors, but with particular impact on capital intensive industries where cost increases of two or even three fold have been seen
- A major uplift in global coal prices driven by recent strong demand in China and India and a supply system that takes some time to respond with new infrastructure and shipping capacity
- Increases in global prices for traded natural gas, albeit not keeping pace with even greater increases in oil prices

In Australia, domestic energy prices have seen some impact of the first of these forces. That was exacerbated from early 2007 by the impact of the drought on water availability for hydro generation and power station cooling. The existence of long term domestic contracts for black coal, the unsuitability of brown coal for export and the absence of LNG export infrastructure on the East Coast have largely cushioned Australian prices from the other forces. This position is not sustainable: the contracts will be re-negotiated, new coal export infrastructure is being developed and several LNG export projects have been announced. The takeover bid by the BG Group for Origin energy has been linked to a likely uplift in domestic gas prices towards international levels—an increase of many times

from current levels.

The result has been large increases in market prices of electricity within the national electricity market: over the four years to 2007-8, by 27% in NSW; 93 %; 126% in South Australia; and 84% in Victoria. Large interstate variations in prices indicate the absence of the interconnectivity that would underpin a truly national electricity market. Note that these increases precede the main effects of rising capital costs and prices of gas and tradeable coal. The general and continuing tendency is for the rising costs of new capacity to enhance the profitability of established generators with access to coal resources that do not face export competition. Increased costs from an Emissions Trading System will be introduced into a dynamic environment, dominated by cost increases from other sources, and, prior to the ETS, favouring established, high-emissions producers.

What transformation does the challenge of climate change require?

In our Interim Report we outlined the rationale for it being in Australia's interest to seek the strongest feasible global mitigation, and for the extent of Australia's own commitments to mitigation to depend on progress towards effective global mitigation. Whatever the eventual content of a global budget, it is clear that large cuts in Australia's emissions budget will be required as part of an effective international agreement. Two significant consequences follow. Firstly, global commodity prices will progressively incorporate carbon prices as an effective global agreement emerges, although individual countries and regions will be seeking to balance their domestic commitment against what will be, for some time, a very patchy quilt of measures. Secondly, there will be costs associated with such a commitment, and if an effective system is designed and implemented such that Australia's budget is achieved in the most efficient manner, those costs will flow across commodities and through the economy in

proportion to GHG intensities.

For Australia's economy, there will be particular sectors, industries, companies and even communities where the impacts will be most acutely felt. These issues were raised in our Discussion Paper.

The introduction of a price on emissions via an emissions trading scheme has been generally accepted as the most direct instrument for securing Australia's emissions budget. The design of an ETS was the subject of our Discussion Paper released in March. The many excellent submissions on the Discussion paper, including from the Australian Coal Association and other organisations and individual companies represented at today's Summit, together with a number of direct consultation meetings, will be of great value in framing the content of the Draft Report.

The centrality of the ETS

Our Discussion Paper describes a simple, market-based system that will drive abatement through an emissions permit price to meet the specific limits determined by government. The ETS will have major impacts on economic activity and income distribution. There are equity consequences that arise from these impacts. The need to address these consequences is explored in the Discussion Paper and has been the subject of many of the submissions we have received.

In the case of Australia's stationary sector, there will be a significant realignment of marginal costs of production emanating from any fuel source and directly in proportion to the carbon intensity of the supply chain. This will drive equally significant impacts on the relative attractiveness of investments in additional and replacement capacity. Clearly this is the expected outcome of the ETS.

These direct effects will be accompanied by indirect impacts as new secondary markets arise around the revised commodity structures, including the emissions permit market.

The final effects on individual sectors will depend on complex interactions among the permit price (itself affected by opportunities for international trade in permits), the price of natural gas and tradeable coal relative to the cost of supplying high-emissions coal, and increases in capital costs for new capacity. The final effects on individual firms will depend on these factors and on strategies adopted by other firms within their own sector.

The market failures and the case for other interventions

A credible and efficient ETS will address the primary market failure of uncapped GHG emissions and provide some clarity for investment decisions involving the deployment of existing, lower emission technologies. It will provide encouragement for research and development on new low-emissions technology. However, the public good nature of basic research and the positive externalities of innovation mean that simply establishing a price on emissions will not generate optimal levels of investment in technological change. This establishes a case for policies to assist innovation, with a strong presumption in favour of technology-neutral mechanisms.

In Australia, it is already clear that substantial new investment in infrastructure is likely to be required, particularly for the transmission of electricity, natural gas and carbon dioxide. Whilst current arrangements have generally enabled progressive expansion of the electricity and gas transmission systems, first mover and free rider risks will be of greater concern in meeting in a timely manner the

requirements for major new sources of renewable generation, inter-regional connectivity and the transport of CO₂ between likely sources and sinks. New structures to facilitate appropriate public contributions to such infrastructure investments will almost certainly be required.

Finally, there are possible scenarios in which significant adverse impacts arise for specific communities, namely those dependent on coal and coal-fired power generation, notably the Latrobe Valley, the Hunter Valley and in parts of Queensland. In such cases, there are good reasons and well established precedents for governments providing assistance to individuals and communities. We have said in the Interim Report and ETS Discussion Paper that this provides an additional justification for supporting the development of technologies associated with carbon capture and storage.

How will it play out?

As we have developed our understanding of the stationary energy sector and the implications of the above transforming forces, certain underlying issues emerge as the key factors that will play out over a number of decades. This is not to downplay other short term issues which may have acute impacts, nor to suggest that the Review Team has acquired some form of magical forecasting tools. Rather, it suggests that these factors are likely to exert the greatest leverage.

In the initial period following the establishment of the ETS, the response is likely to involve some fuel switching, constrained by transmission interconnection and gas availability for existing gas-fired open-cycle plants. This early picture will then be strongly influenced in regard to fuel mix and cost implications by the extent to which new coal contracts are negotiated at higher prices and to which domestic gas prices move towards global price parity. It will also be greatly affected by the presence

of any Mandatory Renewable Energy target. The implications for brown coal generation will, in the short term, appear to be dominated by their capacity to recover lost volume in prices and for either fuel substitution or other changes to the existing plant to improve emissions intensity.

I do not want to downplay the acute pressures that this period creates for owners and operators of existing plant, much of which has been optimized to run efficiently in a mode that will become increasingly less viable in this new world. These factors will influence a rising permit price, and provide increasingly strong support for incremental technology enhancements, with higher capital costs for new-build plant favouring retro-fitting of existing plant.

The increasing permit price, and an appropriate mix of public and private funding for research, development and innovation in low-emissions technologies, will drive investment in a range of technologies. A subset of technologies generally described as “clean coal” will be at the forefront of attention. In this context, I would note the commitment of the Coal Industry through the COAL21 Fund, estimated to raise \$1 billion over the next decade for research, development and demonstration of clean coal technologies, the commitments of the Federal and several State Governments in the same space and the alliance formed between the Australian Coal Association, the CFMEU, The Climate Institute and the WWF, calling for a national task force on carbon capture and storage. I expect that these initiatives will be enhanced and given further focus through the recommendations of our final reports.

If the considerable technical, regulatory, environmental and economic challenges for these technologies can be successfully addressed, then a very different medium and longer term future

emerges. Those same forces of high capital costs, high world gas prices and relatively strong export coal prices will strongly favour retro-fitted brown and non-tradeable black coal plants with low-emission profiles and, ultimately, near-zero emissions plants involving integrated gasification combined cycle (IGCC) and integrated drying gasification combined cycle (IDGCC) technology. Effectively this scenario plays out to Australia's comparative advantage in a diversity of fuels, including coal and gas, without ignoring the associated potential growth for uranium exports. At the same time, it is expected that the rising permit price and funding for research, development and innovation in renewable technologies such as geothermal, solar thermal and solar PV will also be delivering favorable trends in early stage deployment of such technologies.

In recent years, there has been much discussion regarding new, integrated technologies such as IGCC and IDGCC, featured in such projects as ZeroGen in Australia and FutureGen in the United States. These projects are complex and large and have struggled to make rapid progress. This complexity is partly responsible for the widely but, I think, erroneously held view that clean coal technologies will not be commercially viable until post-2020.

Whilst such projects remain critical for the longer term, the work of the Review suggests that this time frame is unacceptably long for making major inroads into our emissions. Taken with the other fuel cost pressures, this lead us to expect accelerated work, inter alia, on the retro-fitting of technologies that reduce the emissions intensity of existing plants and facilitate the capture of CO₂ from such plants, even if not involving complete capture. Such developments could also be associated with CCS from gas-fired plant, at least in the medium-term. This may be of lesser value, if and as global gas prices continue to rise and become accessible to east-coast gas supplies, including coal-seam gas.

The imperatives

This assessment of the intersection of an emissions mitigation policy with commodity price dynamics leads us to focus on a set of key issues that will be essential to making early and deep cuts in emissions. These are matters of urgency. These issues will be essential to delivering sustained prosperity for the Australian coal industry, both domestically and internationally.

- A comprehensive survey of likely sources (existing and potentially new fossil fuel plants) and sinks (depleted oil and gas reservoirs and saline aquifers) for CO₂.
- An accelerated development of the regulatory structures around CO₂ storage, including acreage release and interface with oil and gas permits. The lead times in taking this forward are likely to be longer than many would hope, unless the relevant processes can be greatly streamlined.
- Development of a framework to facilitate the most efficient funding of new transport infrastructure, including CO₂, gas and electricity.
- A focused source of funding that drives a mix of public and private funds for emission-reducing technology generally on an even-handed basis. In recognition of the social value of accelerated structural adjustment in regions of established employment that would otherwise be at risk, there would be additional support for productive structural transformation towards low-emissions use of coal in established plants and regions.

We will be expanding on these thoughts in our Draft and Final reports, incorporating input from submissions and ongoing consultation.

The success of the transformation of the Australian coal-using industries, and the transmission of that success to Asian purchasers of Australian coal, will be the critical determinants of the future of the Australian coal industry. They will be critical determinants of the outcome of the global effort to avoid dangerous climate change. They will be critical determinants of continued strong economic growth amongst Australia's Asian neighbours. Few things will be as important to Australian prosperity through the twenty first century.