



BAKERS
Investment Group

General Submission to the Garnaut Climate Change Review

8 February 2008

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EXECUTIVE SUMMARY

The Garnaut Climate Change Review was initiated by the Federal ALP in conjunction with the States and Territories with terms of reference dated 30 April 2007. The Review was tasked to examine the costs of inaction and impact of climate change on the Australian economy and jobs. A draft Report is to be distributed for comment by 30 June, 2008. The final Report is to be completed and published by 30 September, 2008.

Of the three key human activities identified by Sir Nicholas Stern in his report to the British Government, the burning of fossil fuels and other energy related activities of humankind contributes over 65% of greenhouse gas emissions – the largest contributing factor to climate change. Urbanisation and industrialization are major economic drivers which continue to drive the global demand for energy. The need for an integrated policy approach to developing and expanding a diversified, low-emission, energy infrastructure is crucial for Australia's continued economic development while addressing the imperatives of climate change.

Following a discussion of the issues involved in energy demand and its impact on climate change, and the issues relating to Australia's energy security, this submission addresses three key points for consideration:

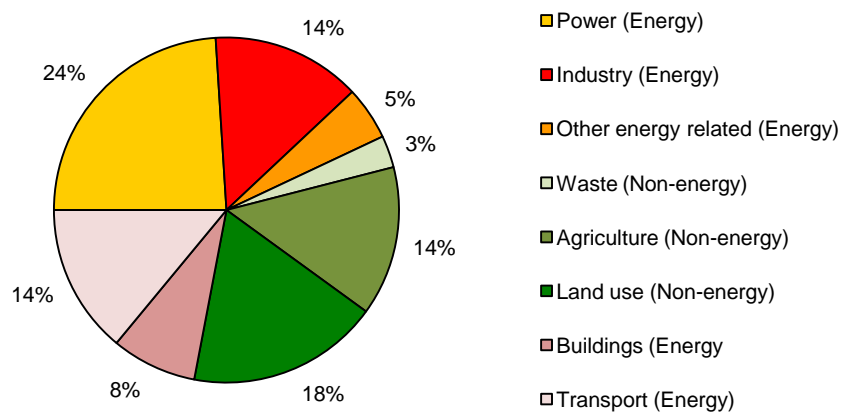
- Increased support to the funding of research and development, and commercialization of renewable energy.
- Improved integration of government policy and administrative response to the growing demand for energy, so as to promote the increased use of transitional and renewable energy, and the further development of low emission energy infrastructure
- A need for market forces to be supported by an efficient and effective regulatory framework to align the political, environmental and economic agendas.

1.0 BACKGROUND

The Stern Report states that “an overwhelming body of scientific evidence indicates that the Earth’s climate is rapidly changing predominately as a result of increases in greenhouse gases caused by human activities.” The report highlights three key human activities leading to greater greenhouse gas emissions; “burning of fossil fuels, deforestation, and other changes in land use”

Of the three human activities, the burning of fossil fuels and other energy related activities result in 65% of greenhouse gas emissions, compared with 35% of greenhouse gas emissions from other non-energy related activities. The share of greenhouse gas emissions is summarized in figure 1.1 below:

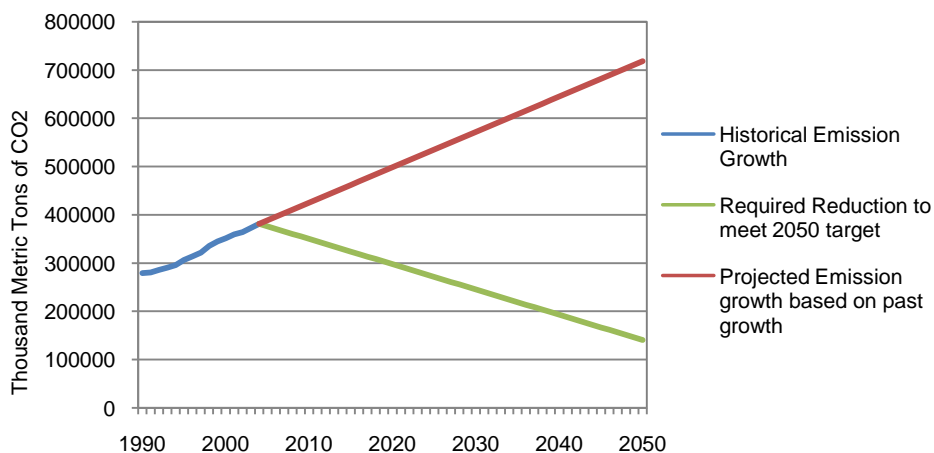
Figure 1.1 - GHG emissions by source in 2000



Source: World Resource Institute 2006

The demand for global energy is expected to grow rapidly with the International Energy Agency predicting global demand for energy will increase 60% over 2005 levels by 2030. Significant changes to power generation, industry use of energy, transportation and building efficiency will be needed if energy production is increased in-line with forecast growth just to maintain current levels of greenhouse gas emissions. The economic, social and political challenges are made even more difficult by targeting a reduction of greenhouse gas emissions of 60 percent by 2050, against 2000 emission levels, if global greenhouse gas concentrations in the atmosphere are to be stabilized to between the proposed target of 450 and 550ppm by mid century. Figure 1.2 shows the magnitude of the task.

Figure 1.2 Australia’s Carbon Emissions



Source: Bakers Investment Group, 2008 based on UNFCCC Data for Australia

Major challenges include:

- Move to low or zero emission base-load and peak load generation
- More localized generation to reduce transmission loss
- Significant advances in energy efficiency both for new construction and existing structures as well as quantum changes in urban and transport planning
- Innovation to “mainstream” renewable energy for base-load and peak generation in a sustainable and ecologically friendly manner
- Pricing energy which is non-inflationary, economically responsible, socially acceptable and politically possible.

This will require significant and imaginative innovation, changes to pricing mechanisms, creative investment incentives and major policy and programme support from government at all levels.

1.1 Demand for Energy

The increased demand for energy is driven by two key, and globally consistent, trends – *Urbanization* and *Industrialization*

Figure 1.3 Historic and Forecast Growth in the World's 20 Largest Urban Centers.

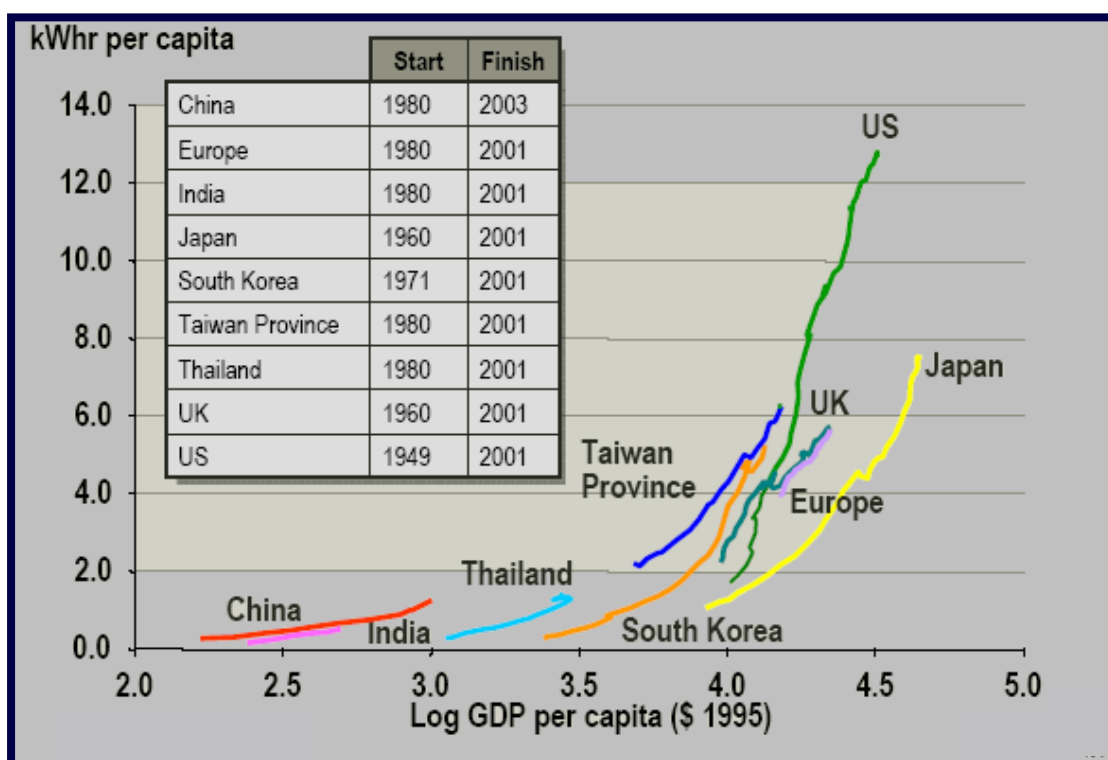
Ranking (2005)	City/Urban Agglomeration	Population (millions)				Ave. Rate of Growth (%)	
		1975	2000	2005	2015	1975-2005	2005-2015
1	Tokyo	26.6	34.4	35.2	35.4	0.93	0.08
2	Ciudad de México (México City)	10.7	18.1	19.4	21.6	1.99	1.05
3	New York-Newark	15.9	17.8	18.7	19.9	0.55	0.60
4	Sao Paulo	9.6	17.1	18.3	20.5	2.15	1.13
5	Mumbai	7.1	16.1	18.2	21.9	3.15	1.84
6	Delhi	4.4	12.4	15.0	18.6	4.08	2.12
7	Shanghai	7.3	13.2	14.5	17.2	2.28	1.72
8	Kolkata (Calcutta)	7.9	13.1	14.3	17.0	1.98	1.73
9	Jakarta	4.8	11.1	13.2	16.8	3.37	2.41
10	Buenos Aires	8.7	11.8	12.6	13.4	1.20	0.65
11	Dhaka	2.2	10.2	12.4	16.8	5.81	3.04
12	Los Angeles – Long Beach – Santa Ana	8.9	11.8	12.3	13.1	1.07	0.63
13	Karachi	4.0	10.0	11.6	15.2	3.56	2.67
14	Rio de Janeiro	7.6	10.8	11.5	12.8	1.39	1.07
15	Osaka – Kobe	9.8	11.2	11.3	11.3	0.45	0.04
16	Al Qahirah (Cairo)	6.4	10.4	11.1	13.1	1.82	1.66
17	Laos	1.9	8.4	10.9	16.1	5.84	3.94
18	Beijing	6.0	9.8	10.7	12.9	1.91	1.82
19	Manila	5.0	10.0	10.7	12.9	2.53	1.90
20	Moskva (Moscow)	7.6	10.1	10.7	11.0	1.12	0.34

Source: United Nations, Department of Economic and Social Affairs, Population Division (2006). *World Urbanization Prospects: The 2005 Revision. Working Paper No. ESA/P/WP/200.*

As shown in Figure 1.3, urbanization is occurring, particularly in non-OECD countries, at a rapid rate. This urbanization is placing added pressure on the demand for infrastructure, building and industry supporting both emerging and already established but expanding urban centers. The development of these urban centers is an energy intensive process, placing added energy requirements on non-OECD countries which traditionally have demanded less energy per capita than the more developed OECD nations. On the other hand the continued economic growth of resource-rich countries such as Australia relies on continued exports of resources which support the two trends fueling the demand for energy.

Industrialization in both OECD and non-OECD nations is also forecast to expand and impact global demand for energy, especially as governments seek new employment opportunities in times of rising populations seeking employment and industry restructuring to achieve continued economic growth in an energy constrained, ecologically sustainable manner. History shows that as GDP increases per capita, so has the energy usage per capita, largely through industrialization as well as urbanization. Currently, close to one third of the global population reside in industrializing nations such as India and China, whose energy usage is forecast to increase per capita in line with trends of other industrialized nations. Figure 1.3 shows industrialization measured against energy usage per capita for a selected number of industrialized and industrializing nations.

Figure 1.4 Energy Usage to GDP per Capita Growth



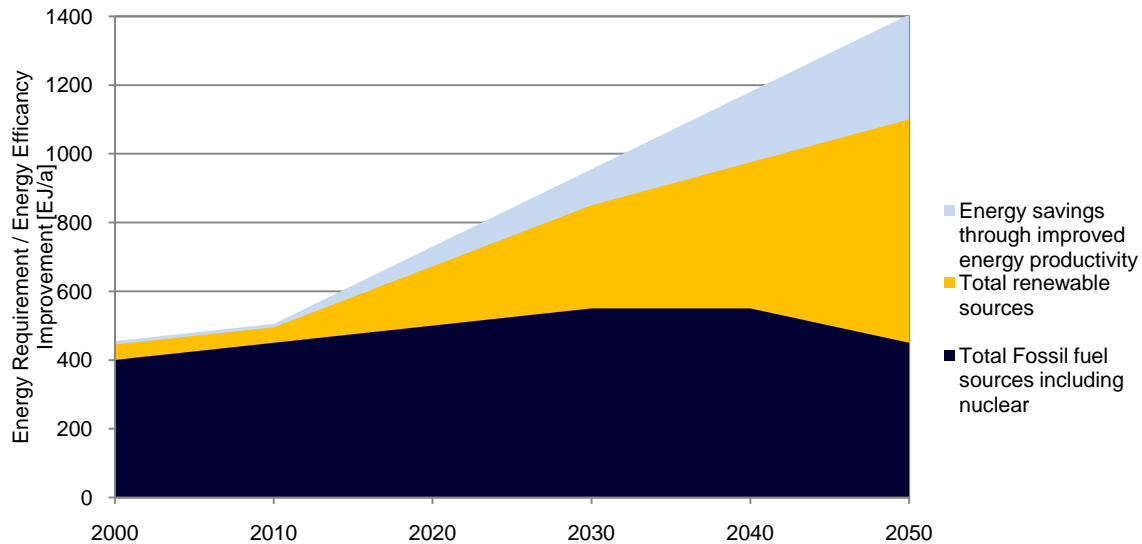
Source: IEA

These increasing trends in both industrialization and urbanization of developing non-OECD countries, underpin the increase in total energy demand globally forecast by the International Energy Agency, the US Department of Energy - Energy Information Administration, the World Bank, the Australian Bureau of Agricultural and Resource Economics and others.

Modelling by Germany's WBGU (*Wissenschaftlicher Beirat Der Bundesregierung Globale Umweltveränderungen* – The Secretariat of the German Advisory Council on Global Change), one of

the leading global experts in modelling climate change, clearly highlights that even allowing for improvements in energy efficiency and improved energy efficiency technologies the growth in energy generation to meet growing demand will increasingly need to come from renewable sources. See Figure 1.4 following.

Figure 1.4 WBGU Forecast Impact of Energy Savings on Energy Demand



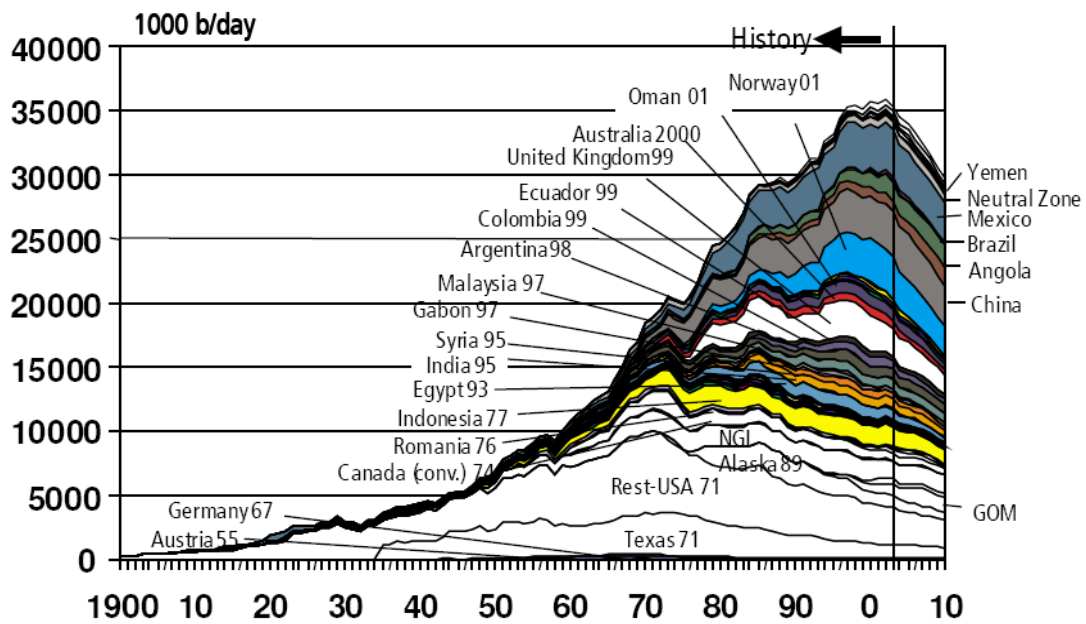
Source: WBGU (The Secretariat of the German Advisory Council on Global Change)

1.2 The Demand for Fossil Fuels

Despite the generally wide availability of coal – some commentators predict up to three hundred years of supply remaining – the demand for fossil fuels is forecast to decline for two reasons:

1. *Peak Oil.* The peak oil debate is focused on when oil production globally will reach a maximum and thereafter production goes into an irretrievable terminal decline. Peak Oil as a concept applies globally, but it is based on the summation of individual nations experiencing peak oil. The issue is complicated by the fact that previously uneconomic wells become economic at some price and the underlying models of reserves have proven to be unreliable. However, there is general mainstream consensus that peak oil will be reached before 2020, if it has not already done so. Figure 1.5 shows that oil production has already peaked in non-OPEC, non-former Soviet Union countries. Subject to the earlier caveat on reserve estimation, current estimates have oil production peaking in Kuwait in 2013, Saudi Arabia in 2014 and Iraq after 2018. Further, new oil discovery peaked in the mid-1960s and has been declining since and oil production per capita has fallen since 1979 due to rising population globally.
2. *Social and Political Imperatives of Climate Change.* Implementation of a governmental policy framework (including mandatory renewable energy targets, carbon credit trading systems, emissions fines, and fiscal incentives), will change the economics for using fossil fuels. It is clear, however, that a policy framework which focuses only on efficiency without adequate incentives for the innovative development of renewable and alternate energy based peak-load generation will fail to meet growing demand leading to energy rationing and severe consequences for the economy, and consequently for society. Thus, policy must contain both supply side and demand side incentives.

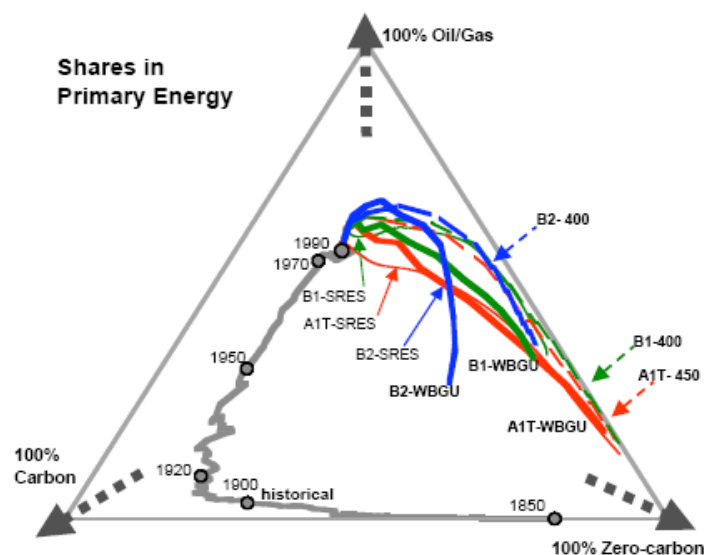
Figure 1.5 Oil Production in Selected Non-OPEC, Non-Former Soviet Union Countries



Source: US Department of Energy

With respect to the social and political imperative of climate change, a number of policy options can be considered both nationally and within a global framework. In a 2003 report to WBGU which analysed the "... feasibility and the technologic and economic implications of scenarios that fulfill the stated objectives of the Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC, 1992), namely to lead to a stabilization of atmospheric concentrations of greenhouse gases (GHGs), as exemplified by the main anthropogenic greenhouse gas – CO₂." Figure 1.6 shows the historical share of coal, oil/gas and zero-carbon options in the provision of primary energy and the implications of various scenarios presented.

Figure 1.6 The Energy Triangle. Share of coal, oil/gas, and zero-carbon options in global primary energy supply: Historical (since 1850) and in WBGU scenarios



Source: US Department of Energy

The WBGU report concluded that while programmes such as carbon capture and sequestration provide some impact on stabilization, **major structural changes in the energy supply chain are key.**

Therefore, while the pressure of a growing forecast demand for global energy is clear, the question still remains on how implemented policy nationally, and through multi-lateral fora, can have the desired effect in encouraging the innovation and commercialization of the technology needed to increase such renewable and alternate energy sources; and how the required infrastructure is to be funded and developed, in the delivery of commercially viable renewable and alternate energy sources.

1.3 Carbon Capture and Storage, Carbon Trading and Carbon Offsets

Carbon Capture and Storage

Carbon capture and storage (CCS) can help reduce greenhouse gas emissions. The IPCC in their 2005 special report on carbon dioxide capture and storage noted increased costs and reduced generation efficiency with carbon capture and storage. The report noted that the

“application of CCS to electricity production, under 2002 conditions, is estimated to increase electricity generation costs by about 0.01–0.05 US dollars per kilowatt hour (US\$/kWh), depending on the fuel, the specific technology, the location and the national circumstances”,

and that

“retrofitting existing plants with CO₂ capture is expected to lead to higher costs and significantly reduced overall efficiencies than for newly built power plants with capture.”

By and large so-called “clean-coal” technologies relate to technologies designed to lower emissions through (small) increases in coal burning efficiencies that still require significant attention to CCS. Even with improvements to efficiency and the use of such technology, emissions remain higher than for other sources of energy production including natural gas. The emission levels for coal with CCS and natural gas as tabled in Table 1.1.

Table 1.1 Comparative Emission Levels

	Natural gas combined cycle	Pulverized coal	Integrated gasification combined cycle
CO₂	43 (-89%)	107 (-87%)	97 (-88%)
NO_x	0.11 (+22%)	0.77 (+31%)	0.1 (+11%)
SO_x	-	0.001 (-99.7%)	0.33 (+17.9%)
Ammonia	0.002 (before: 0)	0.23 (+2200%)	-

Based on Table 3.5 in [IPCC, 2005]. Between brackets the increase or decrease compared to a similar plant without CCS

Source: IPCC

Clearly, there will be costs, especially to older coal-based generation plants that will inevitably raise the cost of energy to the consumer. Incentives to fast track the construction of additional non-coal based generation capacity (possibly through PPP), and the more rapid phase-out of existing coal-based plants may be more cost-effective policy than mandating or subsidising CCS for existing coal-based generation infrastructure.

Carbon Sinks and Carbon Sequestration

A carbon sink absorbs more carbon than it emits. Forests as well as soils, oceans and the atmosphere store carbon, which moves among those different stores over time. The main natural sinks are oceans and plants. Forests not only remove carbon from the atmosphere by incorporating it

into biomass, but release oxygen back into the atmosphere. Forests can act as sources, especially from fire, or sinks at different times. Carbon sinks are a form of carbon offset allowed under the Kyoto Protocol. Because growing vegetation absorbs carbon dioxide, the Kyoto Protocol allows countries that have large areas of forest (or other vegetation) to deduct a certain amount from their emissions, thus making it easier for them to achieve the desired net emission levels. Carbon sinks in the form of forests can also be used in commercial carbon offset schemes offered to people and organizations.

While carbon sinks tend to be transitory stores of carbon, another important and more permanent carbon store are fossil fuel deposits. This carbon store, buried deep inside the earth, is naturally separated from the carbon cycling in the atmosphere - unless it is released into the atmosphere when fossil fuels are burnt increasing the net amount of carbon in the carbon cycle. Carbon sequestration is designed to geologically reverse this process by storing carbon emissions in sealed rock formations. Carbon sequestration removes emissions permanently and therefore reduces net greenhouse gases in the carbon cycle.

The main issues with carbon sinks are twofold.

1. For every tonne of carbon stored in a carbon sink, the Kyoto Protocol allows the release of an additional tonne of carbon from fossil fuel. This is an important allowance, especially for newly industrialising countries in areas with large natural forestlands. Similarly, a commercial offset program does not generally reduce emissions. Substitution does not reduce the net amount of CO₂. Therefore to some extent a focus on carbon sinks can divert attention away from the need to drastically curb greenhouse gas emissions.
2. More importantly, measuring biological activities often involves methodologies with high uncertainties. For many activities, estimating and measuring uncertainties of more than 50% are common. Therefore, uncertainties related to the methodology used to determine the amount of carbon credits from a sink project can be larger than the carbon stock changes measured. This poses the question of how to verifiably assess and determine how many carbon credits can be obtained from a carbon sink project. Further, the carbon content of forests and soils varies naturally -decades of monitoring would be needed to be reasonably certain as to the capacity of the carbon sink and that it was not merely transient. Some recent studies suggest that current scientific estimates about natural absorption are too optimistic as forests and grasslands are likely to become less-efficient "sinks" over time as these systems become saturated with CO₂.

Carbon Trading and Carbon Offset Schemes

Carbon trading and carbon offset schemes are both premised on the fact that a person or organization may possess a transferable right to undertake an action to generate GHG emissions whilst another many choose not to exercise that right. Therefore an entity wishing to increase emissions or to meet an emission target below current levels, may choose to buy that right from another not wishing to do so. While carbon offset schemes have rapidly developed in Australia, and are largely unregulated, carbon trading is yet to be implemented.

There remains significant doubt as to whether carbon offset schemes are effective in any meaningful way, although they remain at this time good business sense for companies keen to prove their "green credentials". Such schemes as carbon offsets for flying, car insurance and even living can now be found almost in abundance and most are attempts to differentiate products or services using what at best can be described as dubious claims given the inconclusive nature of some of the scientific debate around carbon sinks. Further, there is evidence of that in the case of some promoters, new carbon sinks are not being created but that rights to promote existing tree stands as carbon sinks are being acquired rather than the planting of new trees. Indeed the evidence seems to suggest that only an offset scheme accompanied by a specific customized agenda to reduce carbon emissions is effective. In short, the carbon footprint or offset calculators found on many websites advertising offset schemes are misleading due to the underlying assumptions.

In summary, carbon offset schemes need greater regulation to ensure truth in advertising, adequate consumer protection, and that sufficient capital is set aside in trust to pay future obligations – many of which are claimed to have out-year periods of up to 100 years.

Carbon trading, on the other hand, involves a regulated market. Through the Department of Climate Change, the Federal government is establishing a national emissions trading scheme starting no later than 2010 with the detailed design finalised by the end of 2008. The five principles established by the government and the implementation of an adequately regulated market structure should provide an internationally consistent approach to carbon trading.

Issues to be considered in the design of a national scheme are:

A National Cap or a State/Territory Cap?

For an Australian cap-and-trade emissions trading scheme there are two possible methods for the setting of an emissions cap. There can either be a cap for the entire nation, or each State/Territory could have allocated to it a portion of a national cap, which would become its cap. Currently, the EU's trading system operates with individual caps for each member state. This has led to a number of problems, especially in Eastern Europe which suffered significant ecological degradation under the period of Soviet domination along with fewer economic resources available to earn credits. Given the history of Federal/State relations and the integrated national regulatory framework for business, a single national cap is recommended, although States should be encouraged to earn credits through State actions, especially with respect to State owned business activities and land management, which can be used as incentives to attract industry.

How will credits be created and allocated, and to whom?

A major issue at the commencement of each scheme to date has been the determination of the initial stock of credits. The alternative is to begin with a zero stock and create credits only for explicit action. The option of beginning with an established level of credits requires detailed and careful analysis, especially if sinks are included. The European experience was that too many initial credits rapidly devalued tradable credits enabling high emitters to effectively circumvent the process at minimal cost. Beginning from a zero base is more likely to retain credit value and force explicit action otherwise a power-station could simply acquire a plantation of existing trees to claim a credit claiming an offset without actually decreasing emissions or increasing the stock of sinks through new tree plantings. It is recommended that explicit new actions only to reduce greenhouse gases earn tradable credits.

What emissions are to be included? Should the trading system only relate to Carbon?

Whilst the major focus to date has been for a carbon trading system, there is little practical reason why other environmentally harmful emissions like sulfur dioxide cannot be included. In the US, trading systems for other emission types have been operational since the early 1990's, like the Acid Rain Program which trades sulfur dioxide and in Illinois, there is a volatile organic compounds trading system. Although sulphur oxides, nitrogen oxides and dust are relatively minor (in 2006 Loy Yang's emissions were 97.5% CO₂, 1.5% SO₂ and 1% NO plus small amounts of dust) any proposed trading system needs to have mechanisms for the inclusion of additional emission classes.

However, the burning of coal also produces other heavy metal byproducts which can be emitted. The Oak Ridge National Laboratory in the US has found that coal plants have historically emitted more radioactive byproducts (uranium and thorium) in their emissions than nuclear power plants although the levels are very low – in the range of 1.3-3.2 parts per million. According to US data releases in 1982 from worldwide combustion of 2800 million tons of coal totalled 3640 tons of uranium (containing 51,700 pounds of uranium-235) and 8960 tons of thorium. According to the Australian Academy of Science there is up to 4 grams of uranium per tonne of Australian coal. US data shows that population exposure from operation of 1000-MWe nuclear and coal-fired power plants amounts to 490 person-rem/year for coal plants and 4.8 person-rem/year for nuclear plants. Thus, the population effective dose

equivalent from coal plants is 100 times that from nuclear plants. Management of fly ash and retained particulate matter is therefore an emissions issue. During combustion, the volume of coal is reduced by over 85%, which increases the concentration of the metals originally in the coal. Although significant quantities of ash are retained by precipitators, heavy metals such as uranium tend to concentrate in the fly ash. This uranium may be released to the atmosphere with the escaping fly ash, at about 1.0% of the original amount, according to US data. The retained ash is enriched in uranium several times over the original uranium concentration in the coal because the uranium, and thorium, content is not decreased as the volume of coal is reduced. The proper disposal of all heavy metal waste should be brought under the emissions regulatory framework to ensure full pricing of any credits.

What sort of tradable credits should be created?

There are four possible actions which could create tradable credits:

- Explicit reductions from a given baseline
- Carbon sequestration
- Development of carbon sinks
- Acquisition of carbon sink rights to an existing carbon sink that predates the trading system to create a carbon off-set

Given the issues raised concerning carbon sinks, their transitory nature, the recommended preference for a zero-based start only the first two of these are recommended as actions which create tradable credits. Both explicit reductions and carbon sequestration have the result of **permanently** removing greenhouse gases from the carbon cycle. The Government's objective is to reduce the overall level of GHGs and offset schemes just "move emissions" between parties without permanent reduction, while sinks tend to be transitory in addition to the measurement and methodological issues raised above.

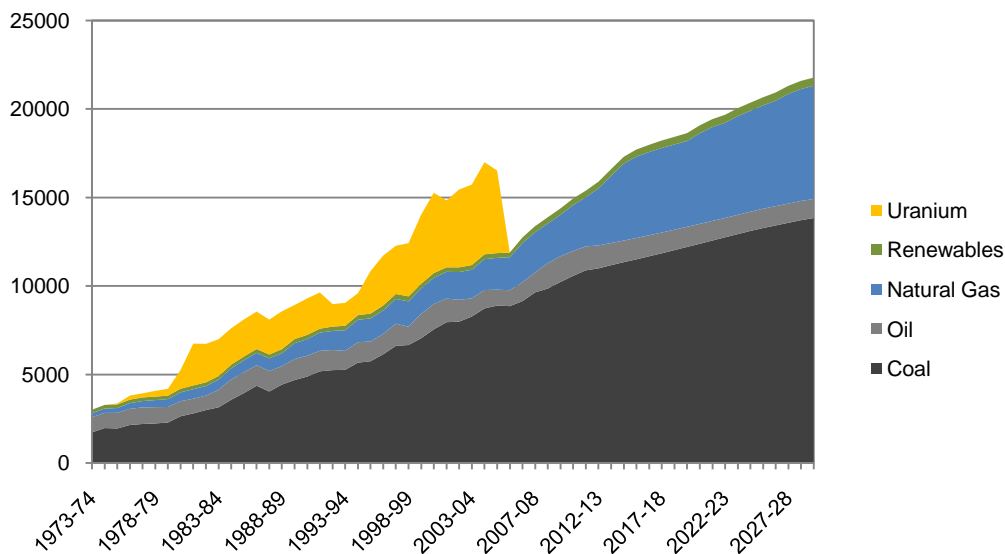
For credits based on sinks to be fairly valued by the market, Government oversight of sinks would need to provide a common standard of carbon accounting which presently does not exist in a generally accepted international standard. Given that CO₂ absorption depends on soil, tree species and age along with numerous other biological and micro-climatic factors, significant costs will need to be incurred by sink owners and Government regulators to ensure that any tradable credits are fairly and transparently priced. On the other hand sequestration is simpler to regulate being just a matter of regulating the nature of the geological formation to be used and then monitoring the volume of emissions sequestered. It is easier for the market to fairly and transparently value and price both actions taken to reduce emissions and sequestration.

2.0 AUSTRALIA'S ENERGY SECURITY

Australia is a net exporter of energy, consuming just less than half of energy produced in thermal terms. In 1975 Australia was a net importer of energy consuming approximately 150% of energy production and in 1995 consuming 70% of energy produced. Coal, Uranium and Gas are the main energy exports.

Australia's energy security is currently based on coal. According to ABARE research, Australia's largest source for energy production (not generation) is Coal at 51% of total energy production. Although nuclear power is not presently part of the energy generation matrix in Australia, it is a significant component of energy production. Uranium represents 31% of total energy production and 40% of Australia's energy exports in thermal terms. Figure 2.1 shows Australia's energy production by fuel.

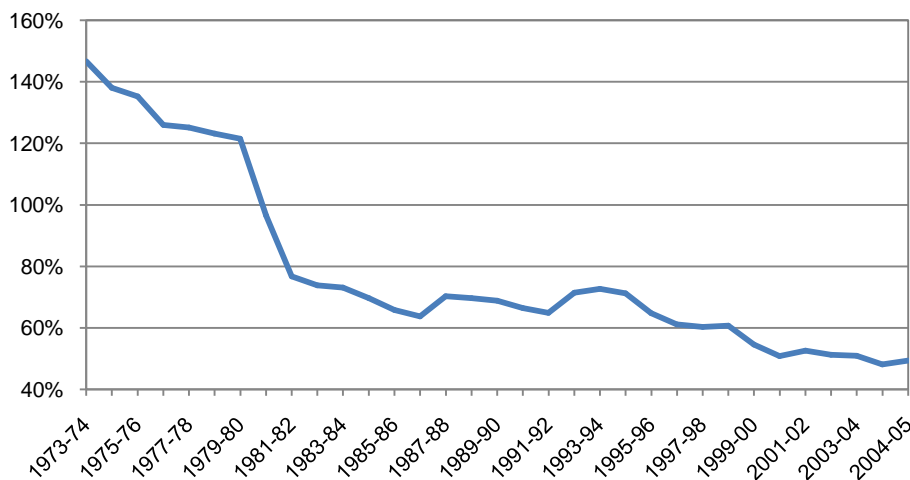
Figure 2.1 Australia - Energy Production by Fuel



Source: Bakers Investment Group based on ABARE Data

Figure 2.2 shows the relationship between energy production and energy consumption in Australia.

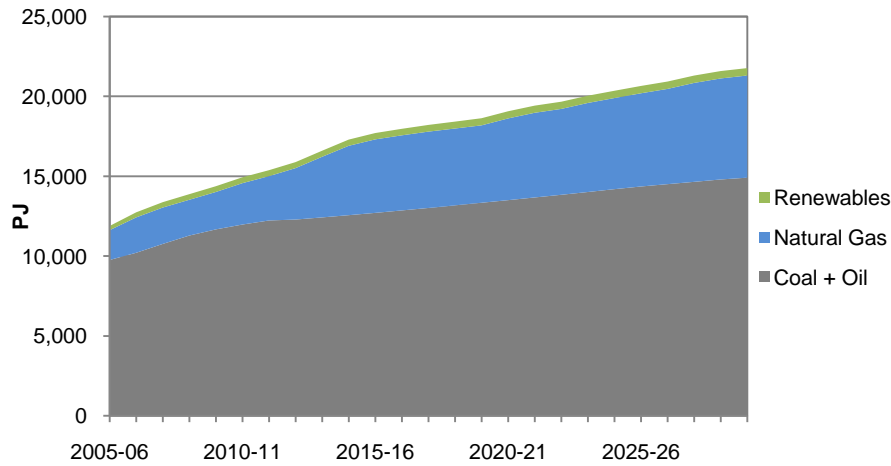
Figure 2.2 Australia - Percentage Energy Produced Consumed Domestically



Source: Bakers Investment Group based on ABARE Data

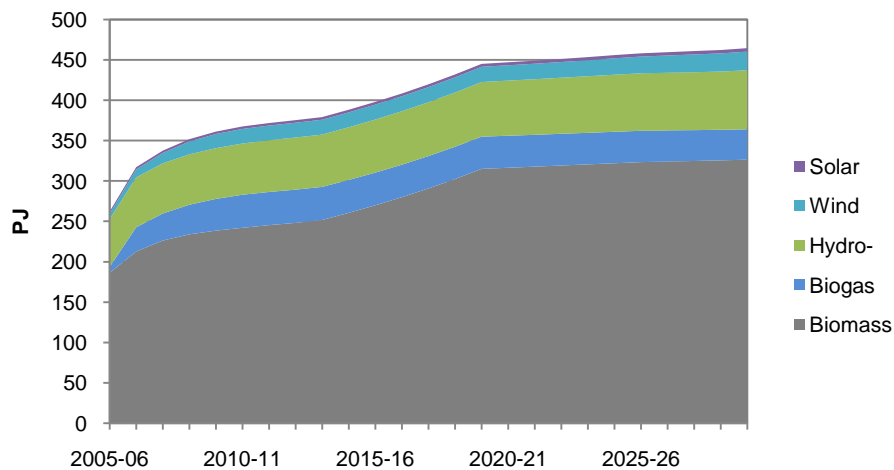
Looking forward, Figure 2.3 shows ABARE’s projected energy production in Australia to 2030, highlighting the relatively small increase forecast in energy production for transitional and renewable fuels. Figure 2.4 shows the detail for renewables.

Figure 2.3 Australia – Projection of Production of Energy from Primary Fuels



Source: Bakers Investment Group based on ABARE Data

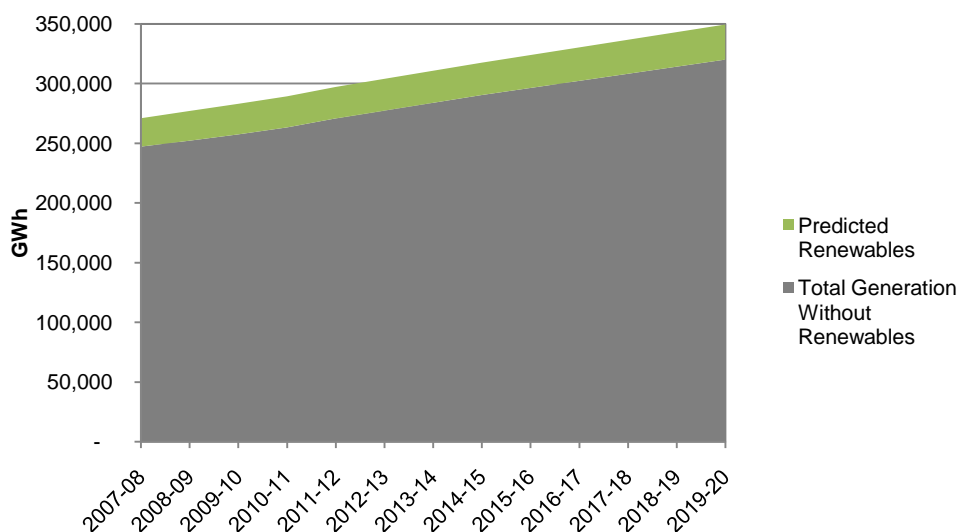
Figure 2.4 Australia – Projection of Production of Energy from Renewables



Source: Bakers Investment Group based on ABARE Data

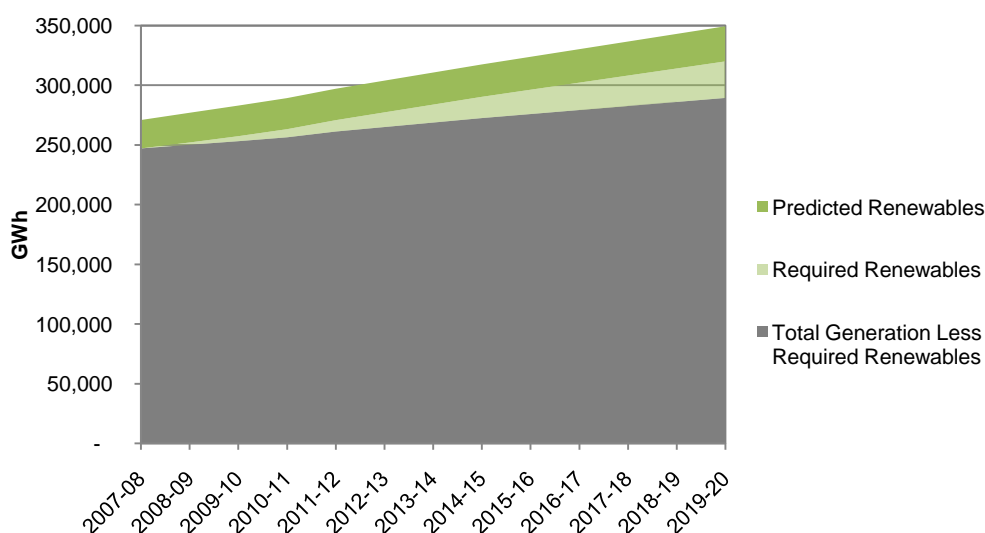
Analysis of ABARE’s projection data indicates that in order to meet the MRET of 20% of energy consumed in Australia being from renewable sources, set by this Government, the production of renewable energy needs to rise more than three-fold between 2008 and 2020. Figure 2.5 shows the current projected consumption of renewables against all other energy sources with Figure 2.6 showing the substitution required to the MRET of 20% by 2020. This will require both significant investment and technological advancement in a relatively short period from the private sector supported by active government intervention and incentives such as tax offsets for investment in R&D and commercialization of advanced renewable-energy technologies.

Figure 2.5 Australia – Projected Consumption of Electricity Showing Proportion of Renewable



Source: Bakers Investment Group based on ABARE Data

Figure 2.6 Australia – Projected Consumption of Electricity Showing Additional Requirement to Meet 20% MRET Target by 2020



Source: Bakers Investment Group based on ABARE Data

Based on such forecasts, a material change in the development of such energy sources, from transitional and renewable energy, must take place if Australia is expected to meet forecast energy demand, whilst reducing greenhouse gas emissions from energy related activities, which combined contribute over 65% of greenhouse gas emissions, as identified by the Stern report.

In addition to direct energy export, Australia is a key exporter of ideas, expertise and services in energy and increasingly in alternative energy. For example, Australians have made significant contributions to wind and tidal power in China and in micro-hydro technology globally. Such expertise can be further fostered with incentives for the technological advances to be applied domestically.

Given the stock of uranium held by Australia in mines and proven reserves, and the fact that nuclear power is a base-load zero-emissions generation option favoured by many countries, significantly China and India which are key nations in the growing demand for energy globally, some in Australia are advocating domestic use of nuclear power. Although nuclear energy production is a zero

greenhouse gas emission option, there remain a number of community concerns over the use of this energy source including the disposal of waste and plant security. For the foreseeable future, nuclear power generation in Australia will be a political decision more than an economic one given a ready low cost supply of uranium and relatively favourable geology for waste disposal.

To develop a suitable energy strategy that helps reduce the output of greenhouse gas emissions, the funding of a transitional shift away from fossil fuels to an increased use of fuels with lower emissions, including natural gas and renewable energy sources, is an imperative. Due to the low level of energy production and consumption at current levels, a significant increase in funding with a focus on encouraging the innovation and commercialization of the technology needed to increase such renewable and alternate energy sources; and the funding of required infrastructure in the delivery of commercially viable renewable and alternate energy sources, is a key component.

3.0 THE NEED FOR ADDITIONAL INVESTMENT

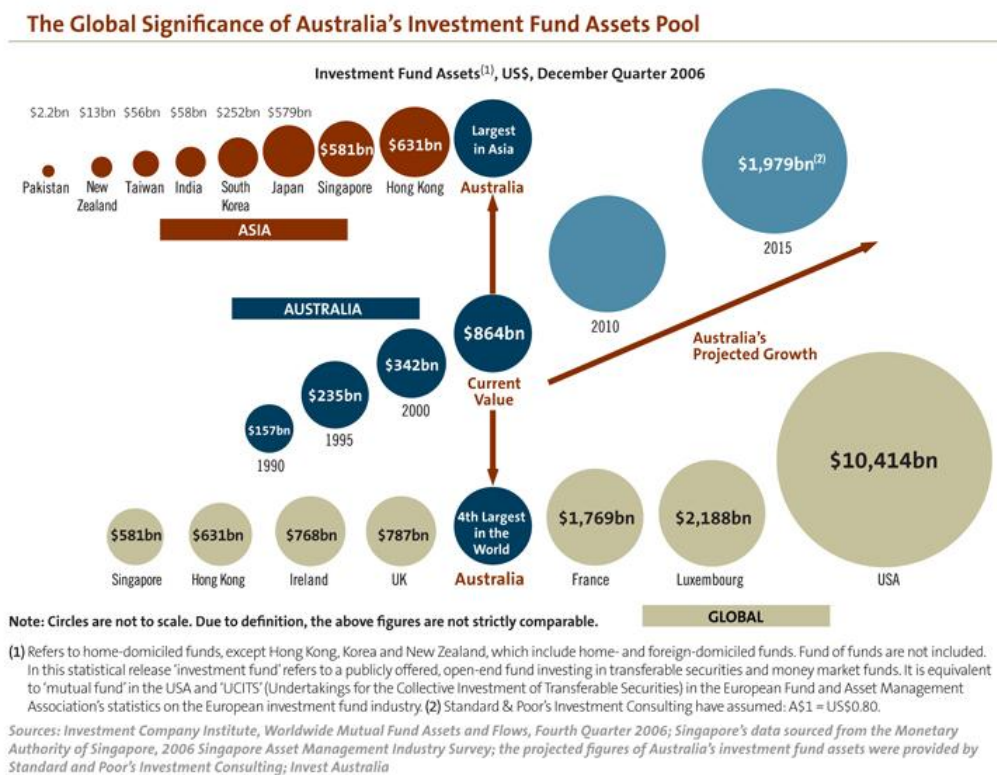
Significant support to promoting a diversified, low-emission, energy infrastructure can be provided through a combination of incentives for super-fund investment in the sector and through direct tax rebates for research and commercialization of alternative energy.

3.1 Super-fund Investment

Australia has the 4th largest superannuation and pension fund in the world. This provides Australia the unique advantage of accessing institutional funding in the investment and development of economic interest on commercially acceptable terms. An example of this includes the \$61 billion Future Fund established by the Future Fund Act 2006 to assist future Australian governments in meeting the cost of public sector superannuation liabilities by delivering investment returns on contributions to the Fund.

Figure 3.1 tables the current size of the Australia Superannuation Industry in comparison with the rest of the world.

Figure 3.1 Global Significance of Australia's Investment Fund Asset Pool



Source: Invest Australia

As the source of superannuation funding provides a large opportunity to develop new assets involved in the generation, transmission, and distribution of transitional and alternate energy, the consideration of the use of such funding must include the commercial terms in which the funding is sought. Such considerations include, the forecast and past returns of such investment, the expertise to successfully manage the implementation of such investments and projects, and an understanding of the risks involved including the impact of current and future government policy impacting on the returns of such investment.

A starting point to explore the commercial viability of investment in transitional and alternate energy is an understanding of how the above investment issues impacted on past projects and companies operating new activities in the emergence of transitional and alternate energy.

The ALTEX™ Indices identify the investment performance of all public companies operating in Australia in the area of transitional and alternate energy including; Natural Gas, Environmental Technology; Renewable Energy; Low Emission Utilities and Infrastructure, and Uranium.

From a thorough assessment of past performance in each sub-sector related to transitional and alternate energy, we can gain a better understanding of how the sub-sector has developed in the positioning of investment returns and production of energy. We can also analyze how companies in these sub-sectors are forecast to return in terms of investment performance and energy production.

An assessment to date shows that an increase in transitional fuels is highly favored by investors, as it is further developed than other sources of renewable energy, and best positioned to capture benefits in change of policy towards carbon credits and fiscal initiatives designed to favor energy production from lower greenhouse gas emitting energy sources. This is evidenced by an increase in the bidding of prices for assets of companies participating in transitional fuel sources, compared with renewable fuel sources. Figure 3.2 below illustrates the investment performance of Australian companies operating in the transitional energy sector of Natural Gas, whilst Figure 3.3 below shows the investment performance of Australian companies operating in the renewable energy sector.

Figure 3.2 – ALTEXBlue (Natural Gas)

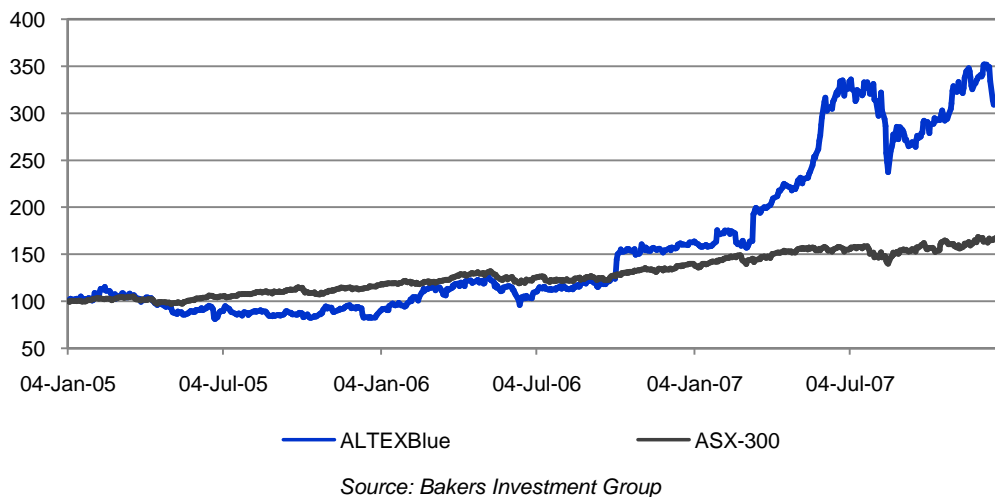
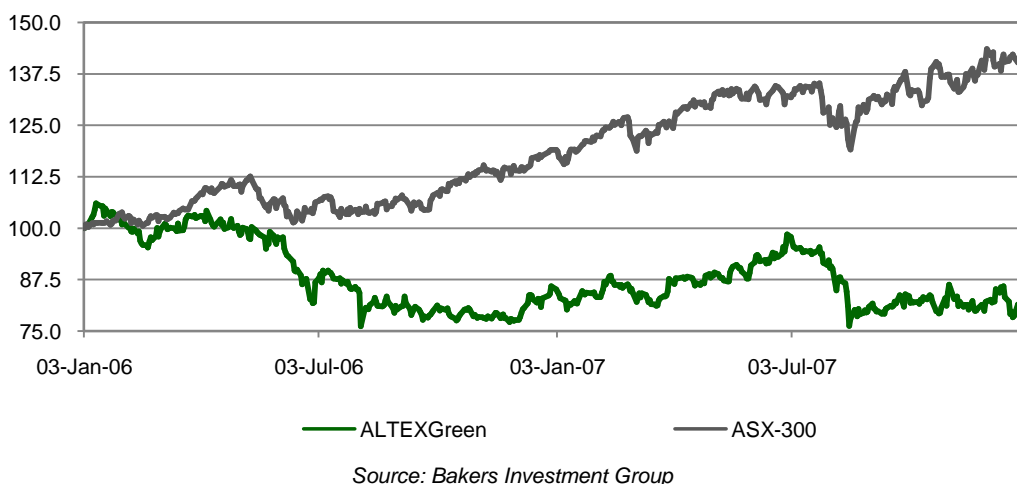


Figure 3.3 – ALTEXGreen (Renewables)



Whilst forecast investment returns and energy production from transitional energy sources are high, the forecast for investment returns and energy production from renewable energy remain low at this

time. Therefore funding support for transitional fuels (such as gas and uranium) and low emission utilities as part of the shift towards lower emissions in the production of energy can be delivered on commercially viable terms. However, the renewable energy sector along with nascent fuels such as hydrogen, and enabling technologies, requires significant support to attract investors and achieve commercially viable investment returns.

The Australian Labor Party's 2020 Target for Renewable Energy policy document, outlines a number of federal initiatives aimed at helping the development of Australia's renewable energy sector. These initiatives include; the establishment of a national emissions trading scheme, ensuring that 20% of Australian electricity supply or about 60,000 GWh comes from renewable energy by the year 2020 (see Figures 2.5 and 2.6), and implementation of a national Mandatory Renewable Energy Scheme and increasing the target to 45,000 GWh. The government also plans to encourage the development of renewable energy by developing a \$15 million clean export energy strategy and a \$20 million clean innovation centre, along with the establishment of a \$50 million Australian Solar Institute and a \$50 million geothermal initiative.

Such government support contains a clear path for the development of renewable energy in Australia but leaves questions to how the commercialization of such technology is to be funded. This presents a key opportunity for government to encourage the commercialization of such activities by providing added incentive for institutional investment.

3.2 Tax Incentives

One method of providing such incentive is the introduction of a taxation credit scheme designed to reward investors by providing companies engaged in the activities of the research and development and commercialization of renewable energy with a 150% tax offset against expenses incurred. The cost of such a scheme would be relatively small compared to historic and projected surpluses. The proposed sectors covered by such a scheme include the development of renewable energy including Wind, Solar, Hydro (especially micro-hydro), Tidal, Geothermal, Bio-fuels and Bio-mass. Such a scheme helps promote Australia as a hub for overseas companies undertaking such work and also helps to promote significant industry development, creating jobs and a number of local and international business opportunities for Australian companies and Australian international subsidiaries alike.

The tax credit approach would stimulate commercial institutional investment providing key incentives for further diversification of existing and potential energy portfolios, having significant impact on development of additional alternate energy infrastructure. Further, it would stimulate private sector awareness and align private sector investment policy with the imperative for reduced greenhouse gas emissions. Tax credits are more targeted compared to subsidies, after the fact compared to subsidies usually being a prepayment, and scaled according to project size and timetable not requiring a budget set-aside. Such a strategy aids in the development of a competitive renewable market environment, with tax credits being phased out, such as the Mandatory Renewable Energy Target, as renewable energy matures supported by a national emissions trading scheme.

A tax-credit scheme provides institutional investors with added incentive to explore new investment in the renewable energy sector, providing commercialization support to low emission infrastructure and utilities companies designed to play a critical part in the delivery of the Mandatory Renewable Energy Targets. Such a scheme also supports diversification of the energy strategy also complementing the \$500 million National Clean Coal Initiative.

Tax incentives should to be supported at the State and Territory levels with possible tax rebates on payroll taxes, land taxes or other business-oriented incentives.

4.0 IMPROVED INTEGRATION OF GOVERNMENT POLICY

Australia was the first nation to appoint a Minister of Climate Change and to establish a specific government ministry to deal with the issue. The Department of Climate Change was largely carved out of the Department of Environment and Water and the Australian Greenhouse Office along with specific other functions. It is located in the Prime Minister and cabinet Portfolio.

However, the issue of climate change is broad with policy and administrative aspects across a range of portfolios, departments and agencies. The following ministries currently have policy responsibility relating to the use and development of alternate energy in response to climate change.

- Climate Change and Water – climate change policy, emissions monitoring, emissions trading, renewable energy, natural resources, and carbon sinks
- Resources, Energy and Tourism – energy reform, energy efficiency and energy policy
- Environment, Heritage and the Arts – environmental impact assessment, environmental reporting, and air quality
- Agriculture, Fisheries and Forestry – resource economics (ABARE), landuse (inc. Landcare), bio-energy, food security, forestry policy, soils and marine resources
- Infrastructure, Transport, Regional Development and Local Government – infrastructure policy and funding under the infrastructure Australia policy
- Innovation, Industry, Science and Research – investment promotion, national industry policy, science grants and awards, and research (including CSIRO, Centre for Australian Weather and Climate Research, ANSTO, and IP Australia)
- Treasury – business law and regulation, competition policy, superannuation policy, financial services, foreign investment, fiscal policy, and taxation related incentives
- Finance and Deregulation – public sector superannuation, future fund investment management, and public sector financial management
- Foreign Affairs and Trade – resource export policy, bilateral and multilateral support for climate change and energy reform, and nuclear non-proliferation policy

Whilst the government is still implementing the machinery of government in this area, we believe close attention needs to be paid to better developing a fully integrated administrative framework which will deliver government policy in this area. This could be achieved either through machinery of government realignment, or a strong interdepartmental coordination process lead by a senior minister. It is further recommended that the department of finance and deregulation as part of the annual budget process implement a climate change budget statement which details government resources allocated to this area with performance targets similar to the Women's Budget Statement implemented in the 1980's under Prime Minister Bob Hawke.

5.0 EFFICIENT AND EFFECTIVE REGULATORY FRAMEWORK

With increasing global demand for energy, it is essential that market forces be supported by an efficient and effective regulatory framework to align the political, environmental and economic agendas.

Labor's 2020 Target for a Renewable Energy Future policy document (October 2007) policy suggests the following three priorities as key to the economic challenge of climate change:

1. Establishing market-based incentives to reduce greenhouse gases through an emissions trading scheme
2. Demand side management measures, assisting households to contribute to reducing carbon emissions;
3. Supply-side measures including support for zero emission and low emission technologies through a National Clean Coal Initiative and a strong renewable energy target

The policy states that

"..renewable energy technologies will play a critical role in achieving emission cuts as well as providing substantial employment opportunities, particularly in regional Australia",

and that

"..economic modeling shows that significant cuts to emissions can be achieved at the lowest cost by combining emissions trading with a strong renewable energy target and investment in energy efficiency."

In the policy Labor committed to undertake the following:

- Immediately ratifying the Kyoto Protocol
- Setting a target based on science to cut Australia's greenhouse gas emissions by 60 per cent on 2000 levels by 2050
- Ensure the equivalent of at least 20 per cent of our electricity supply – or approximately 60,000 GWh – is generated from renewable sources by 2020
- Increase the Mandatory Renewable Energy Target (MRET) to 45,000 GWh to ensure that together with the approximately 15,000 GWh of existing renewable capacity, Australia reaches Labor's 20 per cent target by 2020
- Work cooperatively with State and Territory Governments to bring both the national MRET and existing state-based targets into a single national scheme
- Establishing an emissions trading scheme by 2010 to put a price on carbon
- Phase out the renewable energy target from 2020 as emissions trading matures and prices become sufficient to ensure a mandatory renewable energy target is no longer required
- Establish a \$500 million National Clean Coal Initiative to invest in the development and application of advanced coal technologies to secure jobs in the coal industry
- Introduce household energy efficiency measures to reduce energy use and lower energy bills
- Use Commonwealth revenue from emissions trading to ensure that fixed and low income households are not disadvantaged by energy price increases flowing from measures aimed at cutting greenhouse gas emissions
- Making every Australian school a solar school within eight years
- Encouraging the development of a strong and vibrant Australian clean energy industry with a \$15 million Clean Energy Export Strategy and a \$20 million Clean Energy Innovation Centre
- Establishing a \$50 million Australian Solar Institute and a \$50 million geothermal initiative

The Government has now signed the instrument of ratification of the Kyoto Protocol. To continue the implementation of efficient and effective regulatory framework in support of the development of transitional and renewable energy, the government must expand on the implementation of other key policy measures in order to ensure market confidence, critical to the underpinning of the development of a self-reliant Australian renewable energy sector. Such policy, key to the support of economic development, includes the outlining of the proposed process for the establishment and implementation of emissions trading scheme by 2010 to put a price on carbon.

The implementation of a carbon credit trading system helps to support a shift to more sustainable energy and aligns economic incentive, by making transition and renewable energy more competitive. As suggested above in section 1.3, a simple, transparent regulatory framework is necessary for tradable carbon credits is crucial to the market adequately pricing those credits and valuing the exchanges.

Further, Government needs clear and open communication on the regulatory framework for energy investment to ensure market participation. If modeling of Government policy and the regulatory framework is uncertain, or investment analysts are unclear of the economic impact, a risk premium on investment may be applied. If such a premium is applied, the economic impact is expanded to include not only the price of trading carbon credits, impacting the returns of energy producing companies using fossil fuels, but also carries the economic impact of any investment risk premium.

Investment opportunities in renewable energy are supported by the Government's Mandatory Renewable Energy Target. The MRET promotes investment and focuses on the encouragement of energy production from renewable energy, particularly supporting the development of renewable infrastructure. Whilst implementation successfully helps transition a shift towards renewable energy sources, much work in improving technological advancement and the development of energy projects to the point of production still needs to be done. Increasing the MRET will provide a significant incentive for the production of renewable energy, though investment in the commercialization of technology and the building of infrastructure to bring such energy sources to production remains critical. An implementation of tax credits to support the commercialization is above, in section 3.2.

It is envisaged that support for commercialization through tax credits; supplied to an increasing renewable energy source, supported by a national MRET; would eventually create a self-sustainable market driven by economic pricing, supported by a national emissions trading system.

6.0 CONCLUSION

In summary, the key economic drivers behind the demand for energy are urbanization and industrialization and these factors underpin Australia's energy exports. Australia is a net energy exporter consuming less than 50% of the energy it produces. Despite the generally wide availability of coal the demand for fossil fuels is forecast to decline and major structural changes in the energy supply chain are required. Additionally, a national carbon trading scheme forms a major part of government policy in this area to support policy goals of a significant reduction in greenhouse gases and a significant increase in the use of renewable energy. This submission suggests that such a scheme should begin from a zero base and that tradable credits are only created for explicit action that permanently removes greenhouse gases from the carbon cycle.

It is further argued that Government will need to expand its approach to achieve stated targets. Without significant government support such as through a tax credit for R&D and commercialisation of renewable energy, nascent alternative fuel development and enabling technologies such targets have little possibility of being achieved through commercial markets and private investment.

Finally, this submission addressed three key points for consideration:

- Increased support to the funding of research and development, and commercialization of renewable energy both in terms of supporting investment in the area through super-funds and through investment incentives such as tax credits
- Improved integration of government policy and administrative response to the growing demand for energy, so as to promote the increased use of transitional and renewable energy, and the further development of low emission energy infrastructure
- A need for market forces to be supported by an efficient and effective regulatory framework to align the political, environmental and economic agendas.

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