LABOR'S GREENHOUSE ASPIRATIONS

Bob Birrell and Ernest Healy

The Labor government aspires to reduce greenhouse gas emissions by 60 per cent on year 2000 levels. Is this a realistic commitment? The issue is explored in the context of likely population growth in Australia from 21 million to 31.6 million by 2050. The population factor is ignored by the Garnaut Climate Change Review. Yet this article calculates that the energy required to provide for the material needs of the additional population will (in the absence of intervention) lead to a huge increase in greenhouse gas emissions. In consequence, in order to achieve the 60 per cent reduction target, the price level for permits under the emission trading scheme proposed by Garnaut will have to be very high. It is doubtful whether these prices will be politically acceptable.

The Rudd Labor Government's initiatives in signing the Kyoto Convention and its statement of a target aspiration to reduce Australia's greenhouse gas emissions by 60 per cent on year 2000 levels by the year 2050 have been widely and justifiably welcomed. The aspiration would require annual national greenhouse gas emissions to be reduced from the estimated level of 491 million tonnes of CO_2(e)[1] in 2000[2] to 196 million tonnes in 2050. The Government has set up a Climate Change Review led by economist, Ross Garnaut, which is to recommend an appropriate emissions trading scheme to address greenhouse gas emission levels. It has also indicated that it will establish an interim Mandatory Renewable Energy Target (MRET) to ensure that the equivalent of at least 20 per cent of Australia's electricity supply is generated from renewable sources by 2020.[3] The federal government expects that, by this time, a 'cap and trade' carbon emissions market will be the primary policy instrument to deal with emissions reduction.

How serious is this greenhouse reduction commitment? This question flows from a consideration of the Rudd government's other commitments. These include firstly, continued Australian economic growth so as to maintain the confidence of business and enhance the living standards of working families, and secondly, the pursuit of a very high migration program. The priority given to these objectives is not as explicit as it was when the former Coalition government established a Task Group on Emissions Trading in 2006. The terms of reference stated that:

> Australia enjoys major competitive advantages though the possession of large reserves of fossil fuels and uranium. In assessing Australia's further contribution to reducing greenhouse gas emissions, these advantages must be preserved.[4]

Nevertheless, Treasurer Wayne Swan stated on 7 July 2008 that when the government sets its emission targets under the proposed emissions trading scheme; 'we will strive to maximise Australia's economic prosperity—providing enough scope for existing business to adapt to a low-emissions economy, while still combating dangerous climate change and fostering new, world-leading low-emissions industries'.[5]

On the face of it, the Rudd government's economic growth commitments are incompatible with a sharp reduction in greenhouse gas emissions. In the scenarios explored below, we adopt the Productivity Commission's assumption that per capita economic growth in Australia will grow by around 1.8 per cent per annum. If so, per capita income (in real terms) will increase

by 104 per cent between 2004 and 2050. Increased wealth is closely associated with increased consumption of energy-intensive goods and services. As a result, if the past record is any guide, as Australians' real income increases they will buy more consumables, including bigger houses, undertake more international travel, procure more cars and drive them further.

The 60 per cent reduction in greenhouse emissions also has to be achieved with a much larger population—at least if Australia's current levels of fertility and immigration continue. There are 21 million persons living in Australia today. In 2006–07, net overseas migration reached the record post-WW2 level of 177,000. This followed the former Coalition government's decisions to ramp up the immigration intake. The Rudd government has built on this foundation. In the May 2008 Budget, it announced a further 37,500 increase in the permanent migration program. This implies a net migration intake in the immediate future of at least 180,000 per year. If this level is maintained until the year 2050 and Australia's total fertility rate stabilises at 1.7, Australia's population will reach 31.6 million in 2050.

A fifty per cent increase in population, all living—on average —at double current income levels, implies a massive increase in economic throughput and thus in energy use. Should Australia's heavy dependence on coal for electricity production continue, this also implies a huge increase in greenhouse emissions. In 2003, coal accounted for 42.6 per cent of Australia's total primary energy supply (TPES), the second highest level in the OECD after the Czech Republic. This is the main reason why per capita CO_2(e) emissions are higher in Australia than any of the other major developed countries listed in Table 2 below.

The simple arithmetic of the task is as follows. If Australia were to achieve the 196 million tonne target for CO_2(e) by 2050, per capita CO_2(e) emissions would have to fall from the current level of 24 tonnes per person per annum to 9.4 tonnes.

Table 1: Greenhouse gas emissions of CO_2(e), Australia, Victoria and New South Wales 1995 to 2005

Year	1995	1996	1997	1998	1999	2000
Victoria	105,800	107,479	109,726	116,905	118,733	121,383
New South Wales	138,697	140,370	142,920	142,237	143,485	143,378
Australia	444,656	449,739	461,595	475,822	485,386	497,611

Year	2001	2002	2003	2004	2005
Victoria	121,357	120,692	124,822	126,321	125,360
New South Wales	146,291	145,917	145,365	148,150	149,442
Australia	509,086	511,253	514,515	523,590	525,407

Source: Australian Greenhouse Office 2005
Notes: # not including CO_2 emissions from land use change and forestry

However, if Australia's population reaches 31.6 million by 2050, annual per capita emissions would have to fall to just 6.2 tonnes per person.

A HISTORY OF PROMISES

Before exploring the options for achieving such cuts, it is worth contemplating the record of government promises concerning greenhouse gas reductions in Australia. Most of the state Labor governments have been promising cuts for years. Yet, in all cases, despite a patchwork of measures designed to reduce emissions, greenhouse gas emission levels have expanded since the promises were made.

Prior to the 2006 Victorian election, the then Victorian Premier, Steve Bracks, committed the Victorian Government to legislate to achieve a 60 per cent reduction in greenhouse gas emissions, compared with 2000 levels, by 2050.[6] In 2007, Bracks moved a motion in the Victorian parliament calling for the implementation of a national emissions trading scheme with 'firm emissions caps' and a commitment to 'absolute emissions reductions', of 60 per cent by 2050 compared with 2000 levels.[7]

Nevertheless, in June 2008, the Victorian Government announced it had signed off on a new 400 MW generating plant which will utilise brown coal from the Latrobe Valley (and which will receive $175 million in government subsidies). The plant is intended to incorporate new technology which according to the Victorian Energy Minister, Mr Bachelor, would lead to a 30 per cent reduction in emissions relative to conventional brown coal power stations.[8] Conventional brown coal stations result in 1220 kg CO_2 per megawatt hour (CO_2/MWh) compared with 861 kg CO_2/MWh from black coal power stations.[9] Therefore, even if the proposed plant does achieve the desired 30 per cent reduction in emissions it will still produce CO_2/MWh at the level of black coal stations.

We highlight this Victorian case because it is such a clear indicator of the symbolic nature of political commitments to low greenhouse emission targets. The Victorian Government may be genuine in wanting reductions, but only if they do not prejudice other goals. One of these is a continuing commitment to high population growth. If the current demographic parameters hold, Melbourne will grow by 1.6 million over the next thirty years. This is an outlook celebrated by the current premier, Mr Brumby.[10] But population growth of this order inevitably will require a major augmentation of electricity generation capacity, of which the recently announced 400 MW plant will be the first instalment. This situation will only change if the Commonwealth government introduces a tight emissions trading scheme, the prospects for which are considered below.

Similar declarations on emission reductions have been made by the NSW Labor Government. The 2005 NSW Greenhouse Plan[11] committed the NSW government to reducing emissions to 60 per cent of 2000 levels by 2050. This commitment was reiterated by the NSW Minister for Energy, in the NSW Legislative Assembly in 2006.[12]

As Table 1 indicates, these commitments in Victoria and NSW were made despite a decade of continued increase in total greenhouse gas emissions.

On advice from its National Greenhouse Advisory Committee in 1989, the federal Labor government adopted the 'Toronto Target' of a 20 per cent reduction on 1988 greenhouse emissions by 2005, a commitment that the governments of New South Wales, Victoria and Western Australia had made earlier that year.[13] Subsequently, in 1992, the federal Labor government became a signatory to the United Nations Framework Convention in Climate Change, a convention which aimed

to reduce greenhouse emissions to 1990 levels by 2000.

In December 1992, the Federal government and the Council of Australian Governments (COAG) endorsed a National Greenhouse Response Strategy (NGRS), which largely focussed on voluntary measures to reduce emissions. However, the commitment to reduce emissions was subject to budgetary priorities and constraints in individual jurisdictions.[14] Hamilton argues that, although the NGRS was intended to be a comprehensive approach to emissions reduction, the prescribed measures:

> … were systematically ignored …
>
> A comprehensive review of the National Greenhouse Response Strategy in 1995 concluded that the strategy had 'failed to make any impact on Australia's greenhouse gas emissions'.[15]

DECOMPOSING THE DRIVERS OF GREENHOUSE EMISSIONS

Whether the situation will be different at the national level, given the Rudd government's commitment to establishing an emission trading scheme, remains to be seen. Much will depend on the scale of the task likely to be faced in a 'business as usual' situation, that is one where no major greenhouse gas abatement measures are implemented by government. To understand the magnitude of this task requires an identification of the main drivers of greenhouse gas emissions.

This article follows the practice of the World Resources Institute and the Intergovernmental Panel on Climate Change (IPCC) of decomposing the drivers of greenhouse gas emissions into four determinants.[16] These are per capita economic growth (GDP per capita), the energy intensiveness of GDP, the carbon intensity of the energy produced and population growth. Other things being equal, any increase in GDP per capita will lead to an increase in greenhouse gas emissions. For this study, our starting point (for the business-as-usual scenario) is the assumption that energy production will increase at a lower rate of growth than GDP per capita. As explained below, we assume that the energy intensiveness of each unit of GDP will diminish. This is likely to occur because structural change in the economy favours output of services rather than energy intensive manufactures and other goods. The greenhouse emission impact will be further offset if the carbon intensiveness of energy use declines. Whatever the outcome in per capita emissions from the interactions of these three variables, total emissions will be determined by the multiplication of per capita emission levels by the number of people. If population grows, there will be a parallel increase in total greenhouse emissions.

Table 2, which is taken from a World Resources Institute (WRI) study, provides a decomposition of the overall growth of greenhouse gases in selected countries over the period 1990 to 2002 according to the above formula. The WRI uses a sophisticated mathematical analysis to decompose the contribution of the four drivers to the overall growth in greenhouse gases in each of countries listed. In Australia's case, aggregate emissions grew by 28 per cent during the period. According to the WRI study, per capita economic growth by itself would have contributed an additional 31 percentage points to greenhouse emission levels in Australia over the 1990 to 2002 period. However, this driver was partially offset by a decline of 19 percentage points due to a reduction in the energy intensiveness of this economic growth. During the 1990 to 2002 period, there was little change in the carbon intensiveness of energy use in Australia, thus this component contributed only a

small minus of one percentage point reduction to Australia's overall increase in greenhouse emissions. This leaves the population growth factor, which contributed 16 percentage points to overall greenhouse emission growth.

One reading of this analysis is that, because the decline in energy intensiveness largely cancelled out the impact of increased per capita economic growth, population growth can be regarded as the main determinant of Australia's very large (28 per cent) increase in greenhouse emissions over the period 1990 to 2002. That is, it constituted 16 percentage points to the overall increase of 28 per cent.

Australia's experience is much like that of other developed countries, in that advances in per capita economic growth tend to be offset by a decline in the energy intensiveness of GDP, in part because of structural change (as noted above) and, to a lesser extent, as a consequence of improvements in energy efficiency. Where Australia differs from the UK and most other European nations is that it is experiencing higher population growth than is the case in Europe. In this regard, Australia has much in common with the USA and Canada. This is the main reason why, as shown in Table 2, the growth of greenhouse emissions over the 1990 to 2002 period in Australia, the USA and Canada, was much higher than was the case in Germany, the UK or the EU-25.

Table 2: Estimates of CO_2(e) emissions per capita, national CO_2(e) emissions change and factors contributiong to CO_2 emissions growth, selected countries, 1990 to 2002

Country	GHG emissions per capita 2000 tonnes CO_2(e)	CO_2(e) change 1990 to 2002 Mt CO_2(e)	Per cent	Per cent contributions to CO_2 changes GDP per capita	Population	Energy intensity (Equ/GDP)	Fuel mix CO_2(e)
China	3.9	1247	49	122	15	-96	8
United States	24.5	863	18	23	16	-20	-1
India	1.9	457	70	55	28	-31	19
Sth Korea	11.1	246	97	84	15	12	-15
Iran	7.5	178	93	44	26	24	-1
Indonesia	2.4	164	97	44	25	2	26
Saudi Arabia	16.4	148	91	-7	46	52	0
Brazil	5	125	57	17	21	7	13
Spain	9.4	98	44	31	6	7	-1
Japan	10.4	96	9	12	3	0	-7
Canada	22.1	87	20	24	13	-18	0
Australia	**25.6**	**73**	**28**	**31**	**16**	**-19**	**-1**
United Kingdom	11.1	-36	-6	24	3	-20	-13
Germany	12.3	-127	-13	15	4	-21	-10
Russian Federation	13.2[1]	-453	-23	-5	-3	-12	-3
EU-25	10.5	-70	-2	21	3	-14	-12

Source: World Resources Institute, Navigating the numbers: greenhouse gas data and international climate policy, 2005, p. 15 and p. 22

Note: [1] Russia only

PROJECTING THE COMPONENTS OF FUTURE GREENHOUSE GAS EMISSIONS (ASSUMPTIONS AND APPROACH)

The greenhouse gas emission projections calculated for Australia in this paper over the period 2004 to 2050 are based on assumptions about trends over this period for each of the four drivers described above. The formula is given in Figure 1.

Within the formula, activity level (or total GDP) consists of population multiplied by GDP per person. Energy intensity is the amount of energy consumed per million dollars of GDP and fuel mix represents the $CO_2(e)$ content of energy produced. For any given amount of energy produced in the creation of a unit of GDP, the $CO_2(e)$ resulting from the production of that energy may be high or low, depending on the carbon intensiveness of the source of the fuel mix.

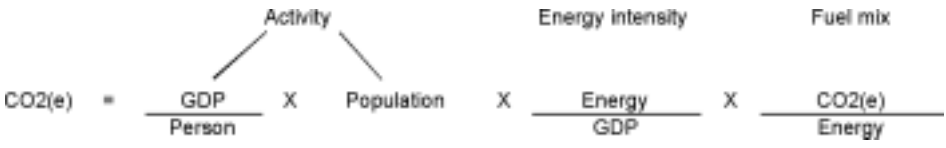
With this approach to the calculation of annual national $CO_2(e)$ tonnages, structural change towards or away from high-energy activities (for example, manufacturing) within the national economy is dealt with indirectly as part of the energy-intensity factor. The calculations exclude emission changes due to land-use change and forestry practices.[17] The reason for this omission is that $CO_2(e)$ emissions relating to land use and forestry activities can be unstable over the short term and can obscure real efficiency gains (or declines) from changes in energy intensity and $CO_2(e)$ intensity from other economic sectors.[18] For example, although the joint government–business Task Group on Emissions Trading, established in December 2006, claims that Australia is on track to meet the Kyoto Protocol target of 108 per cent of 1990 levels in the period 2008 to 2012, the Group also acknowledges that this will be due to the impact of reduced land clearing, a gain that 'will not be repeated'.[19]

The model outlined in Figure 1 facilitates an examination of the impact on total greenhouse emissions in Australia of any changes in the four parameters incorporated. We begin with a base case 'business as usual' (BAU) scenario, then explore the impact of changes in the $CO_2(e)$ intensity of energy production. The purpose is to identify how far such improvements would have to progress if the Rudd Government's greenhouse aspirations for the year 2050 were to be achieved if Australia's population was to reach 31.6 million by 2050.

THE 'BUSINESS AS USUAL' OUTLOOK

The following assumptions have been incorporated into the BAU scenario. As indicated, the GDP per person assumption for the period 2004 to 2050 follows that of the Productivity Commission, that is, growth of approximately 1.8 per cent per annum over the projection period. The population is assumed to reach 31.6 million by 2050. In regard to the energy intensiveness of GDP, it is assumed that the 1.5 per cent

Figure 1: Drivers of greenhouse emission levels



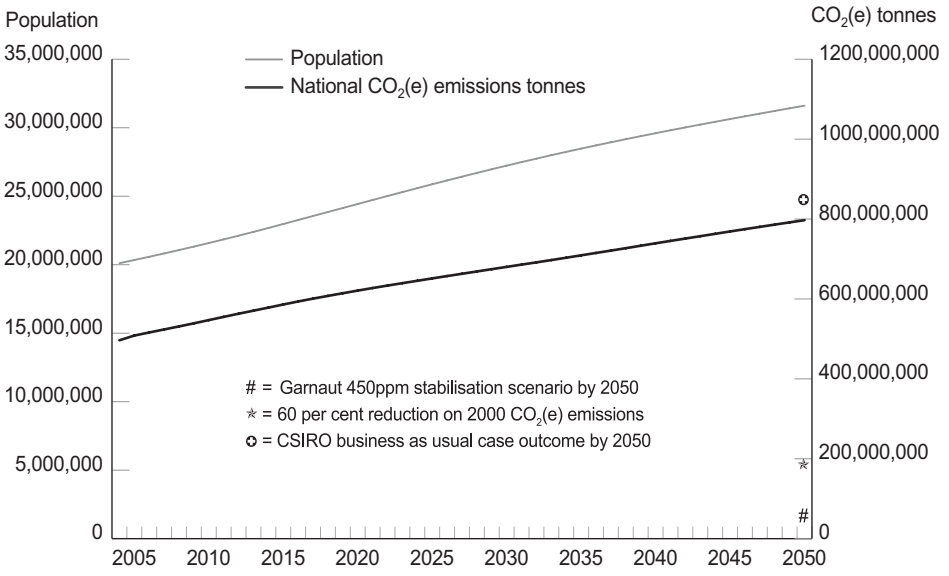
annual decline which occurred between 1990 and 2004 will continue.[20] The carbon intensiveness of energy produced is assumed to be unchanged throughout the period. As noted, this was almost the case between 1990 and 2002 according to the 2005 WRI study.

The starting point for the BAU projection in 2004 of 496 million tonnes of CO_2(e) has been calculated using the formula detailed in Figure 2. It is therefore not an actual figure. However, it corresponds closely to the estimate provided by the WRI study for 2000 of 491 tonnes.

Under our BAU assumptions, by 2050, greenhouse gas emissions will have grown from 496 million tonnes in 2004 to 797 million tonnes in 2050. This level is four times the government's target of 197 million tonnes (indicated with a star in Figure 2).

Our BAU estimate is consistent with other estimates. The reference case in the CSIRO's study *The Heat is On*, published in 2006, assumes that 'technological and government policies progress along their current paths', that there were 'no implementation of any significant greenhouse emission reduction policies' and that global trade barriers are reduced to 70 per cent of 2000 levels by 2025.[21] On these assumptions, the CSIRO modelling projects that CO_2(e) emissions will be 846 million tonnes by 2050. The CSIRO reference case level at 2050 is indicated with a cross in Figures 2 to 5. Also indicated (with a hash symbol) is the emissions level that the interim Garnaut Report (discussed below) indicates would need to be met if per capita emissions in Australia were to converge to the level required across the globe to achieve a stabilisation of greenhouse gas levels in the atmosphere of 450 parts per million.[22] As Garnaut notes, these numbers are 'purely illustrative'.[23]

Figure 2: CO_2(e) emissions under 'business as usual' assumptions (RHS), including population growth to 31.6 million (LHS), 2004 to 2050



Source: CPUR projection, 2008

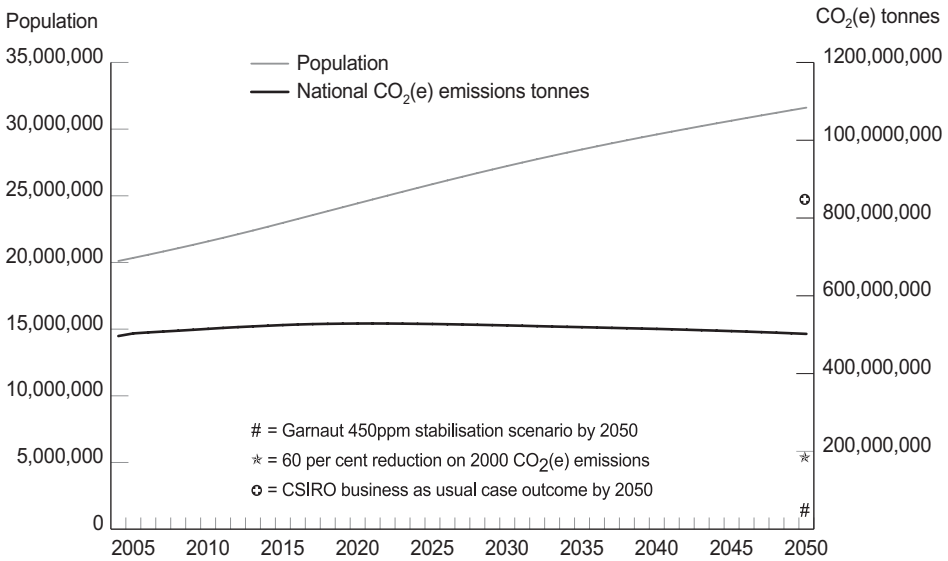
EMISSION DECLINE THROUGH REDUCED CARBON INTENSITY

The Rudd Labor Government's main strategy for attaining its 2050 aspiration of 197 million tonnes per annum is the introduction of a cap and trade mechanism in the year 2010. Emitters will have to bid for 'rights to pollute'. Through this process, they will have to pay for the privilege of discharging greenhouse gases into the atmosphere. The price will depend on how stringent the cap is, as well as the rapidity of growth in demand for fossil fuel derived energy. Rapid growth in demand in the context of a tight cap would lead to keen bidding for emission permits and thus a higher price.

The second scenario (Figure 3) reflects one possible outcome should the emissions trading scheme prompt a significant decline in the CO_2(e) content of emissions from the energy produced over the period to 2050. It assumes that there is a one per cent per annum reduction in these emissions per unit of energy produced. For the rest of this paper, references to reductions in the carbon intensity of energy produced refer to this relationship. This scenario also assumes that the other assumptions in the BAU scenario are unchanged. Should this outcome occur, it will result in a 37 per cent reduction (295 million tonnes) in greenhouse gas emission (relative to the BAU scenario) to 502 million tonnes per annum. This would be an impressive achievement. However, the 502 million tonnes levels would still leave Australia at a level two and a half times higher than the 197 million tonnes level required if the 60 per cent reduction on year 2000 emissions is to be met.

Yet, many energy analysts believe that far more drastic reductions in the carbon intensity of Australia's energy production

Figure 3: CO_2(e) emissions under 'business as usual' assumptions (RHS), except for a one per cent annual decline in carbon intensiveness, 2004 to 2050



Source: CPUR projection, 2008

are possible. For example, the Australian Conservation Foundation (ACF) in its submission to the Garnaut Review states that: '… a 60 per cent reduction in emissions by 2050 could be achieved while maintaining strong economic growth'. [24] This confidence stems from the belief amongst some energy efficiency advocates that initiatives like a sharp increase in the MRET target can be implemented so as to eliminate the need for further fossil fuel power plants in Australia. The Greens Party, for example, proposes a MRET of at least 15 per cent of national electricity demand by 2012 and 25 per cent by 2020.[25]

The most recent contribution of this nature comes from CSIRO Sustainable Ecosystems and the Allen Consulting Group. It claims that reductions of 60 to 100 per cent in greenhouse emissions can be achieved via 'well designed policies (that) substantially decouple economic growth from environmental pressure, so that living standards continue to increase at current rates'.[26] This will involve major changes in technology, dietary adjustments (less meat) and a reduction in the production of mineral and energy commodities after 2030 (among other adjustments).[27]

The CSIRO study, *The Heat is On*, also presents model results which imply that further drastic reductions in greenhouse emissions can be achieved with only minor reductions in GDP by 2050. In the CSIRO's case, the driver behind drastic decarbonisation is a carbon tax (discussed below), which is pitched at a level that will attract business investment in energy efficiency and also lead to controls on non-renewable energy and pollution sufficient to achieve the required reduction in greenhouse gases.

While fine in theory, such initiatives are likely to be regarded as fantasies by Australian governments determined to preserve Australia's competitive economic advantage from abundant and cheap coal. As indicated, there has been little or no change in the fuel mix (or CO_2 intensiveness of fuel use) in Australia since 1990. It is hard to see this situation changing much. Both sides of politics give priority to economic growth and the immediate material welfare of the electorate. Demand for electricity in Australia is expected to escalate from both industry and domestic sources.[28] So too will investment in further coal-fired generating plants, unless the proposed emissions trading scheme has real teeth. In these circumstances, it will be surprising even if the scenario-two assumption, in Figure 3, of a 37 per cent reduction in the carbon intensity of the fuel mix is achieved. To do so would require that no further coal-fired plants be built unless they incorporate the largely untested and expensive carbon capture and storage technology.

The political controversy caused by the recent escalation of oil prices illustrates the difficulties governments face in reducing greenhouse emissions. Both the Rudd Labor Government and the Coalition Opposition have shown that they place a high priority on addressing public disquiet when voters are faced with escalating petrol prices. Yet, it is inevitable that a tough cap and trade mechanism including petrol would add significantly to the price of petrol.

The Heat is On provides a glimpse of the likely scale of this price increase. As indicated, the CSIRO used a carbon tax to drive its modelling across the various scenarios it considered. One of these scenarios concerned the tax level needed if Australia were to achieve a 50 per cent reduction in greenhouse emissions by 2050 by comparison with 1990 levels. The study concluded that a carbon tax of $623 per tonne of CO_2(e) would be required.[29] Currently, the average motorist travels about 15,000 kilometres a year in cars that

require eight litres for each 100 km.[30] At 0.3 kg of CO_2(e) per kilometre, this would produce 4.3 tonnes of CO_2(e). With the carbon tax set at $623 a tonne, the average motorist would be paying an additional $2803 per year (that is 4.3 times $623). This translates into $2.33 per litre, well above the current cost of about $1.60 per litre. It is hard to see any future Australian government maintaining political support for such an outcome.

The conclusion from this analysis is that it is unwise for advocates of strong greenhouse gas abatement to put all their eggs in the carbon tax or carbon permit basket. If there are other possible abatement avenues they should not be ignored.

What are the remaining options? One would be a slow down in the rate of per capita economic growth. This would be anathema to the major political parties and the bulk of their respective political constituencies. For this reason, we do not explore this possibility. The option favoured by green advocates is further sharp improvements in the level of energy consumed per unit of GDP.

FURTHER REDUCTIONS IN ENERGY PER UNIT OF GDP

The BAU scenario (Figure 2) already incorporates a 1.5 per cent annual decline in energy use per unit of GDP. This decline is on the high side relative to past performance in other developed countries and helps explain why our BAU projection of 797 million tonnes of CO_2(e) is lower than that of the CSIRO reference case. As indicated above, on past trends this decline will primarily reflect structural change towards less energy-intensive service industries as well as some gains in energy efficiency.

The Greens have argued that Australia should go much further in reducing energy use per unit of GDP. They want to see:

> … a rapid transition to a low carbon, oil independent and low resource use economy.[31]

This is an attractive ideal, but very unlikely to be achieved given the political and economic priorities of recent Australian governments. We have not modelled the implications of the carbon tax that would be required to bring about the restructuring the Greens aspire to achieve. However, the CSIRO has done so. According to its analysis, with a carbon tax of $623 per tonne of CO_2(e), Australia's non-ferrous metals output would be 75 per cent below their reference case by 2050. The iron and steel output would be 53 per cent below and agriculture 44 per cent below.[32]

A carbon tax at this level would be difficult to sustain over the next few decades if Australian governments are simultaneously coping with a rapidly expanding population. There would be heavy pressure to expand the minerals and energy industries in order to provide the employment and pay for the imports required by a larger population.

It is conceivable that Australian governments could decree energy efficiency standards for the Australian vehicle fleet, buildings and household appliances which would lead to sharply reduced energy consumption relative to current levels. Again, this is attractive proposition, but would have to surmount formidable political barriers. Advocates of these measures also tend to ignore the likelihood that, with GDP per capita set to double over the next 50 years, the increased spending power resulting will prompt greater consumption of energy-intensive goods and services (like travel).[33] Also, it is possible that where energy costs decline with improved energy efficiency, that this may result in consumers increasing the number and types of appliances they use. For example, the mandatory use of energy saving light bulbs may result in consumers

using a greater number of light bulbs in their dwellings.

These considerations highlight the importance of the population issue. Population stabilisation offers a very large potential gain in greenhouse gas emissions relative to the BAU scenario.

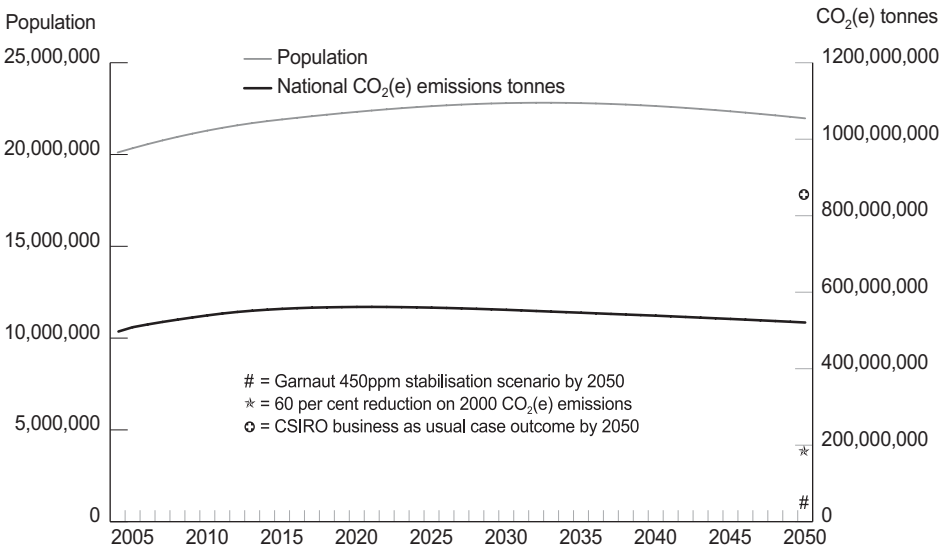
THE IMPACT OF POPULATION STABILISATION

Figure 4 shows what happens to the BAU projection if net migration is reduced to nil, that is, if movement in and out of Australia is equilibrated. Australia's population would begin to decline around 2030 and by 2050 would have reached 21.97 million—nearly one million above the present level. In these circumstances, national greenhouse gas emissions would reach 521 million tonnes or a drop of 276 million tonnes relative to the BAU projection. This reduction is close to the 295 million tonnes reduction on the BAU scenario that would occur if there were a one per cent per annum reduction in the carbon intensiveness of energy production (Figure 3).

Figure 5 models what would happen if the one per cent decline in carbon intensiveness occurred at the same time as Australia's population growth to 2050 was limited to 21.97 million. The outcome would be a decline of 469 million tonnes of CO_2(e), relative to the BAU scenario, to 328 million tonnes CO_2(e) by 2050. This would be an impressive achievement, though still short of the 197 million tonnes aspiration.

These findings raise the question of why the population factor is not considered in the various Australian studies of greenhouse gas abatement, since the gain from population stabilisation is much the same as that from a one percent annual decline in carbon intensiveness. It is also arguable that there would be far less public resistance to the population stabilisation

Figure 4: CO_2(e) emissions under 'business as usual' assumptions (RHS), except for nil net migration (population LHS), 2004 to 2050

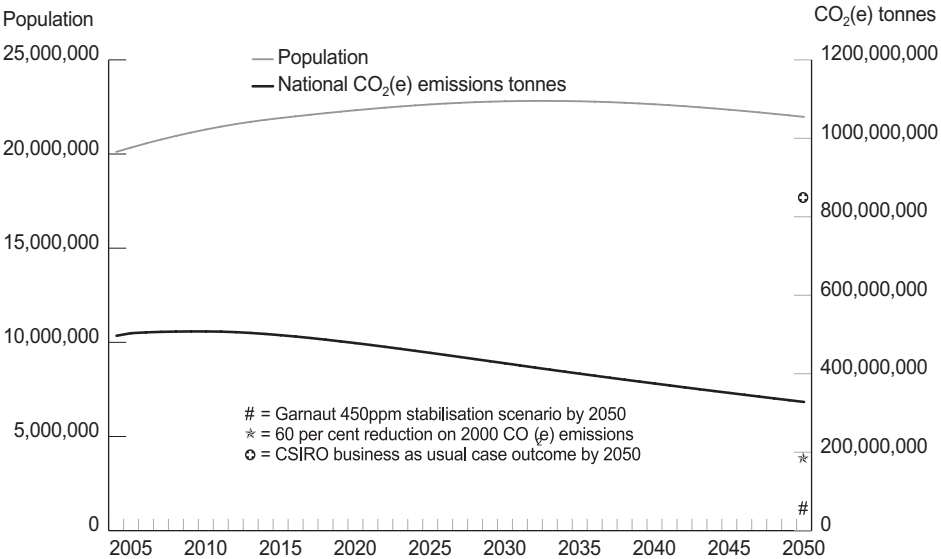


Source: CPUR projection, 2008

scenario than there would be to the high carbon taxes necessary to achieve the decline in carbon intensiveness assumed in this study. As the government's own think tank, the Productivity Commission, has shown, there is only a tiny projected gain in per capita income from increased immigration, even where the increase is focussed on skilled migrants.[34] Some business interests would prefer the much higher aggregate economic growth that occurs under the high migration assumption. But their interests are not the same as those of those of ordinary Australians, for whom it is per capita economic growth that matters.

Perhaps the green groups and the CSIRO are not aware of the greenhouse emission gains from population stabilisation. *The Heat is On* simply assumes a population of 28 million as of 2050 and does not explore the gains from a lower population. If the CSIRO had been aware of how rapidly the 28 million assumption has been rendered obsolete by recent demographic developments, it may have subjected the population factor to the same scrutiny as it does to options for improved energy efficiency and for decarbonisation. The more recent CSIRO and Allen Consulting Group study also assumes without question the continuation of 'recent population and immigration trends'.[35] Alternatively, it may be that the CSIRO, like most green groups, is uncomfortable considering the population factor. In a lengthy submission to the Garnaut Review, the Climate Institute, an independent research organisation with a strong abatement agenda, acknowledges Australia's high population growth rate, but declines to include population management as a relevant variable:

Figure 5: CO_2(e) emissions under 'business as usual' assumptions (RHS), except for nil net migration (population LHS) and a one per cent annual decline in carbon intensiveness, 2004 to 2050



Source/s: ??

> … while national indicators such as population are important, the structure of the economy and the mitigation potential of particular sectors are likely to be more important in determining Australia mitigation potential.[36]
>
> … The Review should therefore examine other indicators in assessing Australia's mitigation potential.[37]

One reason which is sometimes offered for this stance is that the population factor is irrelevant because what matters is the global impact of greenhouse emissions. Therefore the location of emissions is not deemed to be relevant. This response is not credible. As Table 2 shows, Australia's per capita greenhouse emissions are many times greater than those of the Asian countries from which most of our immigrants come and more than double those of the UK, which remains an important migrant source country. The relocation of migrants to Australia, where they will soon achieve Australian living standards and energy consumption levels, adds significantly to the global greenhouse burden.

HOW DOES GARNAUT DEAL WITH THE POPULATION ISSUE?

In his Interim Report, Garnaut dismisses the population factor. He asserts that population levels are not a relevant factor in his analysis, because 'population growth is decided by far more fundamental economic and social determinants'.[38] Instead, Garnaut focuses on per capita emission targets.[39]

Like the CSIRO report, *The Heat is On*, the Garnaut Review's reference or 'business as usual' scenario simply assumes the continuation of the current population growth outlook. All we are told is that Australia's population will reach 47 million in the year 2100.[40] No information is provided in the Draft Report as to the immigration and fertility assumptions built into this projection. There is no sensitivity analysis as to the impact of varying population assumptions and no attempt to advise the reader as to the contribution population growth makes to the level of emissions by 2050 or 2100.

Nonetheless, the Rudd government's commitment to the 60 per cent reduction by 2050 stands unchallenged as an iconic statement of Labor's environment credentials. It will have to be taken into account when the government sets its emission target under the proposed emission trading scheme. Indeed, in the Draft Report of the Garnaut Climate Change Review, published on 4 July 2008, it is stated that the 60 per cent emission reduction aspiration is an appropriate initial guideline for the Australian government to aim for in the post Kyoto Protocol environment (after 2012).[41]

The implication is that Australian greenhouse emitters will have to live with the consequences of a much larger population. Though nowhere stated in Garnaut's reports, these consequences could be severe. Garnaut proposes an emissions trading scheme in which permits to emit greenhouse gasses will be auctioned. The auction price will be determined in large part by the size of the cap. This is the overall emission tonnage from which emitters will have to vie for their share when permits are auctioned. Garnaut has not yet advised on this target except for the comment quoted above and odd references to the effect that it should be 'ambitious' and be set within the 'context of an effective comprehensive global agreement'.[41] It will be up to the Rudd government to set this cap.

Whether Garnaut likes it or not, when the Australian government initiates the emissions trading scheme and sets a cap, the population factor will be felt in the hip pocket by Australian businesses and consumers. As population grows in

Australia, so there will be more demand for emission permits (to accommodate the material needs of the extra population). Given that there will be a cap on these emissions, the price will rise to reflect the increased competition for emission permits required to satisfy the needs of the additional population. We have shown that the impact of accommodating an extra 11 million people by 2050 (the result of net migration at 180,000 per year) under BAU conditions will be very large. It will add 276 million tonnes or, on average, about 25 million tonnes for each extra million persons.

One possible and unprecedented outcome of this situation may be that for the first time a major component of the Australian business sector (that engaged in energy intensive activities) will have an economic interest in stabilising Australia's population.

CONCLUSION

Labor's 2050 greenhouse abatement target is commendable. However, on our analysis, it is largely symbolic. Australia faces a BAU outlook of some 797 million tonnes of CO_2(e) by 2050, four times the 197 million tonnes per annum aspiration. Given the priorities the government places on strong economic and population growth, there seems little prospect that this reduction will be achieved.

Does it matter if the 2050 aspiration is not achievable? Doesn't the aspiration at least provide a guideline for policy and practice? In our view, it does matter. The dissociation between government aspiration and action distorts and limits the national debate about greenhouse gas abatement strategy. Aside from business interests, most Australian contributors to the greenhouse debate gloss over the social, economic and political barriers to achieving major cuts to greenhouse emissions. This applies to the CSIRO and to other advocates of sharp reductions in greenhouse emissions. All tend to incorporate wish lists for energy efficiency and decarbonisation initiatives, as though they are readily-achievable options.

One consequence is that they can ignore the population factor in the comfort that their wish lists will do the job. Yet, if Australia's population were to grow from 21 million to just 22 million by 2050 (with nil net migration), this would reduce greenhouse emissions by about 276 million tonnes. This saving is almost as much as the around 295 million tonnes which would flow from a one per cent annual reduction in the carbon intensity of the fuel mix.

We are left with a major puzzle. The Rudd Government is well aware that some business interests (abetted by the Coalition) will oppose a tough emissions trading scheme. Why then has it signalled its intention to pursue record high immigration levels? The government must know that this policy will add a massive additional hurdle to the achievement of its 2050 greenhouse emission target. Garnaut's silence on the matter is equally puzzling.

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