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## Population growth and sustainability

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### Executive summary

This paper explores the role of population growth in the prospects for a sustainable economy and society in Australia. It deals separately with ecological and social issues. On the former it concludes that should Australia's population reach the 'Big Australia' projection of 35.9 million by 2050, this will not put serious pressure on Australia's non-renewable resource stock or capacity to feed the nation. However such population growth will make the task of reducing greenhouse emissions very difficult. On the social dimension, quality of life issues (including congestion, urban redevelopment and competition for amenity) are a major factor in public concerns about sustainability. The evidence suggests that most people think population growth is a major cause of these problems. State government moves to increase urban density in order to cope with additional capital city residents are likely to exacerbate these quality of life concerns.

### About the Author

Bob Birrell (PhD Princeton) is the Founding Director of the Centre for Population and Urban Research and Reader in Sociology at Monash University. He is the co-editor of the demographic quarterly *People and Place*. He has served as an advisor to successive Commonwealth Governments on population, immigration and educational issues, including as a member of the National Population Council from 1987 to 1993.

## Population papers series

Population related issues were among the most contentious areas of public debate prior to and during the recent election period. Given its enduring and multifaceted nature, the debate on population is likely to be of continuing policy interest to senators and members of the 43rd Parliament.

The Parliamentary Library commissioned a series of papers from leading authors on a range of aspects of population including the environment, the economy, demographic trends, public opinion, urban transport and international comparisons. The views expressed do not reflect an official position of the Parliamentary Library, nor do they constitute professional legal opinion.

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## Introduction

The concept of sustainability emerged in the context of concerns about whether economic growth was compatible with the maintenance of the world's non-renewable and renewable resource base. The Club of Rome's *Limits to Growth* published in 1972 represented the extreme end of this concern.<sup>1</sup> With the advances in ecological science, sustainability concerns since that time have focussed more on the viability of the global and local ecosystems to cope with the pressures of human activities. This approach is summed up by the concept of ecologically sustainable development (ESD). These are essentially instrumental concerns about whether economic growth can continue in the face of the available supply of renewable and non-renewable resources and of the overall health of the ecosystem.

The focus here will be on this instrumental view, but is important to note that there is another less anthropocentric perspective on the resource issue. It is summed up by Bob Brown and Peter Singer's statement that 'The Greens reject the traditional western belief that nature exists only for us to exploit as best suits our immediate wants and desires'.<sup>2</sup> Those drawing on this perspective favour a 'balance between man and nature' which implies that sustainability must include the preservation of at least some remnants of the nation's fauna and flora, regardless of human consumption needs.

More recently, a quite different perspective on sustainability has emerged. This covers Australians' concerns about whether they can maintain their urban or rural lifestyle in the face of development pressures. These include worries that the Australian way of life, including the land extensive settlement pattern hinging on the detached house and garden, easy access to bush and beach, and the ready availability of health, education and other public services are under threat.

These lifestyle issues were at the centre of the debate during 2009 and 2010 about the appropriate size of Australia's population. Concerns about higher density development in suburban areas can arouse considerable passion. Just as respect for nature is a deep commitment for some environmentalists, so for many Australians, their identity is linked to the way they live in their residential locality. If this is threatened, as by the loss of the suburban environment to high density apartments, it can generate profound feelings of displacement.

There is a rich literature on why housing development in Australian cities has been dominated by the detached house and garden form. Such housing has long been regarded as symbolic of Australians' achievement in avoiding the negatives of living in close proximity

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1 D Meadows, *The limits to growth*, Earthscan, London, 1972.

2 B Brown and P Singer, *The Greens*, Text, Melbourne, 1996, p. 52.

with neighbours that settlers from the UK felt they were leaving behind.<sup>3</sup> Partly as a consequence, this style of living remains the dominant preference of Australians once they begin to raise a family.<sup>4</sup> In this paper this preference is not taken to be problematic.

What is at issue, and will be explored later, is the extent to which fears about the pressures for higher density development and about associated increases in congestion and other urban vexations, are tied to a perception that these pressures derive from rapid population growth.

That such concerns have shaped public notions about the meaning of sustainability seemed to be assumed by political leaders during the recent 2010 federal election campaign. In July, the Prime Minister, Julia Gillard, declared that Australians ‘are experiencing the strains of rapid and often unsustainable growth’.<sup>5</sup> Referring to metropolitan residents in Brisbane, the Prime Minister said that lifestyle concerns ‘are in the frontline of our population challenge ... which includes where you have to set the alarm earlier and earlier because peak hour traffic doesn’t last for just an hour anymore.’<sup>6</sup> She went on to declare, ‘there could be no more appropriate place to discuss our sustainability than south-east Queensland and specifically here in Brisbane’.<sup>7</sup> Again, in a speech in western Sydney, the Prime Minister stated that ‘Sustainability is about the liveability of our cities and how the density of population, the state of our infrastructure and the quality of our services can impact upon our quality of life’.<sup>8</sup> These concerns were at the core of Dick Smith’s population documentary screened in August 2010.<sup>9</sup> This was dominated by visual images of gridlock on metropolitan highways and the destruction of detached houses for multi-storey apartment blocks.

Sometimes the resource and lifestyle-based definitions are combined as with the Prime Minister’s plea, ‘Let us make the national goal a ‘sustainable Australia - an Australia that preserves our quality of life and respects our environment’.<sup>10</sup> In reality, as is stated at the

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3. For example, see: P Troy, *The perils of urban consolidation*, Federation Press, Sydney, 1996, pp. 35–40; and L Frost and T Dingle, ‘Sustaining suburbia: an historical perspective on Australia’s growth’, in P Troy, ed. *Australian cities*, Cambridge University Press, Cambridge, 1996, pp. 20–38.

4. B Birrell, K O’Connor, V Rapson & E Healy, *Melbourne 2030*, Monash University ePress, 2005, Chapter 4.

5. J. Gillard, Address to the Eidos Institute, ‘Forward to a sustainable Australia’, Brisbane, 18 July 2010, p. 2

6. Ibid.

7. Ibid.

8. J Gillard, Address to the Western Sydney Regional Organisation of Councils, National Population Summit, Casula, 20 July 2010, p. 3.

9. *Dick Smith’s Population Puzzle*, Australian Broadcasting Corporation (ABC) Channel 2, August 12, 2010.

10. J Gillard, Address to the Western Sydney Regional Organisation of Councils, op. cit.

conclusion of this paper, it may be that our ‘quality of life’, if defined to include dispersed, car-based suburbia, is not compatible with respect for the environment.

Both definitions of sustainability are legitimate in that they speak to important public concerns. For the purposes of this paper the relationship between population growth and the environment and quality of life will be treated separately.

## The population benchmark

The reference point as to the scale of population growth potentially faced in Australia is the ‘Big Australia’ assumption. The most recent projections prepared by the Commonwealth and state governments as well as the Australian Bureau of Statistics (ABS) all assume that net overseas migration (NOM) will be sustained at around 180 000 per year and that the total fertility rate (TFR) will continue at the recent level of around 1.8 or 1.9. Under this migration assumption and a TFR of 1.9, the 2010 Intergenerational Report (which also includes optimistic mortality assumptions) projected that Australia’s population will grow from 22 million in 2010 to 35.9 million by 2050.<sup>11</sup> This figure is usually referred to as the ‘Big Australia’ projection.

Under the most recent projection prepared by the ABS, whose middle range projection also incorporates the net 180 000 NOM assumption and a TFR of 1.8, Australia’s population will reach 33.9 million by 2050. For this scenario, the ABS projects the following outcomes for Australia’s major capital cities by 2050.

Table 1: Population projections for capital cities 2006–2050 (millions)

	2006	2050
City		
Brisbane	1.8	3.7
Sydney	4.3	6.7
Melbourne	3.7	6.5
Adelaide	1.1	1.6
Perth	1.5	3.1
Australia	20.7	33.9

Source: Australian Bureau of Statistics (ABS), *Population projections Australia, 2006 to 2101, series B*, cat. no. 3222.0, ABS, Canberra, 2008.

11. Treasury, *Australia to 2050: future challenges*, Commonwealth of Australia, Canberra, 2010, viewed 11 October 2010, <http://www.treasury.gov.au/igr/igr2010/>. About nine million of this growth will come from NOM (including the children born of migrant families arriving after the projection begins) and the other five million from natural increase (on the assumption that henceforth, the NOM equals nil).

Assumptions: net overseas migration 180 000 per year; TFR 1.8. Life expectancy at birth by 2050-51; 85.0 years for males and 88.0 years for females.

The focus for this paper, as far as the life style issues are concerned, will be on the capital cities. This is because most of Australia's population growth is occurring in these cities and as a result that is where controversy about these issues is located. One indicator of these population trends is the proportion of Australian residents living in the capital cities (including the ACT). This proportion has increased from 63 per cent in 2001 to 64.1 per cent in 2009.<sup>12</sup> The main reason for this increased proportion is that the great majority of overseas migrants locate in these capital cities.

## Population, resources and ecologically sustainable development

Much of Australia's natural environment has been modified or destroyed as a consequence of the needs of a rapidly growing and wealthier population (in per capita income terms). Most of the remaining native forest cover has been affected by logging. Except for areas reserved as parks, this native forest has largely been transformed into tree farms. Many of the nation's river systems, including those in the Murray Darling Basin, have been converted into de facto irrigation channels. From the point of view of those wishing to maintain a balance between people and nature, this is a lost cause, alive only in the dogged preservation of remnants.

On the issue of whether Australia's renewable and non-renewable resource base is capable of providing for the growing needs of a much larger population, there is little agreement. This is partly because of the difficulties of separating the influence of per capita economic growth and population growth in assessing resource demands and partly because of disagreement about the potential of technological solutions or political fixes to prospective resource difficulties.

Tim Flannery is the best known amongst those arguing that Australia's carrying capacity is very limited. His views (originally expressed in the early 1990s) were based on the low productivity of Australia's ecosystem and on its climate variability. The major climate worry at this time was the marked variability in wet and dry seasons associated with El Nino Southern Oscillation (ENSO) phenomenon, which derives from medium to long-term temperature variations in the Pacific Ocean. The greenhouse effect and associated global warming received only a brief mention. On this basis Flannery suggested an optimum long-term population would be about six to 12 million.<sup>13</sup> Though this assessment did not address the capacity of contemporary science to address the limits of the original ecosystem, it has been influential.

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12. Calculated from Australian Bureau of Statistics (ABS), *Regional population growth, estimated residential population*, cat. no. 3218.0, ABS, Canberra, 2010.

13. T Flannery, *The future eaters*, Reed New Holland, Sydney, 1994, p. 369.

Flannery's view appears to have influenced Jared Diamond's well-known book *Collapse*.<sup>14</sup> His chapter on Australia is accompanied by others on societies which did literally collapse, including the Norse settlements on Greenland. This juxtaposition implies that he thinks Australia is headed for a similar end. Indeed, Diamond (like Flannery) writes that Australia's environmental fragility, including its nutrient depleted soils, vulnerability to salinisation and erratic weather patterns (he too, focuses on the ENSO phenomenon) mean that there are severe limits on carrying capacity. He concludes that 'the best estimate of a population sustainable at the present standard of living is 8 million people, less than half of the present population'.<sup>15</sup>

Such estimates have little credibility among agricultural scientists. In considering their views, we need to keep in mind that the size of the domestic population is only relevant where a high proportion of Australia's rural and minerals output is likely to be utilised for domestic purposes. For most of these commodities the bulk of the output is exported. This point is spelled out in detail in the 1991 report of the National Population Council on *Population Issues and Australia's Future*.<sup>16</sup> Whether this will continue to be the case should Australia's population reach 36 million by 2050 is more problematic.

As regards agricultural production, Australian farmers currently produce enough food to feed well over 22 million. In the case of wheat, in 2009–10 production was 21.6 kilotonnes (kt) of which 14.7kt were exported. There have been various attempts to estimate Australia's 'carrying capacity' should all of food production be consumed in Australia, including that of the National Population Inquiry of 1975. It concluded on the basis of Commonwealth Scientific and Industrial Research Organisation (CSIRO) estimates that a population of 50 to 60 million was 'feasible and manageable'.<sup>17</sup> Another CSIRO review of these issues, published in May 2002, concluded that total crop production was likely to increase substantially over the years to 2051, notwithstanding concerns about dryland salting and soil acidification.<sup>18</sup> In other words, there is a technological fix that should comfortably insure Australia against domestic food shortages. The strong rise in agricultural productivity over the past couple of decades supports the CSIRO's judgement.<sup>19</sup> The 2002 CSIRO report

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14. J Diamond, *Collapse*, Allen Lane, Melbourne, 2005.

15. Ibid, p. 398.

16. National Population Council, *Population issues and Australia's future*, Final Report, AGPS, Canberra, 1992, chapter 4.

17. R Birrell and T Birrell, *An issue of people*, Longman Cheshire, Melbourne, 1987, p. 191.

18. B Foran and F Poldy, *Future dilemmas. Options to 2050 for Australia's population, technology, resources and environment*, report to the Department of Immigration and Multicultural and Indigenous Affairs, CSIRO, 2002, pp. 125–132, viewed 11 October 2010, <http://www.cse.csiro.au/publications/2002/fulldilemmasreport02-01.pdf>

19. Senate Select Committee on Agricultural and Related Industries, *Food production in Australia. Final report*, The Senate, Canberra, 2010, p. 45, viewed 11 October 2010, [http://www.aph.gov.au/senate/committee/agric\\_ctte/food\\_production/report/index.htm](http://www.aph.gov.au/senate/committee/agric_ctte/food_production/report/index.htm)

concluded that ‘Australia has the capacity to maintain a positive food balance in all main food commodity items apart from fish out to 2050 and beyond.’<sup>20</sup> This applied to all its population scenarios, the highest of which had Australia reaching 32.5 million by 2050.

The climate record of the past decade challenges these estimates. The drought since the late 1990s, which ended only in 2010, implies that a new assessment of carrying capacity is required. During the drought there were years when agricultural production fell precipitously. In the case of wheat, production fell from the more normal level of 25kt in 2005-06, to just 10.8kt in 2006-07 and 13.6kt in 2007-08. In these years exports fell from 15.9kt to 8.7kt and 7.4kt respectively.

Whether the recent drought is an auger of the implications of long-term climate change remains to be seen. However, according to one of the world’s leading climate historians, if global warming continues, ‘The whole global water cycle changes too, shifting the distribution of rain and with it the boundaries between places that are eminently liveable for people and others that are not so’.<sup>21</sup> In the case of the Hadley cells which shape the flow of air to and from the tropics to the middle latitudes (around 30 degrees north or south—just north of Perth in Australia’s case) ‘one change which the models predict, though atmospheric physicists don’t fully understand why it happens, is that the tropical circulation loops, called Hadley cells, should expand toward the poles as the planet warms which means the regions of dry, subsiding air that create the subtropical deserts will expand’.<sup>22</sup> Australia is potentially vulnerable to this effect if the Hadley cell shifts further south, bringing drier conditions to the southern areas of Australia. If so, Australia’s self sufficiency in food may not be as secure as past estimates have assured us.

## **Water and sustainability**

Water is at the forefront of most Australians’ concerns about sustainability. The big picture, however, is that most of the water utilised in Australia is for irrigated agriculture. If this water could be accessed for metropolitan use, there would be no urban water shortage. Nevertheless, though metropolitan use is small relative to irrigation use, the political realities are that in most urban water authority jurisdictions, supply is restricted to the limited catchments allocated for metropolitan use.

During the recent drought, most metropolitan water systems were depleted to the point that the delivery of water for residential purposes had to be curtailed. Yet during this time the number of metropolitan residents continued to grow. The result was that the annual per capita delivery of water fell sharply in most systems. In Brisbane, for example, it fell from 102

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20. B Foran and F Poldy, op. cit., p. 64.

21. R Kunzig and W Broecker, *Fixing climate*, Green Profile, London, 2008, pp. 188–189.

22. *Ibid.*, p. 191.

kilolitres (kL) per capita in 2003–04 to 53kL per capita in 2008–09 and in Melbourne from 77kL per capita to 57kL per capita.<sup>23</sup>

Restrictions on water use were imposed in all Australian metropolises. These measures have been supplemented by appeals to consumers (in the community interest) to limit their consumption. Restrictions remain the dominant approach because domestic water is so cheap and so important to households that, except for low income households, price is to date not a crucial factor in determining water consumption.

The population factor has so far rarely intruded in debates about water sustainability. This may change if water restrictions have to be further tightened. When they threaten the maintenance of household gardens or community sporting facilities, challenges to the Australian lifestyle come into play. At this point, questions about the wisdom of further population growth are likely to be raised.

A recent Water Services of Australia (WASA) analysis provides a basis for assessing the significance of population growth for urban water consumption.<sup>24</sup> WASA assumed that Australia's population would approximate the Big Australia projection and that the capital cities would reach the population level projected by the ABS under its mid-range scenario detailed in Table 1. WASA also assumed that per capita consumption levels would remain close to or under present levels, except for Brisbane where some recovery from recent very tight restrictions was expected.<sup>25</sup> Under these assumptions WASA estimates that by 2056, residential metropolitan water consumption in Sydney, Melbourne, south east Queensland, Adelaide, Perth and Canberra would grow in total from 1505 gegalitres (GL) in 2009 to 2652 GL in 2056.<sup>26</sup> Since WASA has assumed that per capita residential consumption will be lower in 2056 than in 2009 in all cities except Brisbane, the great bulk of the extra 1147 GL of water consumed will be attributable to metropolitan population growth.

Australian state governments have already indicated by their willingness to establish desalination plants serving all major metropolises where their priorities lie. They believe the resort to this expensive (relative to gravity fed dams) and energy-intensive option is preferable to more restrictions on water use or more exploitation of 'rural water'. If this continues to be the case, the state authorities in Queensland, NSW, Victoria and WA will each have to provide the equivalent of two desalination plants capable of producing 100 to

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23. Water Services Association of Australia, *Implications of population growth in Australia on urban water resources*, Occasional Paper, no. 25, July 2010, p. 8, viewed 11 October 2010, <https://www.wsaa.asn.au/Publications/Documents/201007%20WSAA%20Occasional%20Paper%2025.pdf>

24. Ibid.

25. Ibid., p. 13.

26. Ibid., p. 15.

150GL per year (and in south east Queensland three such plants) in order to provide for the projected population growth in their capital cities to 2056.

## Greenhouse gas emissions

Global climate change may be the ultimate resource constraint or limit as far as the capacity of the globe to provide food and fibre for the global human population is concerned. The level of CO<sub>2</sub> in the atmosphere has increased from around 280 parts per million (ppm) prior to the industrial revolution to around 380 ppm currently.

The dominant view amongst climate specialists is that the increase in CO<sub>2</sub> and other greenhouse gasses has led to a rise in global mean temperatures of about 0.7 degrees over the same period. The stark fact is that global emissions of greenhouse gases in CO<sub>2</sub> equivalent terms (CO<sub>2</sub>e) are about 42 gigatonnes (gt) each year.<sup>27</sup> In order to stabilise these gases in the atmosphere at around the current level of about 450 ppm and thus limit the rise of global mean temperature to no more than 2.0 degrees, will require a reduction in annual global emissions to about 12gt CO<sub>2</sub>e by 2050.<sup>28</sup>

At first glance Australia's population outlook may seem to be irrelevant to this situation. Australia contributed only about 1.5 per cent of the world's greenhouse gases in 2005, and in any case most of Australia's population growth into the future will derive from immigration (nine out of the 14 million growth projected to 2050 under the Big Australia projection). This could be thought of as a transfer in the sense that it is the total global load of emissions that matters not where the emissions occur. But it will matter because Australia is such a major polluter in per capita terms. Australia's estimated per capita emissions of greenhouse gasses in 2005 were 28.9 tonnes, well above the level in the United States of 23.9 tonnes, double that of the European Union (EU) of 10.7 tonnes per head and of the order of 10 times the level in the countries of Asia, where most of our migrants come from.<sup>29</sup> As a consequence Australia can hardly evade taking action to cut emissions, and indeed that has been the view of the Australian Labor Government since ratifying the Kyoto Convention. The Labor Party's longstanding commitment to reduce Australia's emissions to 60 per cent below year 2000 levels by 2050 is another indicator of this commitment.

The fact that Australia's projected population growth from immigration is a major cause of likely emission increases (as is shown below) is unlikely to draw any sympathy on the international stage, because each country is being held responsible for its own emissions. The recent global negotiations for a post-Kyoto accord, as at Copenhagen, focused on abatement

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27. N Stern, *The economics of climate change*, Cambridge University Press, Cambridge, 2007, p. 194. One gt is equal to 1000 million tonnes.

28. Ibid., p. 233.

29. Treasury, *Australia's low pollution future. The economics of climate change mitigation*, Commonwealth of Australia, Canberra, 2008, chapter 3, viewed 11 October 2010, <http://www.treasury.gov.au/lowpollutionfuture/report/default.asp>

targets expressed at the national level. It is also worth noting that Ross Garnaut's advice that the greenhouse abatement challenge should be expressed in per capita emission targets<sup>30</sup> rather than in national targets, was rejected by the Australian Labor Government in 2009.<sup>31</sup>

Emission reduction in Australia must occur in a context of rapid population and economic growth. If Australia's population reaches 35.9 million by 2050, a 60 per cent decline in total emissions by this date will require a cut in per capita emissions from 28.8 tonnes per head in the year 2000 to 6.1 tonnes per head in 2050. This cut would have to be achieved in a context where the Australian Treasury is projecting that per capita real income will be almost double the year 2000 level by 2050. The much larger and wealthier population by 2050 would be able to afford a far more affluent lifestyle than is the case today including more energy-intensive trips abroad.

There has been little debate in Australia as to the relative role of per capita economic growth and population growth in meeting Australia's emission targets – which explains the attention I give to the topic. The focus below is on the Australian Government's recent commitment to reduce year 2000 emissions by five per cent by 2020 (made prior to the Copenhagen meeting in December 2009). Those supporting this target tend to assume that it can be achieved by moving Australia's energy sources towards renewables and by improvements in the efficiency with which energy is used. This is theoretically possible, even with a larger and wealthier population. But will the political and economic realities allow the required reforms?

The recent evidence in the developed world is not encouraging. In developed countries with relatively high rates of population growth, including Australia, Canada and the United States, total greenhouse gas emissions have increased strongly by comparison with countries with low rates of population growth (notably in Western Europe). This is documented in the World Resources Institute's (WRI) decomposition of the sources of growth (or decline) in greenhouse emissions shown in Table 2.

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30. R Garnaut, *The Garnaut climate change review. Interim report to the Commonwealth, states and territory governments*, February 2008, p. 30, viewed 11 October 2010, <http://www.garnautreview.org.au/CA25734E0016A131/WebObj/GarnautClimateChangeReviewInterimReport-Feb08/%24File/Garnaut%20Climate%20Change%20Review%20Interim%20Report%20-%20Feb%2008.pdf>
  31. B Birrell and E Healy, 'Population growth and Australia's 2020 greenhouse gas emission commitments', *People and Place*, vol. 17, no. 4, 2009, p. 21.

**Table 2: Estimates of CO<sub>2</sub>e emissions per capita, national CO<sub>2</sub>e emissions change and factors contributing to CO<sub>2</sub> emissions growth, selected countries, 1990 to 2002**

Country	Emissions per capita in 2000 Tonnes CO <sub>2</sub> (e)	CO <sub>2</sub> (e)change 1990 to 2002		Per cent contributions to CO <sub>2</sub> change			
		Mt CO <sub>2</sub> (e)	Per cent	GDP per capita	Population	Energy intensity per unit of GDP	Fuel mix CO <sub>2</sub> (e)
China	3.9	1247	49	122	15	-96	8
United States	24.5	863	18	23	16	-20	-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
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, pp. 15 and 22.

This WRI study separates the contributions to overall greenhouse emission increases from four sources: growth in GDP per capita, population growth, energy intensity per unit of GDP and the fossil fuel component of the sources of energy (fuel mix). Table 2 shows that the contribution from growth in GDP per capita in each country is largely offset by a decline in the amount of energy per unit of GDP. There is little change in fuel mix. This leaves population growth as the key swing factor. In Australia, Canada and the United States, where population growth rates have been relatively high, so has the rate of expansion in greenhouse emissions. By contrast each of Western European countries listed experienced a low rate of population growth over the 1990–2002 period and a low, or in several cases a declining rate of emission growth.

The research accompanying the Australian Government’s attempt to introduce an emissions trading scheme (ETS) provides a further opportunity to assess the role of the population factor in greenhouse emission levels. The Treasury prepared a business as usual (BAU) projection on the assumption that economic growth would increase by 1.4 per cent a year and that population would grow by six million from 19.2 million in the year 2000 to 25.2 million in 2020. The latter number is consistent with the Big Australia projection to 35.9 million by 2050. The modelling produced an estimate of greenhouse emissions per dollar of GDP. This modelling took into account the changing structure of Australia’s economy (and thus the energy intensiveness of economic activities), the likely efficiency with which energy was used in this economic activity and the fuel mix employed in producing energy. The BAU modelling was based on a no-ETS assumption and thus no price on carbon.

On these assumptions the Treasury modelling produced a BAU outcome by 2020 of 774 million tonnes of CO<sub>2</sub>(e), up from 553 million tonnes in 2000. To achieve the minus five percent reduction promised at Copenhagen would require a reduction to 525 million tonnes by 2020. Our subsequent analysis of the Treasury modelling showed that in the absence of the projected population growth there would have only been a minor increase in greenhouse gas emissions.<sup>32</sup> This is because, as with the WRI study, the extra emissions deriving from increased per capita economic growth were largely offset by the Treasury's estimate that greenhouse gas emissions per dollar of GDP will fall from 0.62kg in 2000 to 0.49kg by 2020 (see Table 3).

If Australia's population had remained at the year 2000 level of 19.2 million but per capita economic growth and emissions per dollar of GDP reached the levels projected in the BAU modelling to 2020, total emissions would have been 590 million tonnes. This is just 37 million tonnes larger than the 553 million tonnes starting point in the year 2000.<sup>33</sup> The rest of the growth in greenhouse emissions of 221 million tonnes to 774 million tonnes in the BAU case (or 184 million tonnes) was attributable to the six million population growth. Thus population growth was responsible for 83 per cent of the overall growth in greenhouse emissions between 2000 and 2020 under the BAU case.

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32. Ibid.

33. Ibid, p. 23

**Table 3: Treasury assumptions for the calculation of the reference case level of greenhouse gasses in 2020**

	2000	2020
Population (millions)	19.2	25.2 <sup>1</sup>
GDP per capita (A\$)	44,532 <sup>2</sup>	62,357 <sup>3</sup>
GDP (A\$ billions)	885 <sup>4</sup>	1571 <sup>5</sup>
Greenhouse emissions per \$GDP (kg)	0.625 <sup>6</sup>	0.4927 <sup>7</sup>
Emissions (million tonnes CO <sub>2</sub> e)	553 <sup>8</sup>	774 <sup>9</sup>
Per capita emissions (tonnes CO <sub>2</sub> e)	28.8	30.7

Sources: <sup>1</sup> Australian Government Treasury, <[http://www.treasury.gov.au/lowpollutionfuture/spreadsheets/report\\_charts/Annex%20B/Chart%20B.3%20-%20Australian%20population.xls](http://www.treasury.gov.au/lowpollutionfuture/spreadsheets/report_charts/Annex%20B/Chart%20B.3%20-%20Australian%20population.xls)>

<sup>2</sup> ABS, Australian National Accounts: National income, expenditures and product, cat. no. 5206.0, June 2009, Table 1

<sup>3</sup> Australian Government Treasury, personal communication, <[www.treasury.gov.au/lowpollutionfuture/spreadsheets/report\\_charts/Chapter%203/Chart%203.29%20-%20Australian%20GDP%20and%20GNP%20levels.xls](http://www.treasury.gov.au/lowpollutionfuture/spreadsheets/report_charts/Chapter%203/Chart%203.29%20-%20Australian%20GDP%20and%20GNP%20levels.xls)>

<sup>4</sup> GDP per capita multiplied by population

<sup>5</sup> GDP per capita multiplied by population

<sup>6</sup> Greenhouse emissions divided by GDP

<sup>7</sup> Australian Government Treasury, personal communication

<sup>8</sup> Australian Government Treasury, personal communication

<sup>9</sup> GDP multiplied by greenhouse emissions per dollar of GDP

Source: B Birrell and E Healy, 'Population growth and Australia's 2020 greenhouse gas emission commitments', *People and Place*, vol, 17, no. 4, 2009, p. 22.

It is conceivable that tough abatement measures could achieve the minus five per cent target by 2020, even with the projected population increase. As noted, the Treasury's modelling indicates that under the BAU scenario, emissions per dollar of GDP will fall from 0.625kg per dollar of GDP to 0.4927kg per dollar of GDP between 2000 and 2020. This fall reflects continued structural change towards a service oriented (and thus less energy intensive) economy and improvements in the efficiency of energy use. But as the Treasury shows, this rate would still be above the level already attained in the EU, where emissions are estimated to be 0.37 kg per dollar of GDP. If the Australian level could be reduced to this rate by the year 2020, emission levels in Australia (assuming the population grew by six million) would be 581 million tonnes. This is close to the starting point of 553 million tonnes in the year 2000 and within reach of the minus five per cent target of 525 million tonnes.

Unfortunately, idealistic hopes of fundamental changes in the rules impacting on greenhouse emissions are not easy to accomplish, as the Labor Government's difficulties in legislating its ETS scheme illustrate. Meanwhile Australia's total emissions of greenhouse gases continue to rise.

## Lifestyle issues

The population debate since late 2007, at least as it has percolated down to the wider public, has primarily been about lifestyle issues. As noted earlier, these concerns have been picked up by the mainstream political parties and have helped frame their definitions of sustainability. The issues in question include congestion, challenges to the traditional house and garden mode of living, the escalation of housing prices, and competition for amenity and deficiencies in service provision, such as health care.

Most Australian metropolitan residents appear to believe that vexations related to their life style are a consequence (at least in part) of Australia's rapidly growing population. For example, in preparation for its 2010 Growth Summit, the Queensland Government commissioned market research on this matter. The research reported that south east Queensland residents were not enthused about development in their region. A slight majority were judged to be negative about the impact of population growth in south east Queensland.<sup>34</sup> As acknowledged by the Queensland Government at the time of the Summit:

When the South East Queensland Regional Plan was introduced [in 2005] there was broad consensus about the benefits of growth. However, as the region has grown, the focus of communities has appeared to shift from the benefits of growth to the impacts on lifestyle.<sup>35</sup>

Another indication is the results of the Australian Survey of Social Attitudes conducted late in 2009 and early 2010.<sup>36</sup> Voters were asked 'do you think Australia needs more people?' Some 72 percent said that it did not, including 76 per cent of those living in Queensland. Whether the public is correct to blame population growth for increased congestion, house prices and other lifestyle concerns is another matter. These are complex issues on which the opinions of experts differ markedly. In what follows, some of these alternative opinions are examined with the purpose of assessing the significance of the population growth factor.

## Land and house prices

### Land prices

One source of the growth in house prices in metropolitan Australia has been sharply increased land prices. The land development industry commonly complains that a key cause

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34. TNS Social Research, *Queensland Growth Management Summit 2010. Social research on population growth and liveability in south east Queensland, March 2010*, Queensland Department of Premier and Cabinet, Brisbane, March 2010, viewed 11 October 2010, <http://growthsummit.premiers.qld.gov.au/about-growth/assets/growth-summit-social-research-paper.pdf>

35. Queensland growth management summit, 2010 Ibid., p. 6,

36. K Betts, 'A bigger Australia: opinions for and against', *People and Place*, vol. 18, no. 2, 2010, p. 26.

of this increase is the reluctance of governments to release sufficient land for development on the suburban frontier. It is hard to make a firm judgement on this claim since there are a number of factors influencing land prices, including the speed with which local government authorities do the necessary preliminary planning and put the required trunk services in place before developers can begin their work and the marketing strategies of some developers. These strategies may include slow development in order not to swamp the land market in their locality.

However it is the case that in south east Queensland, Sydney and Melbourne, state governments are moving to restrict extension of the suburban frontier in the interests of curbing suburban sprawl. As these policies are implemented there will be increased competition for new vacant lots and more pressure on the established house market (if population continues to increase). The significance of these 'compact city' policies is examined in more detail below.

Developers also complain that governments, particularly in south east Queensland and Sydney have front end loaded the cost of new blocks with infrastructure charges which they must pass on to purchasers. This complaint is correct. Currently these charges in Sydney and south east Queensland are higher than those paid by developers in outer suburban Melbourne and do help explain the rapid price increases of residential land in these two jurisdictions, relative to Melbourne.<sup>37</sup>

#### Housing prices

In the case of established housing prices, the escalation in median house prices in Australia this century is not primarily a consequence of population growth. Housing price booms (at least until the onset of the Global Financial Crisis) were apparent across a diversity of developed societies where the population growth rate was far lower than in Australia. These booms reflected easy access to mortgage credit and a boom mentality – based on the assumption that the rises would never end. This view continues to prevail in Australia, and has been encouraged by Australian taxation provisions (negative gearing on rental properties and low capital gains taxes on house sales). It is likely, however, that the expectation of continued high population growth has contributed to the continuing high levels of investor interest in the housing market, despite record high prices.

Over the next thirty years, the ageing of Australia's population will become an increasingly significant factor in the demand side of the housing equation, because most of the expansion in the number of households in the capital cities will occur amongst persons aged 55 plus.

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37. Urbis Pty Ltd, *Final report. Factors underpinning new housing costs and new housing availability in Victoria and Queensland*, Queensland Department of Premier and Cabinet, 2010, p iii, viewed 11 October 2010, <http://growthsummit.premiers.qld.gov.au/assets/QLD-Residential-Study.pdf>

This is partly because of the increasing numbers in this age group and partly because the number of persons per household in the older age group is low.<sup>38</sup>

### Population growth and congestion

It is clear that population growth has contributed to the growth in the number of cars on metropolitan roads and travellers on the public transport systems and thus to congestion in both areas.

As reported in the *State of Australian Cities 2010*:

Urban car use has grown almost thirty-fold since 1950 when it began to replace rail as the main mode of passenger transportation. The levels of car dependency in Australian cities have increased at a rate faster than population growth, creating traffic congestion problems, particularly in the larger capitals of Sydney and Melbourne and in Brisbane and Perth where infrastructure and public transport provisions have not kept pace with growth rates.<sup>39</sup>

In recent years, the share of the extra traffic load attributable to population growth has increased. This is because there has been a significant decline in the number of passenger vehicle miles travelled per capita across all major Australian cities since around 2004 which Stanley thinks is a consequence of increased fuel costs since this time.<sup>40</sup> Despite this, the total passenger vehicle kilometres travelled has continued to increase (though not as fast as prior to 2004) because of the growth in population and thus increased number of vehicles on the road. One indication of the latter is the expansion of the number of passenger motor vehicles registered in each state. Between 2004 and 2009 the number of such vehicles increased by 10.8, 10.6 and 18.9 per cent respectively in New South Wales, Victoria and Queensland.<sup>41</sup> Over the same period the population growth in the three states was 6.3, 9.2 and 13.4 per cent respectively.

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38. For an example of the huge contribution the ageing process makes to growth in the numbers of households (in this case for Melbourne), see B Birrell and E Healy, *Melbourne's population surge*, CPUR, Monash University, 2008, p. 4.
  39. Infrastructure Australia, *State of Australian cities 2010*, Commonwealth of Australia, Canberra, 2010, p. 54, viewed 11 October 2010, [http://www.infrastructureaustralia.gov.au/files/MCU\\_SOAC.pdf](http://www.infrastructureaustralia.gov.au/files/MCU_SOAC.pdf)
  40. J Stanley and S Barrett, *Moving people*, 2010, p. 13, viewed 11 October 2010, [http://www.ara.net.au/UserFiles/file/Publications/Moving\\_People\\_report.pdf](http://www.ara.net.au/UserFiles/file/Publications/Moving_People_report.pdf)
  41. Australian Bureau of Statistics (ABS), *Motor vehicle census*, cat. no. 9309.0, ABS, Canberra, 2009, viewed 11 October 2010, <http://www.abs.gov.au/ausstats/abs@.nsf/mediareleasesbytitle/28861A19CCDB9441CA25753D001B59DA?OpenDocument>

## The compact city solution

Notwithstanding this information, it is often argued that metropolitan population growth is not the core problem. Rather it is deficiencies in the way this growth is managed. One version of this argument is that the problem is simply bad government, in that insufficient funds have been committed to the required urban infrastructure. A more fundamental critique of the population argument is that congestion is attributable to Australians' attachment to a land-extensive, house and garden way of life. More people can be managed without congestion, it is asserted, if our cities are redesigned so as to concentrate dwellings in locations with easy access to public transport.

Most state planning authorities are now pursuing compact city policies. The urgency for doing so partly reflects the planning ideology just described, but also the constraints the planners are encountering in providing for the extension of the suburban frontier. One of these is that all governments face diseconomies of scale in providing for suburban expansion. This applies to the provision of water, sewerage, trunk and arterial roads and urban services. The resort to expensive desalination plants to provide for additional urban water is an example. As a consequence, the prospect of more intensive use of existing infrastructure in the established urban area is a compelling argument for consolidation.

There are also constraints on the availability of land suitable for new suburban housing. In the case of south east Queensland, there are limits to further expansion along the coast. In Sydney, geographical barriers, notably the Nepean/Hawkesbury Rivers and the Blue Mountains have for some years constrained the further spread of the city. Suburban encroachment on fertile farming land is also a frequent source of concern.<sup>42</sup>

Compact city policies may well be a necessary response to the task of accommodating rapidly growing urban populations. It is questionable, however, whether compact city policies will be sustainable in the sense that they will satisfy the lifestyle concerns evident during the recent election.

## Implications of compact city policies

### Congestion

All Australian metropolises are characterised by a dispersed pattern of jobs. In Melbourne, for example, only 19 per cent of jobs are located within the Melbourne local government area (LGA). Most of those employed in these jobs use the radial public transport system for journeys to work. However, almost all of the other 81 per cent of residents who work in jobs outside the Melbourne LGA, use their car for work trips. This helps explain why public transport use in Melbourne is so low, even for those suburban residents who are well served by public transport. In Melbourne in 2006, only 16.8 per cent of those who lived within 500 metres of a tram stop and 11.8 per cent of those who lived within 500 metres of a train stop

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42. Senate Select Committee on Agricultural and Related Industries, *op. cit.*, 2010, pp 10–11.

used the tram or train for journeys to work.<sup>43</sup> This dispersed job pattern is the main explanation why nearly 80 per cent of journeys to work for residents in Brisbane and Melbourne are by private car and 70 per cent of journeys to work in Sydney are by private car.<sup>44</sup>

It is hard to see any rapid change in this dispersed pattern of employment (and thus car use), especially given that in all Australia's big cities, state governments have provided land for industrial and business employment purposes on their suburban frontiers.

There is also no necessary relationship between the compact city policies described further below and additional use of public transport. The most likely outcome of these policies will be an expansion in infill, as detached houses are replaced with units or town houses. Infill tends to be scattered, reflecting the opportunistic activities of small developers or builders, as they purchase whatever houses are available. Such dwellings are often distant from public transport nodes.<sup>45</sup> As a result most of the new residents are no more likely to use public transport than the existing residents. The result is more cars on already congested local, arterial and freeway roads.

### The vexations of consolidation

The conflict between the traditional life style aspirations of ordinary Australians and compact city policy is likely to intensify. The outcome is most evident in Sydney. Limited land release in Sydney has meant that the number of new suburban lots produced is now well below that in Melbourne or south east Queensland. Partly for this reason, as well as the high upfront infrastructure charges noted above, the costs of a detached house and land are well beyond the resources of most aspiring first home buyers. Nearly two thirds of the new houses built in Sydney over the past decade have been units or apartments.

A similar pattern is emerging in south east Queensland. The 2009 South East Queensland Regional Plan proposes quite radical measures to encourage consolidation, at least in the context of Queensland development history. For the 2006–2031 period it proposes that of the additional 754 000 dwellings projected to be required in south east Queensland, nearly half will be in the form of infill or redevelopment in existing urban areas. The Government will set targets for local government areas so as to ensure that this goal is achieved.<sup>46</sup> The Plan also seeks to achieve a minimum dwelling yield of 15 dwellings per hectare for new

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43. D McCloskey, B Birrell and R Yip, 'Making public transport work in Melbourne', *People and Place*, vol. 17, no. 3, 2009, p. 53.

44. Infrastructure Australia, op cit, p. 106.

45. T Phan, J Peterson and S Chandra, 'Urban infill: extent and implications in the City of Monash', *People and Place*, vol. 16, no. 4, 2008, pp. 27–28.

46. Queensland Government, *South east Queensland regional plan, 2009–2031*, 2009, p. 91, viewed 11 October 2010, <http://www.dip.qld.gov.au/resources/plan/SEQ/regional-plan-2009/seq-regional-plan-2009.pdf>

residential developments within the development zone. By the time land needed for public open space and roadways is excluded this means very small lots of around 450 square metres (or about an eighth of an acre).

The Victorian Government legislated a compact city planning strategy in 2002 with its Melbourne 2030 planning scheme.<sup>47</sup> The objective was to reduce the share of new housing located on the urban frontier to around 42 per cent. So far, the urban growth boundary included within the planning scheme has not had much impact because the state government has since extended the boundary by thousands of hectares. Partly as a result, just over half the growth in household numbers in Melbourne in recent years has occurred in outer suburban areas. Nonetheless competition for access to established housing has increased with the growth of Melbourne's population, as have housing prices. Some of this demand has been met by high density development in designated areas like Docklands. But most, as noted, has been in the form of infill scattered throughout suburbia. As is planned for south east Queensland, the Victorian Government (like its New South Wales counterpart) requires local governments to ensure that their local plans provide for their share of the projected growth of households for Melbourne and Sydney.

#### Lifestyle implications

There is not much doubt that these planning responses reflect the pressures on state governments to accommodate extra people and indeed that they may be necessary on cost and environmental grounds.

But compact city outcomes are confronting for communities which value an ample detached house suburban lifestyle. Infill in established areas is a constant bone of contention because as established houses are demolished and replaced by units, the streetscape changes radically. It is not just the loss of the built heritage. Infill means the loss of canopy trees and shrubs and an increase in the share of space taken up by impermeable surfaces. Those occupying the extra units bring their cars with them, some to be 'garaged' on the streets, others to add to the congestion people experience getting in and out of suburban streets because of the extra cars and the narrowing of road access due to more parked cars.

The loss of the tree and shrub canopy in established suburbia is serious because it tends to result in a decline in biodiversity, the loss of the cooling effect of canopy trees and shrubs and the increased run-off of water because of more impermeable surfaces.<sup>48</sup> For example, studies completed in Brisbane found that residential tree cover in established areas cooled surface temperatures by up to five degrees Celsius.<sup>49</sup> Newer suburban areas can never recreate the

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47. State of Victoria, *Melbourne 2030; Planning for sustainable growth*, 2002

48. T Hall, 'Residential density, layout and design: the unmet sustainability challenges', in B Gleeson and W Steele, (eds) *A climate for growth*, University of Queensland Press, 2010, pp. 167–184.

49. *Ibid.*, p. 172.

greenery of established suburbia because if block sizes reduce to 450 square metres or less there is not the space to plant canopy trees or shrubs.

Other vexations arise from the increased competition for amenity, whether for access to public parks, sporting facilities or other civic facilities. These are rarely increased in size with the extra population.

## **Conclusions**

The question raised at the beginning of this paper was whether the life style aspirations of Australians are compatible with a sustainable natural environment should Australia's population reach the 35.9 million figure projected under the Big Australia scenario.

The material reviewed in this paper suggests that the answer is no. An extra 14 million Australian residents living (like the other 22 million) at near double the current real per capita income level by 2050 will put an immense strain on Australia's environment. In the case of greenhouse emissions it will require very tough mitigation measures just to keep emission levels at their current level, let alone achieve the 60 per cent reduction on year 2000 level target of the Labor Government.

It is equally unlikely that the traditional Australian house and garden lifestyle can be maintained. The environment stresses and costs of accommodating a land extensive settlement pattern for capital cities likely to grow by at least 50 per cent by 2050 will ensure that political leaders and planners continue to embrace urban consolidation policies. In these circumstances the vexations that triggered the lifestyle debate during the 2010 election will continue to simmer. Dealing with these issues will remain a major political issue.

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