

## A CRITICAL COMMENTARY ON THE *FUTURE DILEMMAS* REPORT, CSIRO, MAY, 2002

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*The author argues that the recent Future Dilemmas Report neglects to take account of rising levels of per capita consumption. This means that while its factual material is valuable, its conclusions about the sustainability of future populations of different sizes are misleading.*

This Report by the Resource Futures group within Commonwealth Scientific and Industrial Research Organisation (CSIRO) considers the implications of three population scenarios for Australia: a slight population reduction, growth to 25 million in 2050 and growth to 32 million in 2050 (50 million by 2100). The second or 'base case' represents continuation of the present trajectory and policies.

The very important contribution made by the Report is in focusing the discussion of Australia's situation, future and policy options on the crucial considerations, viz. our physical and ecological resources, as distinct from the monetary factors which often lead conventional economists to put forward mistaken analyses of issues to do with sustainability. The Report provides a great deal of valuable information and the following discussion questions little of its factual content.

The problems lie mostly at the level of interpretation and especially of impressions given or enabled. For example an article in the *Sydney Morning Herald* took the Report as establishing that an Australian population of 50 million would be a reasonable goal. This is not surprising given, for example, the following statements in the Report:

...all three scenarios were found to be physically feasible.<sup>1</sup>

...the high, medium and low

population scenarios tested in this study are physically feasible out to 2050 and beyond.<sup>2</sup>

Under all population scenarios, this study has confirmed that, barring unforeseen catastrophes, Australia has enough land, water and energy to provide food and a moderate lifestyle for all its citizens out until 2100.<sup>3</sup>

The Report's own data show that even the lowest of the three population scenarios explored cannot be achieved without generating resource and ecological problems that are at least extremely serious, and some of which appear to be impossible to solve. In other words *the Report's interpretations are at best quite misleading in understating the magnitude and difficulty of the problems generated by commitment to affluent consumer society*. The Report enables the impression that we can and should go on pursuing the business as usual of increasingly affluent living standards and economic growth. At the very least a report of this kind should oblige its readers to consider the 'limits to growth' possibility which many students of the global predicament have come to in recent decades, viz. that an affluent Australian society of 19 million is already grossly unsustainable and that a sustainable and just world cannot be achieved without dramatic reductions in present rich world per capita consumption, and therefore without extreme change in lifestyles, patterns of

settlement and values, and change to an economy that is not driven by market forces or profit and in which there is no growth. It is of course not surprising that the Report has not dealt with such a possibility, given the fierce opposition that any challenge to the dominant commitment to affluence and growth provokes. The Report's timidity is understandable as it has already ventured so far from conventional analyses of the economy solely in monetary terms.

**THE MAGNITUDE OF THE OVERALL PROBLEM IS CONSIDERABLY UNDERESTIMATED.**

The Report is to the Department of Immigration and Multicultural Affairs and is therefore understandably focused on population. However the major fault in the Report is that attending primarily to increase in population gives a seriously misleading impression of the future consequences of pursuing economic growth and affluence. As Paul Ehrlich stressed long ago, resource and ecological impact (I) is a function of population (P) multiplied by affluence (A) multiplied by technology (T). By far the most important factor in this IPAT equation is affluence. World population is not likely to multiply by more than 1.5 before it stabilises. However, if rich world economic output were to continue to grow at 3.7 per cent p.a., which has been the Australian average for approximately a decade then, by 2050, it will have multiplied by about eight, and will double approximately every 20 years thereafter. Thus the fundamental questions that should preoccupy inquirers concerned with sustainability are to do with the implications of economic growth, not population growth. Twice as many people on current living standards will probably consume only about twice as much, but on the living

standards they will have in 2050 in a growth economy they will consume far more.

In deflated/real terms the rate of economic growth per capita in Australia over the past decade has been in the region of 2.3 per cent.<sup>4</sup> With population growing at around one per cent p.a., the real GDP growth rate has been 3.3 per cent p. a. At this rate the total volume of producing and consuming taking place in 2050 will be about five times the present volume.

In general, resource use probably increases at a slower rate than the rate of economic growth but, as the Report notes, various analysts have emphasised the close general relation between economic growth and energy use, and between income and energy use. The Report's Figure 5.14 shows that as economic growth rises energy use increases with no sign of tapering or approaching a ceiling. Many resource-intensive activities show very high rates of increase. International travel from Australia is increasing at 4.5 per cent p.a.<sup>5</sup> Non-commodity freight shows a similar trend. OECD car ownership has grown by 4.2 per cent p.a. for 20 years.<sup>6</sup> World water use is increasing at 2.5 times the rate of population increase.<sup>7</sup>

ABARE's *Energy Outlook 2000* shows that the average annual rate of growth in energy use in Australia over the decade of the 1990s was around 2.5 per cent p. a. The implication of these figures is very significant. If this rate of increase were to continue to 2050 annual energy use would be about 4.5 times as great as it is now.

The Report frequently analyses the present rate of consumption of a particular resource and concludes that, if population were to increase to 25 million by 2050 or to 32 million, the annual volume of consumption of the resource would

multiply by a factor of about 1.5 to 2. This gives the distinct impression that the general resource and ecological problem set by a population of 32 million by 2050 is to provide or cope with aggregate levels of production and consumption and ecological impact that are only up to twice their present levels, *when the actual multiples will probably be more than four times the present levels, and doubling every 19 years thereafter.*

At a number of points the Report deals tangentially with the key mechanism operating here, sometimes referred to as the Jevons paradox or the 'rebound effect'. It is well known that when more efficient technologies are introduced, resource and ecological impacts sometimes intensify, because the reduced costs prompt people to increase their consumption of the item, or to spend the saved income on something else. This is understandable because people recognise that they can now acquire more benefit for each dollar spent than previously. The Report refers<sup>8</sup> to an instance where individual income increased by a factor of three and individual energy consumption increased by a factor of around four.

It is misleading to identify this as a paradox. What we are dealing with here is the central characteristic of our economy, that is, economic growth. If the Australian economy goes on growing at 3.7 per cent p.a. then, by definition, people will go on increasing their consumption of goods and services at 3.7 per cent p.a. and if, after 50 years they are only buying twice as much food because there are only twice as many people, they *will be buying much more than twice as much of many other things.*

To some slight extent the Report includes this effect, for instance when it assumes that the tendency for the average house size to increase with affluence will

continue (for a time). However it also shows that housing expenditure varies greatly with income. The amount of consumption with respect to housing in 2050 is therefore best estimated not in terms of the increased number of people, but in terms of the increase in the average income that will have occurred by then, along with how much housing people on that increased income consume today.

In other words the resource and ecological problems Australia will have to deal with if it remains committed to the 'base case' consumer-capitalist path will probably be more than twice as great as the Report makes them appear. Obviously the multiple is greater still for the high population growth scenario. If a 2.3 per cent p.a. increase in real per capita GDP is combined with a 1.7 per cent p.a. rate of population growth then, by 2070, Australia's real GDP will be 16 *times* as great as it is now, and the general resource and ecological problems set will have become far greater than the Report envisages. The energy task for an Australia of 32 million people in 2050, each on the increased amount of energy use resulting from continuation of the recent trend, would be to provide around 19,000 petajoules (PJ), compared with the present 4800 PJ and the 7000 PJ the Report sets as the base case task for 2050 (that is, present consumption multiplied by 32/19 for population growth and by around 2.3 for growth in energy use per capita).

#### **DOES THE REPORT END BEFORE THE PROBLEMS REALLY BEGIN?**

It could be argued that the Report deals only with the few decades in which Australia is likely to live well by using up the last of its mineral and energy resource capital. It notes<sup>9</sup> that in 50 years there will probably be few if any minerals left

to export, or petroleum or gas, and land degradation might by then have seriously reduced our capacity to export agricultural produce. Meanwhile we will have added people, who will have increased the need to import but who will make little contribution to our capacity to earn export income. This is because export income comes mostly from mining and agriculture which employ few workers. We will also have built much bigger cities with proportionately more difficult problems of air pollution, congestion and so on, in turn multiplying infrastructure and resource demands.

The Report notes this general possibility of great difficulties arising after 2050 but does not portray these as alarming, mainly because it reinforces the impression that technical advance and the development of renewable energy can solve the problems. (These points are discussed below.)

#### **HOW MANY AUSTRALIANS COULD AN ECOLOGICALLY DEFENSIBLE EXPORT STRATEGY SUPPORT?**

Australia is highly dependent on export earnings, especially as globalisation has reduced our manufacturing self-sufficiency, and generated a huge debt and consequent constant outflow of funds. We use the export earnings to pay for a large volume of imports and without this our 'living standards' would be much lower. Physical items make up 75 per cent of our exports.<sup>10</sup>

How many imports could we pay for if our exports were not so ecologically problematic? Our biggest earner is coal. How much of that would we export in a world that did not generate a greenhouse problem? We export much gas, and this is often cast as ecologically desirable since gas releases less carbon per unit of useful energy, but that should not detract from

the fact that gas use is a major contributor to the greenhouse problem.

We export large quantities of minerals, which are high in embodied energy and therefore are significant greenhouse gas contributors. Our main agricultural exports, wool, wheat, beef and forest products, are produced in ways that are seriously damaging and depleting fragile ecosystems. We are degrading and selling off our ecological capital in order to achieve annual export income via these commodities. How much wool, wheat, beef and timber would we produce if we operated in ways that were perfectly sustainable — let alone if we were to take previously damaged land out of production in order to repair it?

Note also that at present we are accumulating a disturbing debt on our negative balance of trade; that is, we are not exporting enough to pay for what we import. In other words if we were paying fully for what we consume we would have to export even more. This means that the real ecological cost of the living standards we have been enjoying is higher than it seems, because we have been accumulating costs without paying them.

Again these considerations reveal the very worrying nature of our situation with respect to the ecological significance of our exports and the Report does not arouse appropriate concern about this.

#### **A GLOBAL VIEW MUST BE TAKEN**

It is misleading to analyse Australia's situation and prospects primarily in terms of Australia's resources and internal trends. Australia's fate will depend on what happens in the increasingly integrated global economy. The most disturbing prospect in the global economy is the possibility that petroleum supply is within a decade of peaking. Campbell<sup>11</sup> is

one of a number of petroleum geologists whose estimates indicate that by 2025 world supply will in effect be only around 1/15 of the volume that would be required to provide the world's population then with the present Australian per capita petroleum consumption. If the predictions of this group are borne out the world is in for literally catastrophic consequences, given the extreme dependence on liquid fuels. For instance the pumping of fossil ground water, largely using liquid fuels, enables agriculture to produce far more than would be possible using the rainfall budget; in fact without this source of water the world could feed 480 million fewer people than it feeds today.

A petroleum supply crisis would greatly accelerate the use of gas, which is also being turned to for power generation, leading some to fear that an electricity crisis will actually precede a liquid fuel crisis. In a very competitive global market dominated by a few Arabian nations not politically well disposed to Australia it would not be at all certain that Australia could secure adequate petroleum imports, nor that we could simply boost gas use to replace petroleum as the Report assumes. Yet the Report's model assumed that: 'When domestic oil and gas stocks started to become constrained in Australia, the additional requirements were sources from international trade...' <sup>12</sup> Pressure to export gas to an eager global market is likely to increase greatly, especially if greenhouse considerations and restoration of damaged land reduce export earning capacity from coal and agricultural produce.

Thus the Report does not portray well the probable seriousness of our situation when the global resource context and especially the petroleum outlook is attended to. It notes the possibility that there will be problems, but in an understated way. For example, the authors say:

Tensions between domestic requirements and domestic production of oil may be evident from 2015 and natural gas production from 2030... <sup>13</sup>

The Report makes the important point that attention must be given to the rising energy cost of producing oil. In the Report, Figure 5.4 shows that this will mean a net energy return for Australian oil production approaching zero after 2020, and for gas after 2030.

Globalisation is forcing all countries to become highly dependent on the one world economy. Any country will only be able to produce the few items it can market more cheaply than anyone else, and will have to earn from this the income needed to import all the items it no longer produces for itself. We are therefore very likely to become much more dependent on our commodity exports, almost all of which are ecologically problematic. In addition, as the Report notes, energy intensive items are likely to come under international pressure, such as carbon sanctions. It also stresses the high, and under-priced, water content of our agricultural commodity exports and this problem is likely to increase as pressure to export increases.

The Report's tendency to give an unduly complacent impression is also due to the fact that it is discussing the situation of perhaps the most fortunate country in the world insofar as resource and ecological conditions are concerned. Australia has almost twice the agricultural and forest land per capita that America has, as well as large mineral and energy resources. Europe is far less well endowed; Japan is quite resource-poor; and much of the Third World is in a desperate situation. In this context an analysis focused on Australia's stocks and flows gives a misleading impression of our situation because that will be

greatly dependent on what happens in the rest of the world which is far less fortunate and much more likely to experience turmoil due to shortages of water, petroleum, food and so on. We should be considering the prospects, not of Australia, but of the rich countries as a whole. For example, although at present Australia has considerable quantities of oil plus gas, if a petroleum crisis occurs on the scale Campbell and others anticipate then rich world economies will be hit hard within two decades. There will be major effects on the suppliers of the many imports we depend on and on the buyers of our exports, not to mention the effects on the global financial house of cards to which we are heavily indebted.

#### **THE GREENHOUSE GAS CLINCHER**

For advocates of the limits to growth perspective the greenhouse problem on its own seems to constitute a sufficient demonstration of the extreme degree of unsustainability of consumer-capitalist society. The Report's figures make this conclusion alarmingly clear, but its summary statements do not emphasise the significance of the point.

For a decade the Inter-Governmental Panel on Climate Change<sup>14</sup> has been stressing that if we were to reduce fossil fuel use to the levels that would keep the global atmospheric carbon concentration below twice the pre-industrial level, total emissions must be kept to nine billion tonnes. If global population reaches nine billion this means the per capita emission limit must be one tonne of carbon dioxide. The *present* Australian per capita emission from fuel burning is *16 tonnes*, and if land clearing is included it is *27 tonnes*! Note that this target of twice the pre-industrial level is alarmingly high and will probably be associated with very serious ecological disruption. To achieve a sustainable situa-

tion far greater reduction in CO<sub>2</sub> emissions would have to be achieved.

The magnitude of multiples such as this, and the consequent implications for the extreme technical, social, economic and cultural changes that are therefore called for, has not begun to sink into mainstream thinking about the predicament we are in. For example, achieving the Kyoto targets will make no significant contribution to solving the problem (although they are important as a symbolic first step).

The Report is valuable in making clear that in all three scenarios Australia's 2050 greenhouse gas emissions increase dramatically, by 67 per cent, 90 per cent and 130 per cent respectively.<sup>15</sup> Note that this conclusion assumes very advanced technological innovations.<sup>16</sup>

For greenhouse reasons alone consumer-capitalist society is grossly and irremediably unsustainable. This conclusion can only be avoided if it can be shown that renewable energy sources, plus technical advance in resource conservation, energy efficiency and so on can enable enormous reductions in the resource and ecological consequences of the present Australian way of life. The Report should therefore have discussed whether these outcomes are likely. The reasons for thinking that they are not are indicated below.

#### **THE 'TECH-FIX' FAITH**

There is a very strong tendency to assume that technical advance can sufficiently reduce resource requirements and ecological impacts to enable high living standards to continue. Hawken, Lovins and Lovins<sup>17</sup> argue that a Factor Four and possibly a Factor Ten reduction in resource and ecological impacts per dollar of output is possible. Thus they reassure us that we can all enjoy increasing 'living standards' and

continued economic growth, while saving the environment. There is no need to threaten affluence, or business turnover. It is not surprising that Lovins is so popular.

It takes little space to show that a technical fix is most unlikely to enable a sustainable and just society that continues to pursue affluence and economic growth. Let us assume that the present environmental impact must be halved (the greenhouse goal should be much lower than that and a rich-world footprint is probably already six times the presently available productive land per capita). The Australian economy is growing at 3.7 per cent p.a. If this growth rate continues to 2050 and if by then all nine billion people have risen to the 'living standards' we would then have, *total world economic output would be about 50 times as great as it is now.*

So if technical advance is to make possible 50 times as much producing and consuming as at present with only half the ecological impact, a factor 100 reduction must be achieved, not factor four, and that twenty years after that it must be factor 200. In other words it is most implausible that technical advance could make it possible for all people to have the 'living standards' we are taking for granted for ourselves in 2050.<sup>18</sup>

#### **THE ROLE OF RENEWABLE ENERGY SOURCES**

The Report does not discuss the difference that renewable energy resources might make to our situation over the coming 50 years. However its comments reinforce the dominant and largely unquestioned assumption that these could replace fossil fuels. At a number of points reference is made to the need for technical progress or technical possibilities without giving any sense that the answers might not be forthcoming. The possibility that

renewable energy cannot sustain consumer-capitalist society, and the extremely radical implications of this possibility are not seriously considered (although the issue is noted).<sup>19</sup>

A number of statements give reassurance regarding renewables. For example:

Replacing fossil energy usage to some extent requires a revolution in the technology of supplying energy and a revolution in the manner it is used...<sup>20</sup>

If the plant materials grown were used as feedstock for a transport system based on alcohol fuels...then domestic transport fuels could be supplied well into the future...<sup>21</sup>

There are many options to redress the balance such gas, shale oil, liquefaction and gasification of coal, ethanol and methanol from biomass and methyl hydrates from the sea floor.<sup>22</sup>

The production of ethanol and methanol from biomass offers the possibility of a largely carbon neutral production system.<sup>23</sup>

In the 50 year time frame, alternatives to cheap oil pose large, though not insurmountable challenges of transition.<sup>24</sup>

More importantly reference is made to a discussion by Foran and Mardon<sup>25</sup> of various ways in which 17-31 million hectares (ha) could '...power an economy which uses methanol and ethanol from biomass for transport fuels, and distributed electricity plants fuelled by gasified wood'. However, if 31 million ha yield four tonnes of biomass per ha (the approximate Australian fodder production rate), and if one third of the energy in this input material ends up in the liquid fuel, then the 31 million ha will yield 654 PJ (from which must be subtracted the energy used in the process). However the Report says transport alone is using 1202PJ.<sup>26</sup> This gives some indication of the magnitude by which renewable energy resources will probably fall short.<sup>27</sup>

## HENCE THE IMPORTANCE OF THE BASIC 'LIMITS TO GROWTH' ANALYSIS

The foregoing considerations indicate the weight of the 'limits to growth' perspective on the global predicament. Rich world ways are grossly unsustainable and it is not possible for all people to live in anything like the way we few in rich countries live today, let alone the way we would live if our commitment to increasing living standards and to economic growth continues. The Report's main failing is that it has not portrayed the significance of the limits to growth case. It has therefore significantly underestimated the seriousness of our situation and, as a result, it has reinforced complacency regarding the viability of business as usual.

Advocates of The Simpler Way argue that there can be no solution other than through an eventual transition to much less affluent living standards in highly self-sufficient and cooperative local economies that are not driven by market forces, profit or growth. Therefore there must be a transition to a very different culture, in which little value is put on competition, individualism and acquisitiveness.

It goes without saying that our chances of making such vast, unprecedented and

radical change are very poor. In Toynbee's terms, our culture gives little evidence that it has the wit or the will to respond to the challenges we face.

Nevertheless there is now a Global Alternative Society Movement in which many small groups are working to build examples of The Simpler Way. This is most evident in the more than 2000 eco-villages now estimated to be functioning throughout the world. The best hope for transition seems to lie mostly in the possibility that in coming years this movement will generate sufficiently impressive examples to show people in the mainstream that there are workable and satisfying alternatives to the increasingly problematic consumer-capitalist way.

Few institutions have a greater opportunity and responsibility to focus public attention on these themes than the CSIRO. It is to be hoped that in future its work will entail greater effort to get these core theme to do with over-consumption, limits and The Simpler Way onto the public agenda

### Note:

For detailed documentation and analyses on the themes dealt with in this paper, see <http://www.arts.unsw.edu.au/tsw/>

## References

- <sup>1</sup> B. Foran, and F. Poldy, *Future Dilemmas: Options to 2050 for Australia's Population, Technology, Resources and Environment*, CSIRO Resource Futures, Canberra, 2002, Introduction. <<http://www.cse.csiro.au/research/Program5/futuredilemmas/#fd>>
- <sup>2</sup> *ibid.*, Chapter 7, p. 29
- <sup>3</sup> *ibid.*, Chapter 7, p. 31
- <sup>4</sup> C. Hamilton, H. Turton, H. J. Ma, H. Sadler, *Long-Term Greenhouse Gas Scenarios*, Australia Institute, Discussion Paper 48, 2002, p. 10
- <sup>5</sup> Foran and Poldy, *op.cit.*, Chapter 2, p. 21
- <sup>6</sup> *ibid.*, Chapter 3, p. 15
- <sup>7</sup> *ibid.*, Chapter 6, p. 22
- <sup>8</sup> *ibid.*, Chapter 5, pp. 22, 23
- <sup>9</sup> *ibid.*, Chapter 4, p. 11
- <sup>10</sup> *ibid.*, Chapter 7, p. 6

- <sup>11</sup> J. Campbell, *The Coming Oil Crisis*, Brentwood, Multiscience and Petroconsultants, England, 1997
- <sup>12</sup> Foran and Poldy, op. cit., Chapter 5, p. 6
- <sup>13</sup> *ibid.*, Chapter 4, p. 1
- <sup>14</sup> Intergovernmental Panel on Climate Change, *Climate Change 2001: Impacts, Adaptations and Vulnerability*, Report of Working Group II, Geneva, Switzerland, February, 2001
- <sup>15</sup> Foran and Poldy, op. cit., Chapter 5, p. 13
- <sup>16</sup> *ibid.*, Chapter 7, p. 16
- <sup>17</sup> P. Hawken, A. B. Lovins, and H. Lovins, *Natural Capital*, Little Brown, London, 1999
- <sup>18</sup> For a detailed critique of *Natural Capitalism*, see F. E. (T.) Trainer, 'Natural capitalism cannot overcome resource limits', *Environment, Development, Sustainability*, in press.
- <sup>19</sup> See Foran and Poldy, op. cit., Chapter 5, p. 19.
- <sup>20</sup> *ibid.*, Chapter 2, p. 17
- <sup>21</sup> *ibid.*, Chapter 7, p. 21
- <sup>22</sup> *ibid.*, Chapter 7, p. 9
- <sup>23</sup> *ibid.*, Chapter 5, p. 27
- <sup>24</sup> *ibid.*, Chapter 7, p. 32
- <sup>25</sup> B. Foran, and C. Mardon, *Beyond 2025: Transitions to the biomass-alcohol economy using ethanol and methanol*, CSIRO Resource Futures Program, Canberra, 1999
- <sup>26</sup> Foran and Poldy, op.cit., Chapter 5, p. 4
- <sup>27</sup> For a detailed account see F. E. (T.) Trainer, 'Can solar sources meet Australia's electricity and liquid fuel demand?', *The International Journal of Global Energy Issues*, in press