Unpacking aviation futures: An ecological perspective on consumption, sustainability and air transport

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Thanks to the people who agreed to interviews for the case study of Canberra airport and for the useful insights obtained as a result.

Lastly, I wish to thank my parents for their ongoing support for my endeavours.
Statement of authentication

The work presented in this thesis is, to the best of my knowledge and belief, original except as acknowledged in the text. I hereby declare that I have not submitted this material, either in full or in part, for a degree at this or any other institution.
**Claims to originality**

This research is original in its cross-disciplinary approach to the study of the future of air transport, especially in the context of sustainable consumption. For example, the question of tourism futures is one of the related consumption issues addressed.

It applies a critical futures research method, namely causal layered analysis, to the research topic, as well as presenting a broad scheme of policy measures for restructuring and redesigning aviation and air travel. In addition, it provides a critique of these measures within “consciousness” and “frameworks” approaches for the transition to sustainability.

It therefore adds to the emerging literature critiquing air transport within a broad sustainability framework, in contrast with the predominant economic bias in academic studies of air transport.

At the more specific local level, it also provides a case study of the privatisation and expansion of Canberra airport in the Australian Capital Territory. This particular sub-study identifies a range of issues specific to this particular case, but with broader relevance for aviation futures as well.

The following publications have been produced in conjunction with the PhD research work:


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<thead>
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<th>Description</th>
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<tbody>
<tr>
<td>ACT</td>
<td>Australian Capital Territory</td>
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<tr>
<td>AEF</td>
<td>Aviation Environment Federation</td>
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<tr>
<td>ATM</td>
<td>air traffic management</td>
</tr>
<tr>
<td>ANEF</td>
<td>Australian Noise Exposure Forecast</td>
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<tr>
<td>BAU</td>
<td>business as usual</td>
</tr>
<tr>
<td>BTRE</td>
<td>Bureau of Transport and Regional Economics (Australia)</td>
</tr>
<tr>
<td>CCP</td>
<td>Cities for Climate Protection (campaign)</td>
</tr>
<tr>
<td>CFCs</td>
<td>chlorofluorocarbons</td>
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<tr>
<td>CIA</td>
<td>Canberra International Airport</td>
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<td>CLA</td>
<td>Causal Layered Analysis</td>
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<tr>
<td>CNS</td>
<td>communications, navigation and surveillance</td>
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<tr>
<td>CO₂</td>
<td>carbon dioxide</td>
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<tr>
<td>CO₂-e</td>
<td>carbon dioxide equivalent emissions (includes effects of emissions of carbon dioxide, methane and nitrous oxide)</td>
</tr>
<tr>
<td>CSIRO</td>
<td>Commonwealth Scientific and Industrial Research Organisation (Australia)</td>
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<tr>
<td>CST</td>
<td>Centre for Sustainable Transportation (Canada)</td>
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<tr>
<td>dB(A)</td>
<td>decibel noise unit (weighted with an “A” filter to account for human hearing characteristics)</td>
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<tr>
<td>DEP</td>
<td>deep ecology platform</td>
</tr>
<tr>
<td>DOTARS</td>
<td>Commonwealth Department of Transport and Regional Services (Australia)</td>
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<tr>
<td>DTI</td>
<td>Department of Trade and Industry (UK)</td>
</tr>
<tr>
<td>EDF</td>
<td>Environmental Defense Fund</td>
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<tr>
<td>ESR</td>
<td>efficiency-substitution-redesign</td>
</tr>
<tr>
<td>EST</td>
<td>Environmentally Sustainable Transport (OECD program)</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>FAA</td>
<td>Federal Aviation Administration (USA)</td>
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<tr>
<td>FESG</td>
<td>Forecasting and Economic Analysis Sub-Group</td>
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<tr>
<td>G8</td>
<td>Group of eight leading industrialised nations</td>
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<td>GAP</td>
<td>Global Action Plan</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>GBP</td>
<td>British pounds sterling</td>
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<tr>
<td>GDP</td>
<td>gross domestic product</td>
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<td>GED</td>
<td>Grassland Earless Dragon</td>
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<tr>
<td>GHG</td>
<td>greenhouse gas</td>
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<tr>
<td>GNP</td>
<td>gross national product</td>
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<tr>
<td>IATA</td>
<td>International Air Transport Association</td>
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<td>ICAO</td>
<td>International Civil Aviation Organization</td>
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<td>IEA</td>
<td>International Energy Agency</td>
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<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
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<td>IT</td>
<td>information technology</td>
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<tr>
<td>LCA</td>
<td>life-cycle assessment</td>
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<tr>
<td>MLA</td>
<td>Member of the Legislative Assembly (of the ACT)</td>
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<tr>
<td>NAA</td>
<td>noise abatement areas</td>
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<tr>
<td>NASA</td>
<td>National Aeronautics and Space Administration</td>
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<td>NCA</td>
<td>National Capital Authority</td>
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<td>NCCC</td>
<td>North Canberra Community Council</td>
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<td>NFPMS</td>
<td>noise and flight path monitoring system</td>
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<td>NGO</td>
<td>non-governmental organisation</td>
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<td>NOx</td>
<td>nitrogen oxides</td>
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<td>NSW</td>
<td>New South Wales</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Cooperation and Development</td>
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<tr>
<td>OPEC</td>
<td>Organisation of Petroleum Exporting Countries</td>
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<tr>
<td>ppmv</td>
<td>parts per million by volume</td>
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<tr>
<td>PSR</td>
<td>pressure-state-response</td>
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<tr>
<td>R&amp;D</td>
<td>research and development</td>
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<tr>
<td>RCEP</td>
<td>Royal Commission on Environmental Pollution (UK)</td>
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<td>RFI</td>
<td>Radiative Forcing Index</td>
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<tr>
<td>RPKs</td>
<td>revenue passenger kilometres</td>
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<tr>
<td>RR</td>
<td>radical restructuring</td>
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<tr>
<td>SARS</td>
<td>Severe Acute Respiratory Syndrome</td>
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<tr>
<td>SAS</td>
<td>Scandinavian Airlines System</td>
</tr>
<tr>
<td>T&amp; E</td>
<td>European Federation for Transport and Environment</td>
</tr>
<tr>
<td>TFC</td>
<td>Tourism Forecasting Council (Australia)</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
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</tbody>
</table>
UN  United Nations
USA  United States of America
UV  ultraviolet radiation
VAT  value added tax
Vic.  Victoria
WHO  World Health Organization
WTO  World Tourism Organization
WTTC  World Travel and Tourism Council
WWF  conservation organisation formerly known as World Wildlife Fund and World Wide Fund for Nature

Note: Generally Australian usage for spelling is followed as in The Australian Oxford Dictionary. For example, organisation is spelt with an “s”. However, the full name of an organisation is spelt as the organisation itself spells it, as in World Health Organization (not World Health Organisation) or Environmental Defense Fund (not Environmental Defence Fund) (Australian Government, 2002, p. 80).
Abstract

This inquiry examines aviation futures, within the broad context of sustainable consumption and ecological sustainability. Increasing mobility and rapid growth of road and air transport have been identified as key consumption issues, especially in relation to calls for “deep cuts” in greenhouse gas emissions.

Economics and globalisation concerns have dominated recent academic studies of air transport. There is a growing critique, however, of growth-based aviation futures on a range of ecological, resource, security and health grounds. This inquiry adds to that critique. Its primary research aim is to identify and articulate visions and policies for aviation futures within an ecological framework. Associated aims include investigating the extent to which the projected growth of aviation travel is unsustainable (both globally and locally), and articulating visions for sustainable aviation 20 to 30 years on. Policy implications and their implementation are also examined.

Analysis of relevant literatures, including those on sustainable consumption, transport and tourism, is complemented by an analysis of aviation and tourism growth trends worldwide, with specific reference to Asia-Pacific and Australian data.

Causal layered analysis, a critical futures research method, is used to “question the future” by identifying a range of possible future scenarios as alternatives to the prevailing “growth forever” aviation scenario. This method is used to unpack the worldviews and discourses underpinning each scenario, exposing their underlying myths and metaphors.

A pragmatic critical policy analysis is also undertaken. Where possible, long-term thinking and foresight are emphasised in framing policy measures. Such measures vary from the broad “redesign” of the aviation and tourism industries through to encouraging changes in people’s individual travel behaviour.

In addition, a case study of the privatisation and expansion of Canberra International Airport in the Australian Capital Territory is used to provide a global-local link and to
address the airport aspects of aviation. It focuses on understanding community perceptions of environmental degradation, especially those linked to aircraft noise. It also investigates how community groups working on these issues can effect change to protect quality of life, as well as the associated difficulties involved.

The range of visions and policy measures are finally considered within broad "consciousness" and "frameworks" strategies for the transition to sustainability. Theoretically, a broad range of policy measures implemented at various political levels, with demand management integral to the overall framework, is most likely to be successful in moving towards aviation futures compatible with ecological sustainability. However, the application of ecological frameworks is prevented by the dominant policy discourse of economic growth and the "predict and provide" approach to transport planning. An important conclusion is the strong need for independent institutions such as policy bodies and "think tanks"—working in conjunction with community groups—to develop and promote policy discourses and futures visions that challenge the prevailing hegemony of the business-political nexus.
CHAPTER 1
FRAMING THE INQUIRY

Notions of “objective” and “value free” knowledge … serve to obscure the political and ideological dimensions of futures problems (Slaughter, 1999, p. 209).

If we had it to do all over again, we would make values … a part of the basic foundational philosophical dimensions of paradigm proposal (Lincoln & Guba, 2000, p. 169).

Context for this research

This thesis addresses the nexus between sustainable consumption and aviation futures. The United Nations Agenda 21 identified the unsustainable pattern of consumption and production, particularly in industrialised countries, as a major cause of the continued deterioration of the global environment (United Nations, 1993). Further, the Organisation for Economic Cooperation and Development (OECD) (2001) highlighted various urgent “red light” areas of consumption in an “environmental outlook” report designed to analyse likely environmental changes in the period to the year 2020. Climate change as a result of greenhouse gas emissions is identified as one of the most important “red light” issues, with energy use and transport named as prime contributors to greenhouse gas emissions.

The “red light” metaphor used in the report, in contrast with issues classified as “green light” and “yellow light”, is used for environmental issues where recent trends have been negative and are expected to continue to be so. Urgent attention by OECD countries to “red light” issues is therefore recommended. Other substantial reports from the Intergovernmental Panel on Climate Change also consistently underline the issues of increasing mobility and transport activity, and the rapid growth in the associated energy
consumption and greenhouse gas emissions (Moomaw & Moreira, 2001; Moreno & Skea, 1996).

More broadly, the Third Assessment Report of the Intergovernmental Panel on Climate Change (2001) emphasises the gravity and reality of global climate change, citing new and stronger evidence that most of the warming observed over the past 50 years is attributable to human activities. This is reflected in reports from other mainstream scientific bodies such as the World Meteorological Organization, CSIRO and the Australian National University Centre for Epidemiology and Population Health, warning of more extreme weather conditions and events and adverse consequences for human health (Baker, Austin, Barnett, Kearns, & Shugart, 2000; CSIRO, 2001; McMichael et al., 2003; World Meteorological Organization, 2003). Regular reports on climate change also appear in newspapers, emphasising current and future dystopic images such as heat waves (Keaten, 2003), floods ("Europe counts cost of record river heights," 2002), mass species extinctions (Connor, 2004), the melting of glaciers and ice on a large scale (Connor, 2003; "Water warning as glaciers melt," 2003) and the submersion of islands as a result of sea level rise (Arthur, 2004). In addition, some recent reports have raised the possibility of rapid rather than gradual climate change, with one report prepared for the Pentagon in the USA citing the issue as a national security concern (Stipp, 2004).

Although road transport still dominates transport systems, air transport is the fastest growing mode of transport. Such trends contrast markedly with calls for “deep cuts” in greenhouse gas emissions in order to avoid likely large-scale disruptions to climate. The Royal Commission on Environmental Pollution (2000b, p. 57) in the UK, for example, recommends that the UK reduce its carbon dioxide emissions by 60% from current levels by 2050.

Air travel has grown almost 100-fold since 1950, at an average annual rate of 9%. It is predicted to grow substantially in the decades ahead, at a rate of 4 to 5% per annum (International Civil Aviation Organization, 2001b). In countries such as China, growth is expected at 7.6% per annum, with globalisation considered a major driver of China’s international travel demand (Boeing Commercial Airplanes, 2002).
Governments and the aviation industry promote this growth, with the overriding justification being an economic one. For example, the further globalisation of tourism is generally accepted as a given, and indisputably good, by the actors just mentioned.

The World Travel and Tourism Council (2003), for instance, argues for a substantial program of aviation infrastructure expansion over the next 20 to 30 years. Similarly, governments generally subscribe to the further liberalisation of air transport and assume that aviation is a significant contributor to regional and national economies (B. Graham & Guyer, 1999).

In contrast, growth-based aviation futures are increasingly contested on a range of grounds. A major contribution was the publication in 1999 of the Intergovernmental Panel on Climate report, *Aviation and the Global Atmosphere* (Penner, Lister, Griggs, Dokken, & McFarland, 1999). It concluded that aviation is responsible for a significant and fast growing percentage of human generated greenhouse gases. Similarly, the Royal Commission on Environmental Pollution in the UK has had a longstanding interest in the environmental impacts of aviation. In its 18th report, *Transport and the Environment*, the commission concluded that “an unquestioning attitude towards future growth in air travel, and an acceptance that the projected demand for additional facilities and services must be met, are incompatible with the aim of sustainable development” (Royal Commission on Environmental Pollution, 1994, para. 5.39, p. 75). Its more recent report, *The Environmental Effects of Civil Aircraft in Flight*, has re-emphasised and strengthened its “deep concern about the global impacts of the rapid growth in air travel” (Royal Commission on Environmental Pollution, 2002a).

In local communities, the consequences of ongoing airport expansion are also being strongly contested. The impacts are likely to be very large. For example, an analysis by some of the UK’s leading environmental non-governmental organisations (NGOs) suggests that if the predicted demand in air travel is met, by 2020, every airport in the UK will be handling double the number of passengers as at present, and triple the number by 2030 (Aviation Environment Federation, 2002). Communities are therefore increasingly concerned with the effects of aircraft noise on people living near airports and under flight paths, and with the deterioration in local air quality.
In addition, there is pressure to open entirely new airports on presently tranquil and greenbelt sites, as with a potential Rugby international airport in the British Midlands. The announcement of this development, with three runways and the capacity to be 20% busier than Heathrow Airport, effectively stalled the property market in the area concerned (Clark, 2002). Subsequently, the UK Government’s White Paper *The Future of Air Transport*, published in December 2003, withdrew government support for this particular proposal. It clearly acknowledges, however, that the prospect of an airport development can blight property values for some time before the development proceeds (Department for Transport, 2003).

Within an ecologically sustainable transport framework, these challenges to growth-based aviation futures raise questions such as (Fawcett, 2000, p. 34): How does aviation rate in terms of its resource use? What values and consumption choices does it encourage people to pursue? Does an adequate framework exist through which to envisage the long-term impacts of aviation on public health and ecological wellbeing?

**Research aims and focus of this study**

The prevailing policy discourse on aviation futures, as generally articulated by governments and the aviation and tourism industries, is one preoccupied with unending growth, apparently largely oblivious of ecological and quality of life constraints (Whitelegg, 2003). In addition, air travel now exists in the popular imagination as “a smooth, seamless everyday component of life” (Fawcett, 2000, p. 37).

In contrast, the primary research aim of this inquiry is to identify and articulate visions and policies for aviation futures in keeping with an ecological framework.

In his work on “breaking mindset” Snyder (1998) argues that people are constrained to look at the world through their mindsets, and are therefore intrinsically prejudiced and blinded by these mindsets. In particular, experts appear to have extreme difficulty in re-examining and questioning the foundations for their beliefs. To be original, he argues that it is necessary to subvert conventional wisdom, which appears to be culturally dependent. Thus the only way to see more is to acquire more mindsets.
A particular focus for my research is to imagine the future in other ways, and to reframe and rethink air transport and travel. This inevitably involves an investigation of how its largely “unquestioned position of growth sits within a sustainability framework”, and “recasting our question to the problem” (Fawcett, 2000, p. 36).

Given the holistic nature of this inquiry, a number of more specific sub-questions arise under the main research aim. These include:

- In what ways are the projected growth and consumption of aviation travel unsustainable—globally and locally?
- What are some visions for sustainable aviation 20 to 30 years on?
- How do the aviation and tourism industries need to be redesigned in order to be significantly more sustainable?
- What policies need to be put in place to curb the growth of air travel, and how can these be encouraged and implemented?
- How can people’s individual travel behaviour be encouraged to move in sustainable directions, particularly with air travel?
- How are “sustainable ways of living” relevant to the future of aviation travel?
- How do sustainable aviation visions and policies demonstrate sustainable consumption practices and patterns?

**Justification for the research**

This research is important for a number of reasons. As outlined above, in recent years significant bodies, such as the Intergovernmental Panel on Climate Change and the Royal Commission on Environmental Pollution in the UK, have conducted studies into the ecological ramifications of unhindered growth in aviation. As a result, strong concerns are being expressed about the emerging trends. For example, the Royal Commission on Environmental Pollution (2003a) estimates that if air travel expansion goes unchecked, aviation will be responsible for about a quarter of the UK’s climate change budget by the year 2020. By 2050, this could have risen to half or even three quarters of the budget. These estimates assume that by 2050, the rest of the economy progressively reduces its carbon dioxide emissions by 60% from current levels, an
agreed target in the UK Government’s energy policy (Royal Commission on Environmental Pollution, 2003b, p. 8).

Aviation vis-à-vis sustainability is a growing field of study in the context of a need for broader initiatives towards sustainable transport (Organisation for Economic Cooperation and Development, 1997d). A recent book on the topic of “sustainable aviation” (Upham, Maughan, Raper, & Thomas, 2003, p. 240) brings together a range of perspectives on the issue, concluding that:

Whatever one sees as priorities for research and action, and whatever one’s understanding of sustainability, there can be no doubt that this field will remain—live and contentious—for many years to come.

On the other hand, Graham (2003, p. 211) notes that recent academic studies of air transport have been dominated by a shared focus on the effects of liberalisation and competition, and the impacts of globalisation. Although the broader debate on transport and social change is increasingly concerned with issues of sustainability, Graham considers that “these broader sustainability issues have had relatively little impact on the academic study of air transport, either in European or North American contexts”. This underlines the need for further work addressing aviation within an ecological context.

Addressing the aviation issue also has important implications for other issues such as consumption. The link between the growth of aviation travel and unsustainable consumption patterns is apparent and worthy of further investigation. Although there is a need to put in place ecologically more benign infrastructures and consumer lifestyles, the trends in the aviation industry, evident in media events and releases, suggest the reverse. For example, the 2003 announcement in Australia by Qantas of its budget airline JetStar is predicated on the basis that the domestic market is strong enough and can grow sufficiently to support three profitable airlines, particularly on leisure-based routes (Rochfort, 2003). A Canberra airport public relations report of a planned major upgrade of its infrastructure, including an extension to the main runway, exhorts people to “run, run, run … away” (Canberra International Airport, 2003b). Further, consumer oriented developments at airports are substantial, with the presence of hotels, offices,
shopping centres and leisure facilities. Non-aeronautical sources of income for airports worldwide are estimated to be about 46% of total airport revenues (Citrinot, 1999, p. 4).

An additional argument for pursuing this research concerns the current and projected costs to the community associated with aviation. Aviation growth has been critiqued on the basis of the costs associated with building considerable extra infrastructure such as airports and additional runways, as well as the hidden costs associated with air pollution around airports, aircraft noise, climate change, the destruction of landscape, wildlife and communities, and the impacts on health and wellbeing. Sewill (2003, p. 18) estimates that, in the UK, GBP9.2 billion (A$22.2 billion) is a measure of the present value of the hidden tax subsidy to the aviation industry. This estimate does not include any separate tax on external costs, with the latter included by way of a fuel tax making up part of his estimate.

Some consider that the direct expenditure on infrastructure alone, predicated on the rapid expansion in aviation activity discussed above, is an unwise investment. For example, the Centre for Sustainable Transportation (2000) in Canada makes such a judgment, based on the likely decline in the supply of conventional oil influencing the availability of low-cost aviation fuel in the coming decades. In their view, the current rate of investment in airport infrastructure will be found to be unjustified. In addition, such investments are considered to be counterproductive in that they pre-empt investments in infrastructure for transportation that is more sustainable. The Royal Commission on Environmental Pollution (2003a, p. 2) concludes similarly that “building new airport capacity at the rate projected would leave the UK with seriously misconceived investment in ‘stranded assets’”.

The research approach I have used further seeks to be original in a theoretical sense by applying a layered futures research method—Causal Layered Analysis (CLA)—to the issue of aviation futures. CLA was developed by Inayatullah (1998a) and aims to create distance from current categories in order to question the future. In doing this it also aims to elicit other scenarios of the future. By unpacking worldviews and discourses, and by paying attention to deeper layers such as that of metaphor, this method can expose blind spots associated with, and fundamentally question current trends and events. Thus it asks “how an issue has been constructed as a trend or issue in the first
place as well as the ‘cost’ of that particular social construction” (p. 817). This method is applied in Chapter 4, and is the subject of a chapter applying it to aviation futures in a forthcoming book on Causal Layered Analysis (May & Hill, in press).

**Personal context**

The personal context for this research comes from a strong interest and involvement in environmental issues over time. I grew up in the seaside town of Southport in Queensland and spent many happy hours surfboard riding after school. At that time the Gold Coast had not been developed to the extent it is today. My memories are of crystal clear waters, with cracking waves and the exhilaration of being picked up and speeding through them. Friendly dolphins sometimes swam nearby, and wonderful sunsets over beautiful beaches provided a great backdrop in which to play and be close to nature. Whether I recognised it as such or not, a love of nature was instilled by such close contact with my environment.

I was also studious, and at school followed a traditional curriculum focusing on arts and sciences, with chemistry probably my favourite subject. At university I completed an Honours degree in organic chemistry, receiving the CSR Chemicals Prize for topping my Honours year. I began a PhD in chemistry, but was increasingly bothered by the prospect of knowing more and more about less and less. In addition, I became increasingly allergic to working in laboratory environments. At the time, the Vietnam War was coming to a close, and chemistry, especially via its more unsavoury connections such as the use of Agent Orange in Vietnam, was losing its attraction. I wanted to find out about social issues and to be more engaged at that level, and headed off to do a Diploma of Education in Tasmania. Although I enjoyed the course, teaching in a reasonably hard-edged high school didn’t fit either.

Consequently I joined the public service in Canberra. My first posting was with the National Estate Committee of Enquiry and this dovetailed well with a burgeoning interest in environmental issues within the community. It was an exciting and idealistic period, involving contact with well-known environmental advocates on the committee such as Judith Wright and Milo Dunphy. Further, it was instructive, by way of exposure to the concerns of a large range of community groups.
Subsequently I spent over 20 years working in the bureaucracy on issues linked to environmental health, environmental education and environmental policy in various contexts. It took a decade or so to learn that changing the system is not easy and that working with it would serve my interests and those of the community more productively. I then put this learning to good use, becoming involved with facilitating a variety of innovative programs. These included environmental education initiatives in Australian schools, organising the funding of innovative environmental curricula in universities, and stimulating and funding sustainability projects in local governments across Australia. As I continued with this work, I also did further study in the area of counselling, completing a Master’s degree in this field.

In 2000, I began the current PhD program, investigating the problem surrounding the nexus between consumption and environmental degradation. A couple of years earlier I had moved house to a suburb in Canberra close to a nature park. However, the suburb was also increasingly likely to be exposed to aircraft noise, as a result of the privatisation and expansion of Canberra airport in 1998. So began connections with others in the community concerned with the ramifications of this. As the framing of my research questions evolved, the future of aviation increasingly captured my interest, which fitted in well with my community interests.

Although each person has his or her own unique identity and destiny, a couple of insights about my approach may be helpful. Drawing on the work of Carl Jung in his *Psychological Types*, Myers and Briggs developed the Myers Briggs Type Indicator (MBTI) as a way of understanding personality (Myers, 1980). This indicator is based on the assumption that humankind is equipped with two sharply contrasting ways of perceiving—sensing and intuition—and two distinct ways of judging and coming to conclusions—thinking and a preference for impersonal logical processes, and feeling, that is by appreciation, and reference to personal subjective values. Using this typology, I am an INFP, that is an introverted feeling type supported by intuition. Thus although I use both quantitative and qualitative approaches in this thesis, the values based orientation of an INFP suggests a greater ease and liking for qualitative, values-based insights. Similarly, career satisfaction for INFPs typically involves doing work that is in harmony with their values and beliefs, and working towards causes they
endorse, and possibilities beyond what is already known (Tieger & Barron-Tieger, 1995).

Another model that I have found useful draws on three broad approaches to knowledge, namely: specialist, generalist and holist (V. Brown, Ingle Smith, Wiseman, & Handmer, 1995, p. 63). In keeping with a transdisciplinary approach that is both problem- and solution-focused, my approach, although drawing on specialist knowledge, is influenced most by the question “How can I best understand the whole?” Of the three approaches, this holist orientation is typically more tolerant of complexity, draws on a wide range of information, and uses eclectic methods of inquiry (both quantitative and qualitative). Thus my inquiry here is well placed within social ecology, which Hill (1999, p. 199) describes as:

A truly transdisciplinary metafield that is informed by ecology, psychology and health studies, sociology and cultural studies, the creative arts, holistic sciences, appropriate technology, post-structuralism and critical theory, ecofeminism, ecopolitics, ecological economics, peace and futures studies, applied philosophy and spirituality.

**Research philosophy and methodologies**

The research frame containing a researcher’s epistemological, ontological and methodological premises has been termed a paradigm or an interpretive framework. All research is interpretive and “guided by a set of beliefs and feelings about the world and how it should be understood and studied” (Denzin & Lincoln, 2000a, p. 19). The interpretive paradigm influences the questions a researcher asks, and the interpretations brought to these questions. At a general level, Denzin and Lincoln identify four major interpretive paradigms that are associated with qualitative research, namely: positivist and postpositivist, constructivist-interpretive, critical (Marxist, emancipatory), and feminist-poststructural.

The research approaches and methods selected are contained within the broader research frame encompassing the researcher’s philosophical stance and research paradigm (Higgs, 1998). As Denzin and Lincoln (p. 22) put it: “a research design
describes a flexible set of guidelines that connect theoretical paradigms first to strategies of inquiry and second to methods”. In a more targeted way, the research design also focuses on the research question and purposes of the study, and what information and strategies will most effectively answer specific research questions.

Knight (1996, p. 154) underlines how defining the research problem is embedded in theoretical conceptions of the nature of social reality. Thus theoretical frameworks or paradigms commence from differing assumptions, which suggests the need to “map discourses” as part of the research design. The schema shown in Figure 1.1 contains seven questions relevant for research design, including the identification of research paradigm(s).

| 1. | What is my research problem? What are the key questions and issues? |
| 2. | In what ways is it a problem? Why is the problem important and worthy of study? |
| 3. | Which theoretical framework(s) or paradigm(s) are used? Where am I located theoretically and why? |
| 4. | How do I go about researching the problem (research methods and underlying assumptions)? |
| 5. | What is the context for my arguments within the relevant socio-economic, historical-political, educational or cultural background? |
| 6. | What is my criticism of existing perspectives, theories and interpretations, and what are my alternative suggestions? |
| 7. | What is my argument? What is my original contribution to the field of knowledge? (e.g. policy development and implementation, synthesis across fields of study) |

**Figure 1.1.** Questions relevant to the design of a research project, taking into account the theoretically embedded nature of research

With respect to Question 3 in the schema in Figure 1.1, the nature of my research aim, and the more specific research questions related to it, suggest that approaches and methods linked to a critical paradigm are paramount. Here knowledge is not grasped or
discovered but is acquired through critical debate. That is emancipatory knowledge promotes understanding about transforming current ideologies and structures that constrain reform and redesign (Higgs, 1998, p. 140). This is part of a tradition, more obvious in recent decades, that critiques the dominant Western/industrial worldview. Positive critique seeks to facilitate cultural reconstruction and a renewed worldview, and to empower social innovations towards such ends through deep learning, the finding of new purposes and meanings, and the creation of sustainable economies (Slaughter, 1995, chap. 9).

More specifically, my thesis draws on the field of “futures studies as disciplined enquiry” given that futures scholars seek to extend “the chronically short-term time-frames which have become characteristic of Western cultures” towards long-term thinking and the politics of reconstruction (Slaughter, 1999, p. 3). In particular, critical futures study is pertinent, with its emancipatory interest and its favouring of socio/political questions over technical/instrumental ones. The term “critical” emphasises the link to critical theory, and suggests the value inclusive and reflexive nature of critical futures studies. In contrast, positivist models are associated with “value free” and “objective” knowledge, which serves “to obscure the political and ideological dimensions of futures problems” (Slaughter, 1999, p. 209).

The “call to action”, in both an ethical and a political sense, is another dimension that has been used to draw a distinction between positivist and postmodern critical theories (Lincoln & Guba, 2000, p. 174). germane to my inquiry is the observation that “the shift toward connecting research, policy analysis, evaluation, and/or social deconstruction … with action has come to characterize much new-paradigm inquiry work, both at the theoretical and at the practice and praxis-oriented levels” (p. 175). The policy formulation aspect of the policy cycle—that is, the clear definition and understanding of a policy problem—is pertinent for the policy measures outlined in Chapter 4 (Rist, 2000). Action to influence policy is also a key component of the community group activity investigated in the case study of Canberra airport (Chapter 5).

As mentioned above, and as addressed in greater detail in Chapter 4, Causal Layered Analysis (CLA) is the particular futures research method I have applied to aviation futures. CLA is situated within critical futures research, given that its purpose is not
predictive, but rather an emancipatory one. Slaughter considers it to be a paradigmatic method that reveals the deep worldview commitments behind surface phenomena, and as one of the first methodological developments of the new “inner” perspective (Inayatullah, 1998a, p. 815; Slaughter, 2002).

Nevertheless, it is possible to adopt concurrent paradigms including, for example, empirico-analytical, interpretive and critical paradigms. Inayatullah (1998a, p. 816) states that his own preference has been to use approaches encompassing all three. This means using data to note generalisations and trends (the predictive), the extraction of themes and meanings related to these data (interpretive), and then critically debating these in order to disturb power relations, question objective reality and to empower changes in reality. Lincoln and Guba (2000, p. 174) address the question of commensurability between paradigms, and agree that it can be done with caution, provided the paradigms share axiomatic elements that are similar. Thus positivist and postpositivist paradigms are commensurable. Similarly, elements of interpretivism, postmodern critical theory and constructivism can sit comfortably together. However, commensurability becomes an issue when attempting to choose between paradigms that are contradictory and mutually exclusive, as between positivist and interpretivist models.

In Chapter 3, I address the research question “In what ways are the projected growth and consumption of aviation travel unsustainable—globally and locally?” Although drawing on forecasting approaches and trend analysis associated with an empirical paradigm, my main purpose is to understand and interpret the implications of these trends and to provide critique by making explicit what paradigm is privileged by the use of these trends. In addition, the weaknesses and pitfalls inherent in such approaches are explored. For example, some consider that prediction in social systems is neither possible nor desirable (Slaughter, 2002). Others consider that the indefinite extrapolation of a single-variable into the future to create a trend is simplistic and mechanistic, ignoring the interactions intrinsic in ecological models (Dryzek, 1997, p. 52).

In Chapter 5, I describe and analyse a case study (Stake, 1995) of the privatisation and expansion of Canberra airport. Part of the study includes interviews conducted with
people working in community groups, and an interpretive paradigm is linked to the extraction and description of themes as part of the data analysis. A critical paradigm is more apparent in the analysis of power relations discussed in the conclusions from the case study.

Addressing the research question “How do sustainable aviation policies and visions demonstrate sustainable consumption practices and patterns?” necessarily relates to the issue of synthesis across different fields of study. Literature reviews relating to relevant fields—sustainable consumption and sustainability, ecologically sustainable transport, and tourism—are undertaken throughout the thesis. The informative, evaluative and integrative nature of literature review is then brought together in a synthesis as part of the discussion of findings and summary of argument in Chapter 6 (Synthesis and conclusions). Button (1998) acknowledges the literary review as one of three broad approaches to synthesis, the others in his scheme being meta-analysis and subjective quantitative assessment.

In summary, my research philosophy and methods are akin to Inayatullah’s (1998a) approach of encompassing empirical, interpretive and critical paradigms, although the nature of my research questions favours a critical futures approach most strongly. The range of research methods used and their corresponding chapters (discussed in the next section) include:

- literature reviews and synthesis (all chapters, with synthesis especially in Chapter 6)
- trend analysis (Chapter 3)
- critique (Chapters 2 to 5)
- causal layered analysis and scenarios (Chapter 4)
- policy analysis (Chapter 4)
- case study including interviews (Chapter 5).
An outline and overview of the thesis chapters

Turning to the structure of the body of the thesis, the chapter structure is shown schematically in Figure 1.2.

**Figure 1.2.** The chapter structure for the thesis

This introductory chapter has provided an overview of the context for the research; specified a research aim, together with associated research questions; provided justifications for the inquiry; described the personal context motivating my inquiry; and discussed the research philosophy and methodologies used to frame the inquiry.

In Chapter 2, I examine and evaluate “sustainable consumption” as a central theme. Consumerism and consumption are considered within the wider framework of
discussions on ecological sustainability, economics and globalisation, and futures thinking and policy. In addition, the ways in which ecological thinking and values are applicable to reducing environmental degradation are considered, at both the individual behaviour and collective levels.

The contested nature of some of the concepts involved, such as “sustainability” and “globalisation”, underlines the additional issue of complexity, and the need for a transdisciplinary approach. A consideration of various models for considering change and emerging paradigms emphasises that how one frames an issue changes the solution. Design for sustainability, for example, can be merely adaptive or alternatively based on “deep”, more fundamental change.

In Chapter 3, I narrow the focus of the inquiry to consider the consumption of aviation and air travel as a particular subset of sustainable consumption. Growth-oriented visions of aviation futures are being increasingly contested on ecological, resource, security and health grounds. Aviation growth trends are therefore explored in detail, including worldwide and long-range scenarios, as well as projected trends for aviation in Australia.

A significant travel theory related to the future mobility of the world population is also reviewed. It suggests that high-speed modes of transport (such as air travel) will, over time, replace slower modes of transport. Given that aviation is inextricably bound up with larger economic and political processes, a critique of the globalisation of tourism provides another perspective on growth-based scenarios. Particular constraints addressed in greater depth include the ramifications for climate change of the projected growth in aviation and air travel, and the decline of conventional oil and its significance for aviation.

Whereas in Chapter 3, I focus on empirical and interpretive approaches to aviation futures, concentrating on growth-oriented projections for aviation futures, in Chapter 4 I am concerned with the application of a critical futures approach (in particular Causal Layered Analysis) to contrasting visions of aviation futures. My purpose is to create distance from current categories in order to question the future. By eliciting other scenarios of the future, a more holistic account of aviation futures is possible. For
example, other futures can be constructed around developing communications technologies and networks, and by questioning the values and scale of tourism and "hypermobility".

The other major area addressed in Chapter 4 is policy, which provides a more pragmatic and goal oriented approach than the vision orientation of the futures approach. Nevertheless, it can still be of value in questioning status quo assumptions and priorities, as demonstrated by the work of the Royal Commission on Environmental Pollution in the UK. The role of the latter body in policy reform, and in influencing the policy discourse surrounding aviation futures, is analysed. The chapter concludes with a discussion of 11 broad policy measures for the restructuring and redesign of aviation.

In Chapter 5, I report and analyse a case study of the privatisation and expansion of Canberra International Airport. My broad aim is to bring into sharper focus the global issues addressed in previous chapters, as they apply at the local level. The case study in effect covers the period 2000 to 2003, and describes and analyses community perceptions of environmental degradation, especially aircraft noise, related to the expansion of Canberra airport. A variety of data and information are used, including 11 "in depth" interviews with community activists working in community groups, and various policy documents and newspaper articles linked to Canberra airport’s expansion plans.

Throughout the course of the study, the perception of the key problems and contextual factors, and of the layers of issues involved, both broadened and deepened. In the latter part of 2003 the story continues, with Canberra airport making a highly public bid to become a solution for the problems facing Sydney Airport, as the latter reaches its capacity constraints over time. The implications of increasing aircraft noise for the Canberra region’s quality of life is of considerable concern to community groups—particularly as the bid includes a planned main runway extension to allow the airport to accept more large aircraft.

The chapter concludes with the “lessons learned” from the case study. One finding highlights the importance of developing alternative policy discourses and discourse
coalitions in order to challenge the business-political nexus that is driving consumption-focused growth policies and plans.

In Chapter 6, I revisit the original research aims and discuss the central themes that emerged from my inquiry. I then summarise the research undertaken and the main findings. Next, I present an integration of the findings, drawing on some broad conceptual schemes to facilitate this synthesis. Subsequently, I examine the strengths and limitations of the study and suggest future avenues of research. In concluding, an epilogue outlines a vision for a world committed to sustainability principles 25 years from now.
CHAPTER 2

SUSTAINABLE CONSUMPTION—THE WIDER CONTEXT

For now it is sufficient to note that the topic of the consumer society turns out to be a Pandora’s box: Open it and you may end up examining everything (Goodwin, 1997, p. xxxiv).

I’ve just scored 2 Virgin direct flights Adelaide-Canberra and return for $59-00 each way—total $118-00!! Not bad, eh? (Associate, personal communication by email, 29 December, 2003).

In this chapter I examine, evaluate and integrate issues of consumerism, consumption, and environmental degradation within the broad overriding theme of sustainable consumption. Sustainable aviation is the subset of sustainable consumption that forms the focus of my specific enquiry in subsequent chapters. Here, however, I address the broader context for the relevant concepts and lessons it provides, although some specific examples related to the consumption of air travel are given. The first portion of the chapter addresses the sustainable consumption debate vis-à-vis sustainability themes. Subsequent sections address economics and globalisation, the questions related to values and behaviour change, and the social and policy changes needed to achieve sustainable outcomes within a futures context.

The sustainable consumption debate

Although unsustainable patterns of consumption and production have been identified as a priority in a number of agendas for sustainability (MacDonald, 1998), an often quoted reference to this issue is Chapter 4 of Agenda 21, the framework document for the 1992 United Nations Earth Summit in Rio de Janeiro (United Nations, 1993). In this chapter of Agenda 21, changes in consumption patterns, and challenges to the
resource-intensive lifestyles of the world’s richest nations as well as conventional models of economic development, are addressed:

The major cause of the continued deterioration of the global environment is the unsustainable pattern of consumption and production, particularly in industrialized countries, which is a matter of grave concern, aggravating poverty and imbalances. (United Nations, 1993, para. 4.3)

Consideration should also be given to the present concepts of economic growth and the need for new concepts of wealth and prosperity which allow higher standards of living through changed lifestyles and are less dependent on the Earth’s finite resources and more in harmony with the Earth’s carrying capacity (United Nations, 1993, para. 4.11).

Such statements are politically contentious in that environmental degradation issues are linked to the excessive demand, especially from the rich countries, for resources such as energy, water and minerals. This represented a significant departure from the narrower arguments often used by rich countries, which commonly attribute international ecological degradation to unchecked population growth. As Upton (2001, p. 6) acknowledges in his review of roadblocks to implementing Agenda 21, “the core of the problem is what and how people produce and consume. This is a very difficult issue, because it impinges on the fundamental tenets of economic development, of aspirations everyone has for a better life through increased economic means”.

Nevertheless, consumption is being increasingly incorporated into academic environmental discourse (Cohen & Murphy, 2001; Goodwin, Ackerman, & Kiron, 1997; Noorman & Uiterkamp, 1998); the reports of international bodies (Organisation for Economic Cooperation and Development, 1997c, 2002a, 2002b, 2002c; United Nations Environment Programme, 1999); policy statements and documents by learned societies such as the Royal Society in London and the United States National Academy of Sciences (Heap & Kent, 2000); and a range of non-government organisations such as The Center for a New American Dream (2003) and the New Road Map Foundation (Domínguez & Robin, 1992).

Although sustainable consumption is not a popular concept with governments because of its potential threat to competitiveness and profitability, there has been some attention to the issue, for example in the Australian Government’s initiation of a series of
seminars on the issue in 1994 and 1995 (Department of the Environment Sport and Territories, 1996a). The Australian Government also supported a survey to identify a broad range of Australian initiatives to change consumption patterns (Department of the Environment Sport and Territories, 1996b). The latter survey catalogued more than 350 such initiatives within the broader areas of transport, household energy use, housing materials, food, clothing, cosmetics and pharmaceuticals, chemicals and cleaning supplies, product and material purchase, water use, gardens, recreation, population control and investment.

In the UK (Hobson, 2001) and Europe (Staats & Harland, 1995), governments have initiated programs to build pro-environmental behaviours in households, capitalising on the work of the Global Action Plan (GAP). Again, the threatening nature of substantive changes in consumption patterns appears, as in the critique of the positivist assumptions underlying social-marketing techniques and educational-information campaigns, and the lack of attention to structural factors and institutional responsibilities.

In 2001, the Organisation for Economic Cooperation and Development concluded that the environmental effects of current consumption patterns “remain a peripheral issue in most OECD countries, treated in an ad-hoc fashion” (de Leeuw, 2001). Its OECD Environmental Outlook report provides an analysis of likely environmental changes to the year 2020 using data collected from across OECD countries (Organisation for Economic Cooperation and Development, 2001). Drawing on a Pressure-State-Response (PSR)\(^1\) framework for its analysis of environmental changes, the report uses a traffic light analogy to signal the degree of urgency for a range of pressures on the environment.

The most urgent “red light” issues are those where recent trends have been negative and are expected to continue to be so to 2020. Climate change as a result of greenhouse gas emissions is classified as one of the most important “red light” issues faced by OECD countries, with increased energy use and transport being prime contributors to greenhouse gas emissions. With transport, for example, the report concludes that motor

\(^1\) The pressure-state-response model is used in environmental indicators work and is based on the concept of causality. Human activities exert pressures on the environment; these change its state or condition; and society responds by developing policies that influence those human activities, and so change the pressures.
vehicle kilometres travelled in OECD countries are expected to increase by 40% from 1997 to 2020 and that passenger air kilometres are expected to triple. Transport is the growing in all regions of the world, with air travel generally growing faster than road travel. It is asserted that it is the fastest-growing source of greenhouse gas emissions and the area that most policy-makers find difficult to address (Whitelegg & Haq, 2003, p. 12).

At a more macro level, the Environmental Outlook report acknowledges the underlying economic, social and technological factors driving the pressures on the environment. It concludes that the most significant drivers of environmental change (having both negative and positive effects) will be continued economic growth, the use of new technologies and changes in consumption patterns. A more recent study on Household Tourism Travel across OECD countries underlines the fact that a narrow sectoral approach to consumption is more complex than a neat categorisation suggests. Thus tourism related travel is a significant source of transport energy use and carbon dioxide emissions, with the projected growth in such travel—especially long distance air travel—being expected to significantly increase the environmental impacts from this sector over the next 20 years (Organisation for Economic Cooperation and Development, 2002a, pp. 23, 50).

Economic globalisation processes have engendered changes in tourism and travel markets, and the boundaries between tourism, travel, leisure and accommodation are now unclear (Knowles, Dimitrios, & El-Mourhabi, 2001). Thus airlines are increasingly part of global alliance groupings, with partners including international hotel groups, car rental companies, travel agents, leisure and entertainment businesses, and a range of other services including credit cards. The consumption web has become complex.

**Sustainable consumption, sustainability and complexity**

Sustainable consumption, as with most other social and ecological issues, is multifactorial and multidimensional in character, and requires for its understanding a transdisciplinary approach rather than a single discipline approach (Soderbaum, 2000). The relationship between consumption and environment involves not only the physical
aspects (often linked to environmental consequences), but also involves social, political, cultural and ethical questions (Murphy & Cohen, 2001a). At a broader level, issues related to worldviews, pluralism and “paradigm co-existence” are important for facing the question of complexity.

At the disciplinary level, the environmental and physical sciences thus describe consumption in terms of the transformation of energy and matter. They emphasise the material implications of consumption, in view of the ecological limits to growth and concepts such as carrying capacity (Wackernagel & Rees, 1996); conventional economists promote the maximisation of a person’s consumption of goods and services, through the spending of money as the goal of life and as a means to happiness (Goodwin, 1997, p. xxx); and sociologists and anthropologists emphasise the social, symbolic and cultural meanings of consumption (McCracken, 1988).

As consumption is increasingly framed using a variety of discourses, there has been an associated interdisciplinary exchange of ideas on the issue. For example, Cohen and Murphy’s (2001, p. 5) overview volume on sustainable consumption is founded on the belief that “it is only through such a synthesis that it will be possible to provide a theoretically sound and empirically rigorous basis for environmental policy that aims to move affluent nations toward more sustainable consumption patterns”.

At the conceptual level, the idea of “sustainable consumption” necessarily is part of the highly contested nature of the meaning of the concept “sustainability”. The term “sustainable development” gained widespread support in 1987 with the publication of the Brundtland report (World Commission on Environment and Development, 1987). A survey of the Web of Science database revealed an eightfold increase in the use of the term “sustainability” in journal articles published from 1990 to 1999. In contrast, in the researchers’ own field of tourism the use of pertinent descriptors such as “tourism” only doubled over the same period (Carter, Baxter, & Hockings, 2001, p. 267).

The debate surrounding the issue of sustainability has once again brought to prominence ethical, philosophical and political questions such as “How shall we live?” (Singer, 1993) and “How shall we arrange our systems of production and consumption to ensure the sustainability of the Earth?” (J. Davidson, 2000). At the disciplinary level, for
example in economics, such questions have become more pragmatically expressed in forms such as “What type of economic theory dealing with the environment do we need?” (Van der Straaten, 1999). The philosophical and ethical differences being expressed appear in the contrasting approaches taken in neoclassical (or conventional) economics and ecological economics (Hamilton, 1997, p. 58).

A variety of schemes have been suggested for framing values and sustainability, and a large literature is accumulating that has been summarised well by Harding (1998, p. 68) and Birkeland, Dodds and Hamilton (1997), and extensively critiqued by Hay (2002). Such schemes typically span a spectrum of environmental thought and values between technocentric and ecocentric positions (Drengson, 1989).

The maximally technocentric position seeks to maximise economic growth through unfettered free markets and resource exploitation (the current dominant worldview). In contrast, the maximally ecocentric position is associated with a strong preservation ethic and with a reduced scale of economy being seen as imperative. This latter position, which is associated with deep ecology and social ecology, challenges values and principles underlying capitalist societies and attempts to tackle the root causes of unsustainability. In between these extreme positions, a range of weak to strong sustainability positions has been posited, corresponding to various “light green” to “dark green” constructions of our relationships with nature. Here, modified economic growth characteristic of an accommodating position is more typical.

One typical scheme for showing a range of conceptual positions along a spectrum of thought and practice is that used by Harper (2000), shown in Figure 2.1. The major attitudinal division is between “environmentalists” and “contrarians”. In policy terms, there is common ground between the moderate wings of each side, giving three broad policy classes, namely: business as usual, no fundamental change, and radical restructuring.

On the contrarian side, Harper cites several leading “prophets of boom” who are advocates of economic growth and contend that technological progress, increased economic efficiency, and new substitution opportunities will overcome any constraints and their implications for business e.g. Kahn (1977), Beckerman (1974; 1995), and
Simon (1990). Most governments support economic growth, including the growth of affluence, and technological innovation, without fundamental challenge to the modern consumerist project.

<table>
<thead>
<tr>
<th>Contrarians</th>
<th>Environmentalists</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BAU</strong></td>
<td><strong>NFC</strong></td>
</tr>
<tr>
<td>Business as usual</td>
<td>No Fundamental Change</td>
</tr>
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**Figure 2.1.** Map of “faultlines” between contrasting perceptions of our relationships with nature (Harper, 2000).

On the environmental side, Harper draws a policy faultline between the “respectable” mainstream majority seeking solutions broadly within the present framework of consumer culture (sometimes called “ecological modernisation”) and those who believe that radical restructuring (RR) of the basic fabric and aspirations of modern societies is necessary. The latter group generally seeks limits on the principal factors underlying the environmental impact of human activity. Well-known RR names associated with particular factors include for example:

- population growth (P. R. Ehrlich, 1972)
- changing technology and economic structure (Commoner, 1972; Schumacher, 1973)
- changing conceptions of economic growth and levels of material consumption (Daly, 2000; Naess, 1989).

Harper characterises the “business as usual” proponents as taking a “hands off” approach, whereas the “no fundamental change” supporters tend to ignore population and consumption, and focus on technological innovation. In contrast, “radical restructuring” theorists highlight consumption, putting them at odds with the “modern project”. These various analyses of sustainability and economics reflect the current range of environmental discourses (Dryzek, 1997). How the debate on sustainability is framed in each discourse, as well as the key metaphors underlying the various
storylines, determine how the problem is defined, which agents are valued, and where the solutions lie.

For example, the concept “sustainable development”, although considered by many to be an oxymoron, is most often linked to a more technocratic form of “environmentally benign growth”. Related to this is the idea of ecological modernisation of industrial economies (Hajer, 1996, p. 249), which redefines the ecological crisis as a problem to be overcome by “technical and procedural innovation”. Eco-efficiency becomes the driving force for industrial innovation, and continued growth is regarded as part of the solution. The associated discourse thus involves a “rhetoric of reassurance” where we can have it all, including economic growth, environmental conservation and social justice (Dryzek, 1997, p. 132). Thus, sustainable development may be regarded as “the late twentieth century expression for ‘progress’ ” (Sachs, 1997, p. 71).

Such a view tends to be the position of most in governments and business. Murphy and Cohen (2001a) observe that the economist’s and technologist’s approaches to sustainable consumption have been overly influential in policymaking processes. One reason is that such disciplines mirror the discourse described above, and therefore only people using these frameworks are seen as legitimate contributors to policy discussions. However, these disciplines underestimate the complexity of the world, and are politically attractive by virtue of being able to provide what appear to be easy solutions. In contrast, Murphy and Cohen argue for more holistic policymaking, without eschewing technological innovation as one valuable way of tackling consumption related issues.

On the other hand, Davidson (2000) considers the conservative sustainable development approach to be ethically “weak” as it clings to a modernist view of progress. This position accepts trade-offs between economic growth and environmental protection, and sustainability objectives are founded on more efficient energy and resource use and ecologically benign technologies. In contrast, she argues for a radical or “strong” ethical approach to sustainability. This discourse recognises that it is human activities that have to be managed in order to achieve ecological and social viability, rather than the issue being a problem of resource management. As she argues, it “allows consumption patterns and the values which underpin them as well as the structural
rigidities” to come into focus. Further, “by relying on technological expertise to rescue us from the ecological dilemma of industrial society, we run the risk of simply postponing the inevitable” (p. 40). Such a view tends to be held by many Greens, environmental activists and some public sector bureaucrats.

The difference between the dominant (light green) and alternative (deep green) paradigms has been characterised as involving a radical ethical shift in the way humans relate to technology and the natural environment (Harding, 1998). He suggests that it is the vast difference between these contrasting paradigms that is at the heart of many environmental controversies. To emphasise this difference, the economic strategy underlying the deep green approach has been characterised by various scholars as “authentic development”, “ecodevelopment”, “reverential development”, and “alternative development”, in order to redefine the term “development” (J. Davidson, 2000, p. 40).

Another useful schema arguing for an expanded view of sustainability acknowledges not only the physical and socio-political aspects of sustainability, but also its non-material dimensions, which are often neglected (Boyle, Thomas, & Wield, 2000). Such schemes have also been used to broaden frameworks of change to include personal and psychological issues as well as social and environmental aspects (Hill, 1999; J. Huxley, 1964). Hill asserts that it is the usual privileging of economics over all other considerations (including the neglect of personal aspects) in conventional frameworks, which has had the effect of perpetuating money based value systems over more broadly based personal value systems. He considers that economics, along with politics and education, must be regarded as “tools” to enable us to act effectively on our values. It is giving them a higher status that causes problems. Maiteny (2000) takes a compatible position in describing the work of the Grubb Institute in the UK, which is involved in studies of how meaning and inner experience in people can act as a guide to improved well-being and reducing the environmental impact of lifestyles.

A significant body of literature is challenging the central tenets of Western consumer societies, namely that the consumption of goods and services above a certain minimum is the pathway to higher well-being and happiness and that the best way to improve national prosperity is to raise incomes through more economic growth. This literature
emphasises quality of life issues and is redefining the nature of “progress” (Eckersley, 1998), and challenges the narrow, egoistic view of human well-being based on a market ethic. In its place a much more complex view of human well-being is presented, encompassing a wide range of needs that can be broadly categorised as having, being, doing and interacting (Max-Neef, 1991).

A further related and pertinent area of literature promotes the idea that the evolution of human consciousness is a critical determinant of sustainability. For example, the case for a new consciousness is argued in 3rd Millennium, the first report of the Club of Budapest. The often quoted Einstein remark that we cannot solve a problem with the same kind of thinking that gave rise to the problem, underlines the need for “new ways of perceiving and visioning ourselves, others, nature and the world around us” (Laszlo, 1997, p. 13). Without a new consciousness, the report asserts that it is unlikely that human beings will be able to avert deepening economic, social and cultural conflicts and ecological breakdowns. In broad terms the Club’s report calls for:

- consciousness evolution by evolving human consciousness, with habit and inertia no longer being appropriate to the critical choices facing humanity
- evolution not just of technologies, but also of human perceptions, empathies, values and priorities
- a shift in the nature of human attention, empathy and concern from an ego-, business-, and nation-centred approach to a broader human-, nature-, and planet-centred one.

Many authors in this area of literature suggest that this shift in human consciousness is well underway, and that the most distinctive feature of an emerging paradigm is not technological change, but a change in human consciousness (Elgin & LeDrew, 1997). Mack (1993, p. xi) broadly characterises the change process as a “battle” between two differing ontologies. On the one hand is a materialistic worldview that excludes ideas of spirituality and the sacred from consciousness, and where “human beings are ravishing the earth and massacring one another with instruments of ever greater technological sophistication in the quest for power, dominance, and material satisfaction”. On the other hand is a transpersonal vision that “enables human beings to
discover their inseparability from all life” and where “we may again discover the sacred in ourselves and nature”.

Similarly, Harman (1998) considers that at the present time humanity is in the middle of a shift in its prevailing assumptions from an M-1 metaphysic to an M-3 metaphysic, more closely allied to the “perennial philosophy” of the world’s spiritual traditions (A. Huxley, 1945/1970). To simplify discussion, Harman uses three possible metaphysics: (a) M-1 Materialistic monism (matter giving rise to mind), (b) M-2 Dualism (matter plus mind), and (c) M-3 Transcendental monism (mind giving rise to matter). Rather than setting out to prove the validity of a metaphysic, however, he argues that an M-3 metaphysic seems to provide the best fit for understanding the totality of human experience.

Tarnas (1991) in examining the history of Western civilisation, points out however that although many of these theories of a spiritually based evolutionary process have generated a “wide popular response”, the “overt cultural trend, especially in academia, has been otherwise”. Further, he states: “although regarded by many as brilliant and comprehensive challenges to the conventional scientific vision, for others such speculations did not possess a sufficiently demonstrable empirical basis” (p. 383). Another significant objection reflects postmodern theorists’ suspicions of any grand narrative, with their possible totalitarian leanings and associated dangers of naïvely utopian frameworks (Zimmerman, 1994). Defending the countervailing concept of diversity, Galtung and Inayatullah (1997) compare and contrast the work of 20 macrohistorians, encompassing theories of linear, cyclical and spiral patterns of change.

The rationalist analysis by Dryzek (1997, p. 155) equates the new consciousness call with “green romanticism”. He says contemporary green romantics share the outlook of the romantic movement of the 18th and 19th centuries, by tending to reject science, and instead embracing empathy and insight, and radically different ways of experiencing one’s self and nature. Dryzek’s analysis tends to be dismissive of the need for a change of consciousness, as he sees green romantics as neglecting social, political, and economic structures.
Thus, he suggests this discourse is somewhat defective by putting the emphasis on change through individual attitudinal and behavioural change. He challenges green romantics by asking: “how will [the] proposed alternative subjectivities fare in a world currently structured to guarantee their frustration, and moving in a direction that reinforces such frustration?” (p. 171). Further, Dryzek asserts that people have not adopted, except in small numbers, the ecological consciousness of the kind sought by “deep ecologists, eco-feminists, eco-communalists, and eco-theologians” (p. 168). Such networks and groups are often quite small, and not especially visible to a larger public.

The “change of consciousness” literature also raises problematic issues in the somewhat simplistic way it portrays the implications of changes in consciousness. For example, the necessarily favourable connection between feelings and values and ecologically sensitive behaviour is frequently put. Birch (1993, p. 199) describes the nature of the shift and worldview this way:

> The postmodern worldview is more concerned with the subjective, feelings, values, consciousness and internal relations. It is an organic or holistic view contrasted with the mechanical or substance view of things. To embrace it involves a paradigm (*paradeigma* = pattern) shift in thinking and in behaviour.

In a similar way, the notion of the “ecological self” from deep ecology (Devall, 1990; Macy & Brown, 1998) suggests a much wider sense of self than one based on a narrow competitive ego. This is linked to the idea of the self as a “process”, acting in a deeply participatory way with the needs of the environment (Pickering, 1999). Hence, care and action will flow directly from the wider sense of interrelatedness and felt connection with all life. Capra (1996, p. 12) encapsulates the argument as follows:

> The connection between an ecological perception of the world and corresponding behaviour is not a logical but a *psychological* connection … if we have deep ecological awareness, or experience, of being part of the web of life, then we will (as opposed to should) be inclined to care for all of living nature. Indeed, we can scarcely refrain from responding in this way.

Of particular relevance to the issue of sustainable consumption behaviours, however, are findings from various social science studies claiming that environmental consciousness has been shown to account for not more than 10-20% of variance of (mostly) self-reported behaviour. Rather, “there seems to be a broad consensus that personal values, situational contexts, infrastructural deficits and financial considerations
play a more important role than knowledge, affectedness and environmental attitudes” (Brand, 1997, p. 207). This disconcerting finding is clearly at odds with the claims made above, and has been called the “gap” between environmental consciousness and behaviour. It suggests that either a large part of the population does not experience the required holistic consciousness, or that a range of other individual and structural factors override or confound such a consciousness, particularly when it comes to behaviour.

This issue of behaviour change that is supportive of sustainable lifestyles and consumption patterns is addressed in greater detail in a later section.

In spite of these reservations, some observations from the social science literature confirm moves towards sustainable consumption. For example, there is evidence from a number of surveys to support a shift in value systems in Western countries as they become wealthier. From large-scale social surveys conducted in European countries and other western nations over a period of 25 years, Inglehart (1990; 1997) concluded that a shift to postmodern values is taking place, with a shift to post-materialist goals assuming a higher priority than materialist goals.

In the USA, a national survey in 1995 identified what was described as a new force for cultural change, using the term “integral culture” (Ray, 1996; Ray & Anderson, 2000). A core group of “cultural creatives” constituting about 10% of the population subscribe to values encompassing ecological sustainability, self-actualisation and spiritual practice, and issues of social conscience for the making of a better world. Another group of “green cultural creatives”, comprising 13% of the US adult population, share similar high levels of ecological and social concern with the “core cultural creatives”, but give lower priority to spiritual or psychological growth.

Although it is not entirely clear to what extent such changes in values are translated into behavioural changes, studies on downshifting\(^2\) indicate that an increasing number of people are willing to pursue voluntary, long-term, lifestyle changes that involve accepting significantly less income and consuming less. An Australia Institute survey conducted in 2002 found that 23% of Australian adults aged 30-59 have downshifted in

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\(^2\) In the Australia Institute study cited (Hamilton & Mail, 2003, p. 13), downshifters were initially identified by an affirmative answer to the following question: “In the last ten years have you voluntarily made a long-term change in your lifestyle, other than planned retirement, which has resulted in your earning less money?” (e.g. by reducing working hours, or leaving work to study or stay at home).
the last 10 years (Hamilton & Mail, 2003). The various reasons downshifters give include the desire to lead a more balanced and fulfilled life, wanting more quality time with their families, and the desire to live a less materialistic and more sustainable lifestyle.

The field of critical futures studies is in accord with these changes occurring at the individual level, and notes the changing ideas across the range of institutional, civilisational and global fronts. The broad shift in ideas underlying an emerging paradigm is typically that shown in Figure 2.2.

<table>
<thead>
<tr>
<th>Ideas in decline</th>
<th>Resurgent ideas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial worldview</td>
<td>Renewed worldview</td>
</tr>
<tr>
<td>Nature a resource</td>
<td>Nature a community</td>
</tr>
<tr>
<td>Full employment</td>
<td>Redefine employment</td>
</tr>
<tr>
<td>Development = progress</td>
<td>Revised model of development</td>
</tr>
<tr>
<td>Growth is good</td>
<td>Qualitative growth</td>
</tr>
<tr>
<td>Exploitation</td>
<td>Sustainability</td>
</tr>
<tr>
<td>Technology is neutral</td>
<td>Technology has embedded social and political interests</td>
</tr>
<tr>
<td>Dominance of nation state</td>
<td>Decline of nation state</td>
</tr>
<tr>
<td>Subject/object</td>
<td>Unity of subject and object</td>
</tr>
<tr>
<td>Loss of sacred</td>
<td>Recovery of sacred</td>
</tr>
<tr>
<td>Short-term thinking</td>
<td>Long-term thinking</td>
</tr>
<tr>
<td>Lack of foresight</td>
<td>Wide implementation of foresight</td>
</tr>
</tbody>
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**Figure 2.2.** Comparison between declining and resurgent worldviews
Adapted from Slaughter (1995).

Similarly, from a range of possible, probable and preferable futures, a report of the Global Scenario Group posits a “great transition” scenario of a sustainable and desirable future emerging from new values, a revised model of development and the active engagement of civil society (Raskin et al., 2002). Such a scenario assumes conscious
(as opposed to conspicuous) consumption sensitive to ecological concerns. It suggests an “economics of permanence” in keeping with ecological sustainability, and replaces the concept of “consumers” with that of “layered beings” having a variety of material and non-material needs (Slaughter, 1995).

Given the complexity of the issues raised so far, it is useful to consider two models for thinking about these issues in a more holistic way, and for subsequently evaluating arguments from policy analysis and futures studies. Wilber’s (1996) four quadrant classification applies to the interior and exterior of the individual and collective as shown in Figure 2.3.

**Figure 2.3.** Wilber’s (1996, p. 71) four quadrant model of the cosmos

Although the figure shown has been simplified so as to exclude the stages of the holarchies linked to each of the four quadrants, one of Wilber’s key claims is that all the quadrants are linked and cross-correlated. Thus, higher or deeper stages of consciousness development will be reflected in behavioural, cultural and social system areas as well. People may be sitting in their favourite quadrant, so to speak, and miss the wider transformations being manifested in all four quadrants.

Wilber acknowledges the progress associated with modernity, normally equated with Western scientific civilisation since the Enlightenment, but considers that one downside of the Enlightenment paradigm has been its preoccupation with the right-hand column.
of exterior considerations. This is reflected in an inflated concern with the physical, behavioural and “objective”. Wilber’s model provides a more inclusive approach, by also addressing sustainability in the non-material sense. This includes both the individual or experiential aspects (upper left quadrant), and the collective interior or cultural aspects (lower left quadrant).

The integrative nature of the model implies that the emerging paradigm involves both a change in consciousness and a change in institutions—and in the sense that “trans” means beyond, it is both trans-rational and trans-industrial. That is, modes of consciousness beyond rationality are also reflected in techno-economic structures that move beyond industrialisation. Further, Tarnas (1991, p. 439) suggests that “the evolution of paradigm shifts is an archetypal process, rather than merely either a rational-empirical or a sociological one”, and therefore such shifts occur both subjectively and objectively. In an analogous way, pathology in any one quadrant reverberates through all four quadrants. As Wilber (1996, p. 138) states: “we are fast approaching an understanding that sees individual ‘pathologies’ as but the tip of an enormous iceberg that includes worldviews, social structures, and cultural access to depth”.

A second valuable model is Norgaard’s (1994) framework for understanding development as a coevolutionary process between social and environmental systems (Figure 2.4). The social systems encompass the knowledge, values, organisation and technology systems, which coevolve with each other, and with the environmental systems.

A number of observations from this model are useful in thinking about sustainable consumption. First, each system is related to each of the others, but is also changing and interacting with the others. Thus the coevolving nature of these systems and their relationships means that change occurs in unforeseeable ways. The model thus challenges the thinking underlying modernity, given that it does not facilitate prediction and control. As Norgaard (1997, p. 163) puts it: “In a coevolving world, the medium future is murky, the distant future invisible”.

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Figure 2.4. The coevolution of environment and society (Norgaard, 1994, p. 27).

Second, there is currently an overemphasis on institutional structures such as global economics and the use of technologies (symbolised by the labels in italics in Figure 2.4), thus compromising a consideration of values. Norgaard believes that all the systems need to be considered. Further, he also argues that there is denial of the interconnections between people and nature and declares that “the whole Western construct of choice, of weighing options, and of conflict between the individual and the group follows from the premise of atomism and individualism” (Norgaard, 1994, p. 132). Hence efforts to promote “green consumption” at the individual level can fail to see the broader picture or appreciate the structuring of “choice” itself.

A third way in which the coevolutionary framework facilitates a critique of modernity is in acknowledging that industrial social systems have coevolved with the use of fossil hydrocarbons. The effect of this strong emphasis on fossil hydrocarbons has been to transfer the environmental impacts to other people, and “expanded the temporal and spatial dimensions of our interactions and coevolution with nature” (Norgaard, 1997, p. 165). Thus knowledge, organisation, technology and value systems are now being challenged by the ramifications of our interactions with nature, especially with the issue of climate change.
IPAT and consumption

A useful, although overly simplified, identity (I = PAT) provides a helpful starting point for discussing a range of factors that are determinants of environmental pressure (P. R. Ehrlich, Ehrlich, & Holden, 1973). The equation states that environmental impact (I) is a product of population size (P), affluence or consumption per capita (A) and technology (T).

Although the formula and its limitations continue to stimulate debate (Diesendorf, 2002; Roca, 2002), it is valuable for considering the multiplicative effect of population, consumption and technology in determining environmental impact, and in considering the relative roles of consumption and production. For example, if population increases by 42% and consumption by 100%, then the equation can be used to calculate the reduction in T required to hold the environmental impact constant. That is, if P = 1.42 and A = 2.00, then I = 1 requires T = 0.35. In the case of car exhaust emissions, emissions per kilometre would need to fall 65% to accommodate increased numbers of people driving further distances. In the USA, the rising population of about 1% per year continues to offset roughly the efficiency gains of motor vehicles (Ausubel, Marchetti, & Meyer, 1998).

Thus, the issue of demand for products and services continuing to increase (A) often more than offsets the efficiency and productivity gains (T). Jevons foresaw this effect in 1865, suggesting that making coal burning more efficient would result in increased coal use, as the improved efficiency led to more economic uses of coal. The Jevons Principle is now used to describe this effect of technological advances more generally. Analogously, Newman and Kenworthy (1999) outline how increasingly efficient motor vehicles only exacerbate the problem of car dependence in cities.

This conundrum has also been expressed in the questions posed by Paul Ehrlich et al. (1999), namely: “Will more knowledge help the environment?” and “Is the rate of innovation sufficiently rapid to offset increases in consumption driven by increases in population size and per-capita affluence?” Using data from 1975 to 1994 for four industrialised nations (the USA, Germany, the Netherlands, and Japan), these researchers chart the trends toward lower resource use per unit of gross domestic
product (often labelled dematerialisation and decarbonisation). However, when population (P) and rising incomes (A) are taken into account over the same period, the reductions in resource use brought about through improved energy efficiency (T) are offset by the adverse environmental impacts of population and per capita consumption.

A review of sustainable consumption and production for the Earth Summit in 2002 (Michaelis, 2000) concludes that globally, many of the environmental and resource impacts of production and consumption have worsened in the last 25 years. Michaelis suggests, especially in industrial countries, that environmental problems are increasingly linked to consumption rather than production patterns. That is, the technological solutions applied in industry have been offset by rising global incomes per capita (A), with more resource use and pollution caused by activities in the transport, residential and commercial sectors. Aggregate materials use is more or less stable for some types of materials, but is rising with others such as paper, plastic and composites.

Michaelis acknowledges that one of the most environmentally significant trends is the rapid growth in road and air traffic and the associated greenhouse gas emissions—in spite of the energy efficiency improvements in both cases. Even advocates of economic growth and the use of eco-efficiency measures such as Kageson (1998) acknowledge that one of the most difficult environmental problems to bring under control in the next 20 years is that of curbing carbon dioxide emissions. He concludes that transport is a sector where particularly strong policies are needed, with the aviation sector putting considerable pressure on the environment in spite of its small share of overall passenger traffic.

The I = PAT equation thus underlines the fact that although technology (T) has a significant role to play in policy development, consumption related issues (A) need to be understood in their own terms and not as determined by technology. For example, Potter and Skinner (2000) critique a technological perspective often taken in studies of transport futures. Drawing on an OECD study exploring the reduction of transport emissions to sustainable levels by 2030, they note that 30-40% of the reduction could be achieved by technical measures. The remaining 60-70% reduction needs to come from demand management approaches, which depend on political, cultural and social
innovation. In other words, the eco-efficiency discourse is tied primarily to supply-side and production debates. Discussion of consumption issues, however, addresses the long-standing denial of the social dimensions of environmental problems, and is concerned, for example, with issues such as identity creation and the structural/infrastructural constraints on consumption (Murphy, 2001).

With respect to technology, the trend towards “radical resource productivity” (Hawken, Lovins, & Lovins, 1999) using Factor Ten and Factor Four strategies (von Weizsacker, Lovins, & Lovins, 1997) is clearly an important part of future approaches to systems change in production and consumption. The fields of industrial ecology and what is described as industrial transformation research (Hill, in press; Vellinga & Herb, 2000) are investigating revolutionary advances in design and technology in the areas of energy and material flows and in the ways in which information and communication can substitute for energy and materials.

Underpinning the technological worldview, however, is often an uncritical technological optimism. Ausubel (1995), for example, has catalogued the vast technological improvements in the last 100 years in fields such as computing, communications, transport and energy and asserts that the global warming debate has neglected and underestimated the importance of technical change in reducing greenhouse gases and adapting to climate change. In the same way that propulsion of aircraft has improved by one hundred thousand times in 90 years, these researchers are optimistic about technological trajectories linked to decarbonisation and “envision a transport system producing zero emissions and sparing the surface landscape” (Ausubel et al., 1998, p. 137). They support the prospects for 21st century “green mobility” based on historical evolution and declare: “We can clearly see its elements: cars, powered by fuel cells; aeroplanes, powered by hydrogen; and maglevs, powered by electricity, probably nuclear. The future looks clean, fast, and green” (p. 154).

Conversely, others strongly critique the “technological dynamic that acknowledges no limits” and believe that “a combination of low-level human motivations and high-powered technology” is likely to be “a continuing disaster” (Slaughter, 2000, p. 49). The unquestioned assumption that constantly evolving technology is critical to the future and “progress” needs to be balanced by asking questions such as “Is
technological change taking us where we want to go?” and “What effect does it have on our social, political and moral imagination?” (Orr, 1994, p. 33). Orr further highlights the complexity of the Earth and its life support systems, and argues that such complexity can never be safely “managed” with science and technology. Rather, advances in knowledge carry with them the risks of advances in ignorance, as occurred with the initial discovery of chlorofluorocarbons (CFCs) in 1929 and the much later discovery of their impact on stratospheric ozone. The initial ignorance of the potential impacts of these chemicals became “a critical life-threatening gap in human understanding of the biosphere” (p. 9).

More pragmatically, Geels and Smit (2000) have identified a range of pitfalls linked to future explorations of technological developments. For example, initial promises are often set high to attract attention from financial sponsors and to stimulate agenda setting promises as part of strategic gains. A case in point is the impact of tele-conferencing on business travel with expectations of much decreased travel as a result of the contacts made by tele-conferencing. However, both substitution and generation effects have been noted with tele-conferencing, so that the initial societal gains promised by the technology then need to be scaled down.

In relation to my thesis topic, the technologically optimistic claims that more and more hydrogen will fuel aircraft (Ausubel et al., 1998) need to be contrasted with a major study by the Intergovernmental Panel on Climate Change (Penner et al., 1999), which underlines the difficulty of any easy “technical fix” for air travel. The technology is still tied to oil, and there do not appear to be any practical alternatives to kerosene-based fuels for several decades. In the medium term, the future growth in air traffic is expected to far outstrip any efficiency gains. In addition, the specialist National Research Council Committee on Aeronautics Research and Technology for Environmental Capability (2002) notes that the rate of technological innovation is insufficient to address the aircraft noise, carbon dioxide (CO\textsubscript{2}) and nitrogen oxide (NO\textsubscript{x}) emissions generated by increasing aircraft movements.

With respect to the use of hydrogen in aircraft, hydrogen engines are still in the R&D stage and it is not clear when or whether they will be introduced on a larger scale (Nijkamp, Rienstra, & Vleugal, 1998, p. 109). Some suggest that large scale hydrogen
in aviation is not likely in the next 50 years, and that the pressure on declining oil stocks may lead to the manufacture of a kerosene-like fuel from other sources such as oil shales and natural gas (Armstrong, Allen, & Denning, 1997). Hence the high expectations in relation to this technology may need to be scaled down.

Even if effective substitution strategies such as hydrogen powered aircraft could be produced on a broad scale, this approach may still not get to grips with Orr’s question above: “Is technological change taking us where we want to go?” For example, such aircraft, although not producing climate changing carbon dioxide emissions, could leave existing tourism and consumption patterns in place, or still have significant global warming consequences from the water vapour contrails left in their paths, as water vapour acts as a greenhouse gas too (Penner et al., 1999, p. 257). I return to this issue in greater detail in Chapter 3.

With respect to the population (P) factor in the IPAT equation, it is significant that for the past 25 years many affluent nations, backed by a number of professional scientific associations, have framed global environmental problems as arising from high rates of population growth. This allowed the industrialised countries to place the prime responsibility for remedying environmental dilemmas with the developing countries, thus diverting attention from the environmental consequences of lifestyles (A) in the rich countries (Cohen, 2001, p. 29).

The United Nations Development Program (1998), on the other hand, highlighted global inequalities in consumption and resource use as the central issue, rather than overpopulation per se. Thus, this report asserts that 20% of the world’s people in the highest income countries account for 86% of total private expenditure, with the poorest 20% of people accounting for a tiny 1.3%. The pattern is reflected in a range of statistics. The richest fifth:

- consume 45% of all meat and fish, the poorest fifth 5%
- consume 58% of total energy, the poorest fifth less than 4%
- have 74% of all telephone lines, the poorest fifth 1.5%
- consume 84% of all paper, the poorest fifth 1.1%
• own 87% of the world’s vehicle fleet, the poorest fifth less than 1%.

Others (Durning, 1992; Korten, 1995) have characterised the differences in consumption patterns by dividing the world’s population into three socioecological classes. The richest 20% (“overconsumers”) typically travel by car and air, eat high fat, meat based diets, and use pre-packaged and disposable products; another 20% live in absolute deprivation, travel by foot or donkey, eat nutritionally inadequate diets and drink contaminated water; the remaining 60% of the world’s people are classified as “sustainers”, living relatively lightly. They typically travel by bicycle and public service transport; eat healthy diets of grains, vegetables and some meat; and drink clean water and generally use unpackaged foods.

These inequitable consumption patterns have also been expressed numerically using the ecological footprint concept\(^3\) (Wackernagel & Rees, 1996). Illustrative national averages in hectares (ha) per person are USA (9.6), Australia (9.4), Canada (7.2), Germany (4.6), Italy (4.2), China (1.4), India (1.0), and Bangladesh (0.7) (Wackernagel, 2000). If everyone at present on Earth adopted the same lifestyle as the average North American or Australian, Rees (2000) concludes that the land required to support this level of resource use would require three more planets. The challenge facing the North and South in the decades to come in order to avoid “overshoot and collapse” lies in answering the question: “How can all people enjoy satisfying lives within an average of no more than 1.8 ha per person?” (Wackernagel, 2000, p. 106). The scale and patterns of development are an important component of answering such a question.

Of particular relevance to my thesis topic is the issue of global warming. 20% of the world’s people in rich countries account for 53% of carbon dioxide emissions, whereas the poorest fifth of the world’s people contribute only 3% (United Nations Development Program, 1998). Brazil, China, India, Indonesia and Mexico are among the developing nations with the highest emissions, although their large populations mean that their per capita emissions are still small. The USA and Australia represent the extreme of overconsumption at more than 20 tonnes of carbon dioxide per person per year, whereas

\(^3\) Ecological footprint is the land (and water) area required to support a defined human population and material standard indefinitely. The concept is designed to answer the question of how much ecological capacity there is in comparison with how much people use (Wackernagel & Rees, 1996).
China’s per capita emissions are less than three tonnes and India’s less than one tonne. Thus, Australia’s per capita emissions are more than 20 times higher than India’s emissions (Hamilton, 2001a, p. 152).

The inequities of the patterns of global consumption highlight the need for the richest 20% of people to significantly reduce their resource consumption and for the poorest 20% to achieve consumption levels that will adequately contribute to human development. Wackernagel (2000) suggests that the richest segment of humanity needs to reduce its resource throughput by 6% every year—a reduction much more rapid than the Kyoto Protocol CO₂ reduction targets.

On the other hand, the South’s carbon dioxide emissions, propelled by both population growth and expanding industrialisation, are (in absolute terms) raising the carrying capacity dilemmas revealed by ecological footprint analysis. China’s fossil fuel emissions are second to the USA, and India’s emissions have surged by nearly 50% since 1990 (Benedick, 2000).

In relation to the consumption of aviation travel, industrialised country airlines accounted for 80% of air traffic in 1995 (Michaelis, 2000) and are the primary focus here. Nevertheless, it is pertinent to note that developing country contributions are growing rapidly. For example, Boeing (2000) projects that China will continue its rapid aviation development in the 21st century and will eclipse all other aviation markets except the United States. Specifically, a market for 1,790 new aircraft valued at $US 137 billion is forecast for the next 20 years. This is linked to a forecast average growth rate of 9% per year for China’s domestic market over the 20 year period, compared with an average growth rate of 4.8% per year for world air travel.

Although it has been argued that the effects of population growth can be offset by changes in consumption habits and more efficient technologies, an Australia Institute study shows that Australia’s population growth has been one of the main factors driving growth in domestic greenhouse gas emissions (Turton & Hamilton, 1999). A large proportion of Australia’s recent population growth can be attributed to high rates of immigration.
What is relevant for Chinese industrialisation processes (and in particular the aviation growth example) are the difficulties created when both population and resource use are increasing. As Turton and Hamilton comment: “Changing energy-dependent lifestyles and shifting away from fossil fuels are hard enough without the added pressure of a rapidly growing population” (p. 1). For China, the probability of reaching a peak population within the next two decades is still low owing to its relatively young age structure. However, improvements in probabilistic forecasting indicate that by 2040 the probability of the population peaking becomes greater than 50% (Lutz, Sanderson, & Scherbov, 2001).

**Economics and globalisation**

The discussion so far shows that differing perspectives on sustainable consumption are closely associated with the debates about growth and the environment. These debates, whether in relation to “sustainable growth”, “sustainable tourism”, or “sustainable transport” for example, can only be assessed in a system-wide context. Here I address economics and globalisation as an aspect of the wider context.

In the past, economics and economic policy have displayed little concern about environmental issues. However, it is increasingly recognised that resource and pollution intensive growth may be getting closer to its limits, as natural resource depletion and environmental pollution take their toll (Organisation for Economic Co-operation and Development, 2002c). Nevertheless, uncertainty about the facts and disagreement over values has led to a fragmented debate. Hart (2002) provides a framework for classifying various economist’s positions, suggesting that the value differences underlying the positions depend on which “myth of nature” each proponent subscribes to. This approach parallels the spectrum of environmental thought discussed previously.

Well known figures who challenge mainstream theories on economic growth, liberal market ideology and globalisation include Herman Daly (2000) and Arne Naess (1989). The value positions underlying their approaches have been encapsulated in the term “ecologism” (Soderbaum, 2000), to describe the evolutionary and holistic nature of this thinking, in contrast to the mechanistic and reductionist character of neo-classical
economics. Thus, the new field of ecological economics challenges the very basis of conventional neoclassical economics, by recognising that human economies operate within the global ecosystem (Hamilton, 1997). Ecological economics assumes that the scale and design of human economies need to take account of the inherent uncertainties associated with ecosystem interactions, and uses a coevolutionary perspective of environment and society as one guiding framework (Norgaard, 1997).

Globalisation, in its often-used sense of “economic globalisation”, is strongly associated with the processes of expanded commodification and consumer capitalism, furthering the “growth of transworld capitalism” (Scholte, 2000). Although the instrumental processes of globalisation are often referred to—such as the spread of trade, the growth of transnational corporations, and the power of international financial markets—some e.g. Hamilton (2001b) contend that the ideology of growth and consumer capitalism are central defining characteristics. As he says (p. 190):

Globalisation represents not just the export and imposition of economic policies built on neo-liberal orthodoxy. It represents the export of a culture and a psychological disposition based on growth, compulsive consumption and the exploitation of the natural world.

An example pertinent to this thesis concerns tourism. In contrast to “travellers” of earlier generations, vastly greater numbers of “tourists” are encouraged to buy packaged and branded products, with the advertising of “exotic” places regarded as an important tool of the capitalist enterprise. Air transport has been critical for the expansion of tourism on such a large scale, and shopping malls attached to airports have helped embed shopping as a core ritual of tourism (Citrinot, 1999; Jansen-Verbeke, 1998). Advertising is promulgated through transnational mass media, and a global event such as the Olympic games has become as much a “gathering of the brands” as a “gathering of the nations” (Scholte, 2000, p. 115).

From another perspective, social democrats such as Rudd (2001, p. 159) argue that although “globophobia may constitute a satisfying political response to the complex challenges of globalisation for some … it does not constitute a credible policy response”. His position does not uncritically accept neo-liberal economic ideology, but does acknowledge “the positive contribution that economic globalisation is delivering to global security, development and society” (p. 149). In doing this, Rudd notes that the
“real multiplier” of economic globalisation has been the revolution in transport and communications technologies. Hence, “the global compression of transaction time and space is acting to create a genuinely global market, arguably for the first time in economic history” (p. 148).

This stance also acknowledges the negative impacts of globalisation, and favours a reformist policy approach. Scholte’s (2000) approach is similar, but acknowledges the significant challenge such a pathway represents, given the deep ideological and material roots underpinning laissez-faire, market led globalisation. More radical critiques of globalisation are not supported, given that a reversal of globalisation looks impractical in the short or medium term, and given that such critiques offer only “fairly vague and insufficiently convincing visions of alternative futures” (p. 288).

More specific reform policy measures draw on other meanings given to the term “globalisation”. Thus “public order globalisation” refers to governments working together to solve common problems (Suter, 2000, p. 9), and could include, for instance, suprastate mechanisms to reduce environmental degradation that go well beyond the existing measures. Another example is the introduction of progressive global taxes, such as the so-called “Tobin tax”, which would impose a charge on foreign exchange transactions. A further connotation for globalisation, “popular globalisation” (Suter, 2000, p. 9), points to a much greater role for global civil society.

With respect to my thesis topic, the reform of trade, including by air freight, is a case in point. Although “free trade” and “trade liberalisation” are very much part of neo-liberal orthodoxy, an “ecological trade” approach based on ecological economics, questions “the whole project of free trade” (Leveson-Gower, 1997, p. 148). If growth is to occur, it has to be “decoupled” from growth practices that are contrary to ecological sustainability and social justice. For example, international goods transport would pay attention to the carbon dioxide emissions generated by transport over long distances, and ensure that the full social and environmental costs are included in the market prices of products or services. In this regard, van Veen-Groot and Nijkamp (2000) surveyed the relationships between globalisation trends, international transport and global environmental change for the Dutch economy.
When environmental organisations advocate measures to reduce transport’s harmful impact (including from global aviation), they are effectively advocating a vision of a society in which less transport is needed because goods are consumed much closer to where they are produced (European Federation for Transport and Environment, 2003a). Similarly presaging a future focus on national and local economies, Daly (2000) argues that many relatively tractable national problems are converted into one intractable global problem, in the name of “free trade”. This occurs because each country seeks to expand beyond its own ecosystem and markets by growing into the ecological and economic space of other countries, and into the global commons.

**Ecological thinking and values, behaviour change and sustainable consumption**

It is clear from earlier discussion that many argue that reducing the environmental impacts from consumption, especially in the rich nations, requires major lifestyle changes. This is a large issue, encompassing the role of culture, values and individual psychology in motivating and shaping consumption behaviours. The issues of ecological thinking and values, and behaviour change in relation to sustainable consumption constitute extensive areas of research. Here, I address some significant findings from these areas, particularly for their relevance to a subsequent section on policy development.

One pertinent example is an OECD project conducted on sustainable consumption and individual travel behaviour (Organisation for Economic Cooperation and Development, 1997b). A strong message from the report is that travel behaviour is only marginally related to fundamental values and preferences. Rather, travel patterns and levels are more likely to result from a combination of habits and circumstances. The individual behavioural aspects of travel were de-emphasised in the report, with individual travel behaviour seen as constrained within a wider socio-cultural web of institutions such as the media, the retail sector, industry and governments. Thus the report concludes that these higher-order actors are best targeted, as policy measures focusing only on individuals in these networks will most likely fail to bring about substantial shifts in travel behaviour.
The difficulties in tackling consciousness change as a change strategy are also borne out by comparing models used to understand responsible environmental behaviour (Hines, Hungerford, & Tomera, 1986/87) on the one hand, and the travel decision process (Hudson, 1999) on the other. Responsible environmental behaviour has been linked to a variety of personality factors, and also depends on the individual knowing that a problem exists, before he or she can intentionally act on a particular environmental problem. In addition, an individual must possess knowledge of the courses of action available to address the problem. Further, there are a variety of situational factors such as economic constraints, and social pressures to choose differing actions, which may counteract or strengthen other variables in the model. A typical “consumer behaviour” model of the travel decision process, on the other hand, frames the issues in terms of customer goals, travel opportunities, communications effort, and other variables such as the cost and time involved, assessment of travel risks, and previous travel experience.

Comparison of these models reveals the range of issues involved in decision-making processes. For example, the consumer behaviour model includes as an important element various travel stimuli such as advertising and promotion, and indicates where marketing action can be used to influence the decision-making process. The responsible environmental behaviour model in contrast raises the question: At what point will a person forego economic and other personal benefits to preserve the integrity of the environment?

Some social science research on environmental consciousness and behaviour reveals that there is a dilemma between the common good and individual cost-benefit calculations, and that this has an effect on environmental behaviour. Brand (1997) contends that the classical assumption that a high level of environmental knowledge leads to high environmental consciousness, and consequently to matching environmental behaviour, is not supported by the empirical findings. Rather, because of a variety of situational and infrastructural factors, environmental consciousness has been shown to account for not more than 10-20% of variance of (mostly) self-reported behaviour. Thus, for example, the lifestyles of a number of older, immobile, traditionally thrifty people who show no pronounced environmental consciousness, is better (at least in terms of impact), than those of environmentally conscious, in many
ways ecologically correct, academics who are highly mobile in pursuit of work or leisure.

Similarly, Gatersleben and Vlek’s (1998) study of Dutch consumers in the context of household metabolism and consumption in Europe found that:

- Dutch consumers will keep on buying consumer goods as long as they have the (increasing) opportunity and ability to do so.

- Most respondents considered household consumer behaviour should become more environmentally sound, except for moving to a smaller house and taking holidays closer to home. However, this generally did not motivate them to change their behaviour, even in those people who were more aware than others of the environmental impacts of their behaviour. For example, respondents agreed that it was necessary to reduce use of the car, but judged it only slightly possible to do so.

- Income and household composition were shown to be the most important variables influencing consumer behaviour, with level of education having a minimal effect.

In summary, the above body of work suggests that it is typical for most people, except the most environmentally committed, for utilitarian and instrumental values to often prevail over environmental values, in determining behaviour in relation to the environment. The effect of positive environmental values is constrained by the influence of prevailing incentives or disincentives to adopt sustainable practices. Environmental attitudes have much less effect on behaviour when external incentives or disincentives are strong (Guagnano, Stern, & Dietz, 1995). That is, the more difficult, time-consuming or costly the behaviour, or if the behaviour is not required or tangibly rewarded, the less the influence of pro-environmental attitudes is on that behaviour being adopted. For example, forgoing the convenience of a private car, especially in cities constructed around this form of transport, is a disincentive in conflict with pro-environmental desires to use more sustainable public transport forms.
Therefore, as suggested in Maskit’s (2000) critique of deep ecology and the problem of consumption, policy changes appear to be needed to force even those who “know better” to behave in a way that is commensurate with their beliefs. Because “the practical effects of Self-realisation may lag behind the transformations in a way that Naess does not acknowledge” (p. 224), Maskit argues that policy changes are necessary for modifying our behaviours. This returns the emphasis to politics, as expressed in particular in the sixth point of the deep ecology platform (DEP) (Naess, 1995b), namely the need for deep changes in policies affecting basic economic, technological and ideological structures.

The relationship between policy changes and people’s consciousness can be further clarified by considering a typical model for environmental education, which usually focuses on factors such as awareness, understanding, values, and taking action. The understanding segment of the four-stage environmental education model is important, as such an understanding influences the potential remedies for problems. It also demonstrates the disadvantages of incorrect perceptions. For example, an extensive study of mental and cultural models of people in the USA, especially in relation to climate change, revealed the common misconception that such change is caused by the ozone hole (Kempton, Boster, & Hartley, 1995). Similarly, energy efficiency was poorly understood and rarely mentioned as part of the solution to global warming. Surveys in Europe, on the other hand, have demonstrated a better understanding of renewable energy and energy conservation, but as in the USA, find the misapplication of the ozone hole model to global climate change. If most people support a cultural model inappropriately, majorities then support policies that are unlikely to be effective. For example, banning CFC spray cans is incorrectly seen as more effective than energy efficiency in preventing global warming.

It is apparent that although environmental educators have enjoyed successes, often their messages have limited success, or even fail (Buchan, 2000). The complex nature of global environmental problems such as global warming is one barrier, with the causes and consequences being large in scope and distant across time and space, which obscures individual and social perceptions. Burke (2001) thus concludes that the “dilemma of the commons”, where the dilemma is between maximising individual benefits and avoiding collective ruin, does not arise, because of users’ lack of
knowledge of the collective costs. Rather, the costs of modern resource use are likely to be misinterpreted and marginalised in daily behaviour, if not altogether ignored.

Although committed to a social learning approach, Milbrath (1989) also acknowledges the strong barriers to social learning and social change. Given the deeply embedded nature of belief systems together with the reinforcement of dominant belief systems every day through activities such as modern advertising, he concludes that the presentation of research findings and reasoning is insufficient for social learning. Although a rational approach is helpful, it is seldom persuasive in itself. Hobson (2001, p. 193) similarly critiques programs based on filling the public “information deficit” surrounding environmental issues as offering an “impoverished view of the complexity of human-social engagement”, and suggests that the assumed direct link between information and behaviour is based on positivist models of behaviour change.

These observations were borne out in the earlier mentioned survey of initiatives to promote sustainable consumption in Australia (Department of the Environment Sport and Territories, 1996b). The levels of success for initiatives that relied on information alone were low, although the use of promotion combined with educational efforts improved outcomes to a degree. Success levels were high with obligatory or coercive initiatives where compliance was mandatory (or perceived to be so), or avoidance was difficult, as people had no choice but to act in an environmentally responsible way.

A more sophisticated way of initiating change at the social learning level is found in the Global Action Plan (GAP) groups involving discussion and support within community networks over a number of months (Hobson, 2001). What is critical here is a shift from “practical consciousness” to “discursive consciousness”. Routine and habitual consumption is likely to involve practical consciousness that is rarely questioned, whereas a change in consumption practices is facilitated by debate about behaviours taken for granted. For example, the global warming issue can include discussion of the implications for those in industrialised countries of the current internationally inequitable pattern of greenhouse gas emissions. This leads to the idea of a “greenhouse gas budget” that is both ecologically sustainable and globally equitable. Lenzen and Smith’s (1999/2000) arguments to achieve global equity imply a figure of 3.5 tonnes of
carbon dioxide per capita per year, thus requiring drastic reductions in Australia and the USA.

Patently, a central theme in this section is the role of the individual vis-à-vis approaches that depend on agreed collective action or coercion. My thesis topic, being linked to air travel and tourism, demonstrates well the web of institutions within which consumption occurs—including alliances between governments, global businesses, financial institutions and the media. The linkages between these groups can play a dominant role in determining societal norms through narrative and symbol, including the use of advertising through the mass media (Michaelis, 2000).

Questions about what is responsible travel behaviour confront firstly the increasing number of tourists and their environmental impacts, as expressed in the equation $E = NB$, where $E$ is environmental impact, $N$ is the number of people, and $B$ is their behaviour (Dovers, 1994). Further, the complex nature of global environmental problems such as global warming and the range of situational and infrastructural barriers to appropriate action underline the difficulties involved in targeting individual actions.

With respect to individual change, intensive community based programs that involve deeper questioning (Hinchcliff, 1996), and a discursive review of habitual consumption patterns, appear to be the most effective. In addition to initiatives such as the Global Action Plan discussed above, transformative learning experiences of this deeper kind have been associated with fundamental changes in perspectives, feelings, values and ways of living, as evidenced in a four month course on global futures with a group of adult learners and graduate students at the University of Toronto (Rogers, 1998).

At the collective level, new alliances working for cultural change might include schools, universities, religious institutions, community groups and local governments (Michaelis, 2000). Ideally governments, the media, and business might be involved as well, but it is clear that few liberal democracies have advanced propositions that seriously challenge current consumption patterns, thereby endangering the prevailing economic growth agendas. Milbrath (1989, p. 376) contends that nature itself is likely to be the most unsettling spur to new thinking. By virtue of increasingly erratic weather patterns and
their consequences, “climate change is likely to be the most insistent and persistent
teacher”. Such a threat underscores the necessity of political leadership. As Murphy
and Cohen (2001b, p. 235) say:

The use of fossil fuels is so central to lifestyles in affluent countries, and the
amount of change required over a relatively short time-scale is so great that it is
difficult to imagine publics acting quickly enough without leadership and
coercion.

Politics, policy and futures

The above analysis reinforces the fact that sustainable consumption is both a political
and a policy issue. Inevitably, normative issues about the definition and nature of
sustainable development as a general goal sit along side more policy-oriented issues
such as how sustainable consumption is to be achieved and what instruments are best
used for this purpose.

Typically the complexity of the issue is framed with an agenda like the following one
from the OECD, quoted in Cohen (2001, p. 32). It catalogues a series of tasks
including:

The need for better knowledge of present consumption patterns; the challenges
remaining to define a framework and set of goals for government to address
consumption patterns as a coherent issue; the opportunities to influence
lifestyles and consumption through practical, value-neutral measures; the
importance of influencing the broader network of actors and institutions which
shape individual consumption patterns; government measures to empower the
individual consumer to make positive changes; and the need for the underlying
macro-economic framework to encourage rather than obstruct progress towards
more sustainable consumption and production patterns (Organisation for
Economic Cooperation and Development, 1997c).

However, a closer examination of the consumption issue is potentially threatening as it
confronts the fact that profound changes in consumption are required to achieve a
sustainability transition. The emergence of global environmental issues that are
challenging governments, and the recognition that such issues require more than
technological solutions, raises basic questions about the nature of societies and the
social dimensions of these ecological dilemmas. Nevertheless, because of potential
threats to economic growth mechanisms, Cohen (2001, p. 35) believes that it is
“unreasonable to expect the prevailing discourse around sustainable consumption to include in the foreseeable future unequivocal calls for restraint”.

These dilemmas appear in the initial policy formulation phase of the policy cycle too. Rist (2000, p. 1007), for example, is a proponent of the value of qualitative research in identifying, understanding and defining policy problems. He also notes, however, that the “the pressures and structural incentives in the policy system all go in the other direction. To wit: Develop short-term proposals with quick impacts to show responsiveness and accommodate all the vested interests in the iron triangle”.

The short-range orientation of policy analysis contrasts with the long-range theoretical and action orientation of futures studies (Inayatullah, 2002). Whereas policy analysis is concerned with analysing the viability of particular policies, futures studies, especially in its critical dimensions, is concerned with making basic assumptions problematic. Where policy analysis is goal oriented, futures studies is vision oriented, examining a range of futures. Where policy analysis often takes a limited view of knowledge approaches, futures studies attempts to acknowledge the differing ways in which individuals construct the world.

“Policy Reform” is one of a series of futures scenarios proposed by the Global Scenario Group (Raskin et al., 2002), with aspects of all the scenarios put forward currently in evidence. These scenarios vary in their underlying philosophies and responses:

- “Market Forces” depends on market optimism, assumes a world of accelerating economic globalisation, and regards well functioning markets as the key to resolving social, economic and environmental problems.

- “Policy Reform” depends on government action to constrain markets, with sustainability policy shaping a planetary transition. This is the perspective that informed the Brundtland report (World Commission on Environment and Development, 1987), and which generally influences policy discussions on sustainability.
• “Breakdown” envisions a world calamity, with population and economic growth leading to ecological collapse, international conflict and institutional disintegration.

• “Fortress World” is a variant of “Breakdown”. In this case, authoritarian leadership and the armed forces are used to re-establish order and to prevent a collapse into “Breakdown”.

• “Great Transition” is guided by sustainability philosophy and progressive global social evolution, with an involved global citizenry advancing a new development paradigm encompassing quality of life and a strong ecological sensibility. New roles for business and government, new values and participation by citizens, and the importance of civil society organisations are characteristic features.

One possibility the Global Scenario Group envisages is the phased emergence of a “Great Transition” as time proceeds. Initially, the “Market Forces” scenario still dominates until its internal contradictions lead to a global crisis. “Policy reform” ascends in the wake of the crisis, particularly in the period after 2015. Eventually, the “Great Transition” scenario asserts itself more strongly as the gestating popular desire for changes in lifestyle, values and technology becomes widespread. This portrayal of futures transitions serves to highlight the issue that the “Policy Reform” scenario is eclipsed by the “Great Transition” era, signifying more fundamental shifts in consciousness and values.

This sequence of the rise and fall of the strength of each scenario suggests that broad transformations in policy will be matched by changes in consciousness (Maskit, 2000; Naess, 1989; Wilber, 1996). Applying Wilber’s quadrant model (Figure 2.3) shows that making the needed social and economic changes to address global problems such as global warming requires not only the setting of national policies and the implementation of international treaties by governments, but also the understanding and active support of civil society. Further, the constructive synergies between the quadrants necessary for sustainability, avoids the contradiction of environmentally beneficial beliefs and actions
being opposed by barriers to action such as structural constraints or ineffective financial incentives.

However, in the shorter term, given that progressive “Policy reform” can begin to have a positive impact on various indicators of sustainability, and given that governments have more tools at their disposal than other actors, a consideration of the various policy instruments that can be used to influence sustainable consumption is relevant. These instruments fall into four broad groups (Jager, van Asselt, Rotmans, & Vlek, 1999; Organisation for Economic Cooperation and Development, 2002b):

1. *Regulatory (command and control) instruments* are typically applied to producers e.g. pollution control, product standards, and extended producer responsibility. Legislation directed at “consumers” is less common (“thou shall consume in a sustainable way”), but includes, for example, restrictions on water use in times of drought.

2. *Economic instruments* include full-cost pricing, environmental taxes and charging, green tax reform, and the removal of environmentally harmful subsidies. The use of price incentives to influence individual behaviour is typically strongly favoured by economists, although price is only one of a number of factors influencing people’s behaviour. With respect to producers, significant subsidies provided to airlines, for example, are strongly questioned by environmental groups, with a recent study estimating that three of Europe’s top airlines receive around 20% of their operating revenue from subsidies (European Federation for Transport and Environment, 2003b).

3. *Social (information) instruments* include awareness raising and information directed at “consumers”, and voluntary eco-labelling schemes used by “producers”. As discussed earlier, this approach works well for the so-called “easy choices” such as joining recycling schemes. It is much less effective, however, when the disadvantages to “consumers” increase, as in the case of getting people to switch from private cars to public transport.
4. **Provision of physical alternatives and rearrangements, and using design for sustainability** includes the development of ecologically benign technologies, and infrastructure changes that facilitate people taking sustainability into account in their decision-making.

These four general strategies can be directed at individual “consumers”, at organisations in industry and public services, and also at the more macro-level of states and international organisations (Jager et al., 1999). An OECD study recommends that a mix of instruments is generally used to best advantage (Organisation for Economic Cooperation and Development, 2002b).

The necessary political will and the value positions underlying the application of these instruments strongly affects their effectiveness. Governments strongly aligned with a “Market Forces” scenario are unlikely to pay attention to widespread social and environmental externalities, thus sending a message to the public that it is acceptable to continue consuming along present lines. Similarly, top-down informational campaigns directed at individual behaviour change enable such governments to avoid confronting the contradictions between ecological stewardship and economic growth. That is, “consumers” in a sense inherit the regulatory responsibilities that the state has cast off (Cohen, 2001).

On the other hand, governments founded on Social Democratic and Green Party value orientations can apply these instruments in more progressive ways. Influencing the context of consumption could, for example, include changes to educational curricula, and the encouragement of public debate on the relationship between consumption and quality of life. Confronting, and perhaps regulating, advertising that portrays unsustainable behaviour as desirable is another possible strategy. Akin to the earlier conclusion about the need to engage people in dialogue about their consumption practices and the resulting impacts, Gereluk and Royer (2001) have proposed strategies to make workplaces centres of learning, as one way of facilitating the transformation of “consumers” into “environmental citizens”.

The design for sustainability approach is preventive rather than remedial in focus, and can bring progressively greater environmental benefits as an expanded view of design is
applied. Design concepts based on “shallow” adaptive or substitutive change need to be distinguished from those based on “deep” more fundamental change (Hill, 1999). Thus some strategies redesign what is consumed, or make existing products more resource efficient; others reorganise the way consumption takes place; and others question the need fulfilled by the object, service or system (Fletcher, Dewberry, & Goggin, 2001). Corresponding examples in the transport area include the use of economically viable fast tilt trains that travel at 150 km/h, and are ecologically advantageous over cars or aircraft for short haul trips; the design of car free city districts supplemented by bicycles and rented or shared cars for special missions and holidays; and the use of videoconferencing to replace business trips, given that not all transport demand is based on a genuine need for mobility and meeting people face to face (von Weizsacker et al., 1997). The latter approaches can increasingly threaten the consumer culture central to the “modern project” and its associated vested interests.

As foreshadowed at the beginning of this chapter, an examination of sustainable consumption invites consideration of a much wider context that includes issues linked to ecological sustainability, economics and globalisation, and fundamental changes in how societies operate. The contested nature of some of the concepts involved, such as “sustainability” and “globalisation”, is important to keep in mind when narrowing the focus of inquiry to the consumption of aviation and air travel, as occurs in Chapter 3.
CHAPTER 3
THE GROWTH OF AVIATION AND SOME MAJOR CONSTRAINTS

A no-growth solution is simply unacceptable. Sir Richard Branson, Chairman of Virgin Atlantic (Done, 2002).

An unquestioning attitude towards future growth in air travel, and an acceptance that the projected demand for additional facilities and services must be met, are incompatible with the aim of sustainable development (Royal Commission on Environmental Pollution, 1994, p. 75).

Commercial aviation is most vulnerable to the coming decline of conventional oil, the transport mode least able to adapt (Fleay, 1999, p. 33).

In this chapter I narrow the focus on sustainable consumption in Chapter 2 to the more specific topic of aviation travel and aviation futures. This includes an overview of issues influencing and driving growth-oriented aviation futures, and an analysis of some major ecological and resource constraints. As background for a number of alternative scenarios considered in Chapter 4, the following four broad theme areas are reviewed:

- current growth-oriented accounts of world aviation futures, with particular reference to their ecological ramifications (especially climate change)

- a significant travel theory related to the future mobility of the world population

- the globalisation of tourism, in order to give an economic and political context for aviation futures

- the decline of conventional oil and its significance for aviation.
Air travel has been predicted to grow substantially in the decades ahead as shown by aviation industry projections, and as reflected in scenarios linked to the globalisation of tourism, and travel theories related to the future mobility of the world population. On the other hand, aviation futures are increasingly contested on ecological, resource, security and health grounds.

In the next chapter, I address policy issues and critique aviation futures in greater depth, including the application of Causal Layered Analysis (CLA), a layered futures research method, to a range of qualitatively based scenarios. My aim in Chapters 3 and 4 is to provide a more holistic account of aviation, mobility and communications futures and their policy and futures implications. The constraints arising from health and security considerations are also discussed in more detail in the next chapter.

Before presenting the analysis of growth-oriented accounts of aviation futures, I first address the ecological ramifications. Generally in this chapter a worldwide focus is taken, but in some cases more detailed examples and data from the Asia Pacific region and Australia illustrate the themes discussed.

**World aviation futures—an ecological context**

The range of ecologically contentious issues surrounding the growth of aviation extends from global climate change to the effects of aircraft emissions on local environments, including the effects of aircraft noise on people living near airports and under flight paths, and deterioration in local air quality. As the focus of the analysis is extended to quality of life and health, and landscapes, habitats and biodiversity, it becomes clear that the ramifications of airport development and increasing air travel are far reaching (Table 3.1). The fact that we are living during the end of the “age of oil” raises concerns about the wisdom of the increasing use of this non-renewable resource largely for non-essential transport and travel. Furthermore, the “embodied” greenhouse emissions associated with the increasing production of aircraft and consumer oriented commercial developments located at airports are substantial (Citrinot, 1999; Lenzen, 1999).
Table 3.1. Environmental impacts and problems associated with civil aviation
Based on several sources (Janic, 1999; Penner et al., 1999; Price & Probert, 1995).

<table>
<thead>
<tr>
<th>Impacts and problems</th>
<th>Specific issues</th>
</tr>
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| Aircraft noise                     | - Noise near airports caused by aircraft operations  
- Noise under flight paths en-route  
- Night noise and sleep disturbance  
- In the case of supersonic aircraft, sonic boom  
- Engine testing and other noise sources at airports |
| Local air pollution near airports  | - Aircraft engine emissions  
- Emissions from airport motor vehicles  
- Emissions from airport access traffic  
- Emissions from other airport sources |
| Global climate change              | - Subsonic aircraft fly in 9 to 13 km range with radiative forcing from CO₂, NOₓ, and contrails  
- Supersonic aircraft cruise at 17 to 20 km and water vapour gives dominant radiative forcing |
| Airport/infrastructure construction| - Loss of land, so-called “land take”  
- Habitat loss and impacts on flora and fauna  
- Soil erosion and construction impacts on water tables, river sources and field drainage |
| Water and soil pollution near airports | - Water and soil pollution caused by leakage from storage tanks  
- Water pollution from inadequate treatment of contaminants in airport waste water  
- Nature of de-icing chemicals used and associated water pollution (cold climate areas) |
| Airport waste management           | - Disposal of environmentally harmful materials used in aircraft servicing and maintenance  
- Disposal of waste from the airport and incoming traffic |
| Congestion and delays              | - Airport and en-route congestion and delays |
| Aircraft incidents and accidents   | - Accidents or incidents involving passenger death or injury  
- Other problems arising from aircraft accidents e.g. fire  
- Emergency fuel dumping and pollution |
To fully account for all the issues and associated ramifications of aviation, a systems approach as used in life-cycle assessment (LCA) (Curran, 1996) is required. Such an assessment would encompass issues such as the use of natural resources (particularly non-renewable forms such as oil); materials and energy use, for example in the manufacturing of aircraft and associated infrastructure construction and maintenance; waste generation (solid, waterborne and air emissions); ecological health; and human health and safety. Upham (2003, p. 6) argues that only through such a process, linked to protocols for allocating consumption and emission quotas, can one accurately assess the sustainability of an industry or sector. Likewise, Whitelegg (1997, p. 107), in considering sustainability targets, asserts that any calculation of transport’s contribution to unsustainability must include the whole productive cycle.

Full LCA is complex, difficult and expensive to carry out, however, and beyond the scope of this thesis. The systems analysis approach used in life cycle assessment is nevertheless useful here at a conceptual level in emphasising the large socio-technical system surrounding aviation that is supported to a considerable extent by economic subsidies from governments (Neilsen, 2001, p. 29). The key components of this system are shown in Figure 3.1 and encompass a wide variety of materials including aluminium, steel and plastic (aircraft), concrete (roads, airports and runways), and computers and satellites (for navigation, air traffic control and administration). The social and cultural aspects of the system include, for example, the way in which aircraft production, operation and maintenance have become integrated within global and local economies, and the value and meaning of personal mobility for the various leisure and business users of the system.

In relation to materials intensity, Whitelegg (1997, p. 25) summarises the matter by saying that the amount of concrete, tarmac, metal, plastics, glass and composite materials going into transport (including aviation) and its infrastructure is a serious cause for concern. In a study focused specifically on the total requirements of energy and greenhouse gases associated with Australian transport (Lenzen, 1999), the indirect requirements of energy and greenhouse gases linked to a given transport task were found to be a significant proportion of the total energy and greenhouse gases. The direct requirements are linked to fuel use, whereas the indirect requirements are those incurred during the extraction, mining, storage and distribution of these fuels as well as
those embodied in the goods and services necessary for the transport mode under consideration. In the case of an aircraft, for example, this includes not only the energy and greenhouse gases required for manufacturing the aircraft, but also for mining and producing the iron and steel, aluminium and titanium, as well as other materials.

Figure 3.1. Key components of aviation’s socio-technical system
Adapted from Nielsen (2001, p. 30).

For most modes of transport, Lenzen found that energy consumption and greenhouse gases associated with the operation of transport are about a third of the total. However, in the case of general, regional and domestic aviation, operational (indirect) requirements exceed fuel requirements (p. 277). For example, domestic aviation has a
total greenhouse intensity of 0.49 kg CO$_2$ equivalent$^4$ per passenger-kilometre (pkm),$^5$ made up of 0.22 kg CO$_2$-e/pkm for direct fuel requirements and 0.26 kg CO$_2$-e/pkm from indirect operational requirements. On the other hand, international aviation has a total greenhouse gas intensity of 0.25 kg CO$_2$-e/pkm, made up of 0.16 kg CO$_2$-e/pkm for direct fuel and 0.09 kg CO$_2$-e/pkm for operational requirements. These data therefore show that especially operation requirements, and also fuel requirements per passenger-kilometre, decrease with increasing passenger task and average journey length.

In this chapter I argue that the dynamics and scale of growth in the aviation sector are clearly moving in an unsustainable direction. Trend analysis is used to provide a basis for investigating this increasing consumption, using various indicators for monitoring changes in “key resources” such as energy, and in “consumption clusters” such as mobility (United Nations Commission on Sustainable Development, 1998). Specific examples include, in the case of energy, emissions of greenhouse gases in gigagrams of CO$_2$ equivalent, and for mobility, distance travelled per capita by mode of transport.

Of the environmental issues listed in Table 3.1 above, climate change and noise provide the prime focus of analysis for my thesis. For reasons outlined subsequently in this chapter, climate change is considered to be a particularly significant issue for aviation at the global level. At the local level, aircraft noise is currently widely accepted as the most significant local environmental impact associated with the operation of airports (Callum Thomas & Lever, 2003), and is addressed in the case study in Chapter 5. In addition, climate change and aircraft noise are prime concerns of both conservative official bodies such as the International Civil Aviation Organization (ICAO) (2001a), and also of non-government networks of environmental organisations such as the Green Skies Network (http://www.greenskies.org).

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$^4$ Carbon dioxide equivalent (CO$_2$-e) is the mass of CO$_2$ necessary to have the same radiative effect as the mass of greenhouse gases emitted (i.e. the radiative emissions of carbon dioxide, methane, and nitrous oxide in the case of the “direct” greenhouse gases).

$^5$ Revenue passenger-km is a measure of the traffic carried by commercial aviation that takes into account distance flown. It is equal to the number of paying passengers on an aircraft multiplied by the number of kilometres flown, and is one measure of demand.
Depletion of the ozone layer is another environmental issue that has been linked to aviation, but supersonic aircraft are implicated in this case. At the altitude at which these aircraft cruise (17 to 20 km above ground level), the chemistry of nitrogen oxides (NO\textsubscript{x}) is responsible for the depletion of ozone and a consequent increase in the transmission of ultraviolet (UV) radiation. To date, only a limited fleet of supersonic aircraft has been developed in the form of Concorde, and it has now been retired for commercial reasons (Concorde grounded for good, 2003). Thus there does not appear to be a significant problem associated with ozone-related change and surface UV radiation from aircraft at present (Royal Commission on Environmental Pollution, 2002a, p. 14).

However, if a second-generation supersonic aircraft fleet was developed this issue could become important. Moreover, supersonic aircraft have a larger climate impact than subsonic aircraft, consuming twice the fuel per passenger-kilometre travelled, combined with the positive radiative forcing (warming) from emissions of water vapour (Penner et al., 1999, p. 9). For these reasons, Pastowski (2003, p. 193) suggests that an international agreement may be needed to ban the large-scale introduction of supersonic civil air transport.

The range of issues outlined in Table 3.1 together with a full accounting of direct and indirect energy and greenhouse gases are associated with serious and rising environmental costs that are not internalised in the full economic costs of air transport. Button (2001, p. 61) acknowledges the importance of taking account of these externalities, in spite of the difficulties of putting monetary values on items such as noise and air pollution. One such study that costed both social and environmental externalities (Banfi et al., 2000) is discussed here to give an overview of the relative impacts of a range of issues across various modes of transport (Figure 3.2).

Seven categories of externality are costed in Figure 3.2, although congestion was not taken into account here, but treated as a separate issue. The study covered European Union member states, Switzerland and Norway using 1995 as its base year. The assumptions and challenges in estimating external costs are again acknowledged, but carefully specified. For example, with noise, the valuation approach is based on a willingness to pay for silent space above 55 dB(A). With climate change damages, a
unit cost value of 135 Euro per tonne of CO$_2$ was used, although with air transport, unit costs were doubled to take account of the risks of emissions at higher altitudes.

![Figure 3.2. Average external costs for 1995 in Western Europe by transport mode and cost category linked to environmental and social externality: Passenger transport (without congestion costs) (Banfi et al., 2000, p. S-4).](image)

Across all categories of transport (not all are shown in Figure 3.2), external costs (excluding congestion) amounted to 530 billion Euro for 1995, this being 7.8% of total Gross Domestic Product (GDP). The most important cost categories are accidents (29% of total cost), air pollution (25%), and climate change (23%). The most important mode is road transport, causing 92% of total cost, followed by air transport, causing 6% of total external costs (for 1995). A trend forecast is made between 1995 and 2010 with total costs projected to increase by 42%. Transport growth, and in particular aviation growth, and the increased valuation of environmental damages are seen as significant drivers.

For aviation, climate change is a dominant factor. Out of the total average cost for aviation of 48 Euro per 1,000 passenger-kilometre, climate change contributes a cost of 35 Euro per 1,000 passenger-kilometre (see Figure 3.2). In the freight sector, the average external costs for aviation are significantly higher than the costs of other means of transport. The study found average external costs for aviation freight in 1995 totalling 205 Euro per 1,000 tonne-kilometre, with climate change contributing 154 Euro per 1,000 tkm of the total. An additional smaller but still significant contribution

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*6 Freight tonne-km is the number of tonnes of air freight times the distance carried.*
to climate change is attributed to an upstream processing component linked to factors such as the production and maintenance of aviation infrastructure. Of significance here is the prominence being given to air pollution and climate change as important and increasing factors in externality costs.

The difficulty involved in attaching monetary values to non-market phenomena highlights the question of how sustainability is to be approached in relation to aviation, and comes up against the contested nature and definition of sustainability explored in Chapter 2. Monetary valuation to avoid or accept damage is considered inappropriate for the valuation of systems people cannot live well without, such as a relatively stable climate, a healthy level of air quality or a quiet environment (Upham, 2003, p. 14). The issue of values vis-à-vis sustainability confronted in Chapter 2 thus now appears more specifically in discussions of the sustainability of aviation.

Aviation, sustainability criteria and sustainable transport

The issues of policy and aviation futures are addressed in more detail in Chapter 4. However, in relation to sustainability, some broad questions and issues are usefully introduced here. As Upham (2003, p. 10) observes, at the heart of environmental and sustainability debates are differences in perception and response to the scale of the growth in human economies.

Fawcett’s (2000, p. 33) approach, for example, is based on an ecocentric, “radical restructuring” perspective, and recommends a fundamental rethinking and reframing of the economic and social constructs driving aviation and airport infrastructure development. She considers that ecological integrity is not infinitely negotiable and that “the primacy of this dynamic needs to be more squarely brought to the fore”.

More typical of a position taken by business and government is that put by Dobbie (2003, p. 207), a former director at the International Air Transport Association (IATA). She argues that the negative environmental impacts of aviation are overly influential in policy-making, and that the facilities and services offered to society by aviation constitute a public good. Thus “aviation might be considered sustainable on account of its contribution to the development of a sustainable global economy, meeting today’s
needs while investing in the future”. Dobbie emphasises economic benefits and suggests that environmental impacts be “kept within limits acceptable to society”. This position is akin to the “rhetoric of reassurance” characterising the Brundtland discussions on sustainable development. Although acknowledging the place of the polluter pays principle in policy making, Dobbie refers to the original definition of the concept giving due regard to any potential distortion to the public interest and international trade and investment.

One way in which the concept of sustainable transport has been addressed is by the application of generic sustainability principles such as those developed by the OECD (Organisation for Economic Cooperation and Development, 1999, p. 12; Upham, 2003, p. 8) and those used in the Natural Step system (Yencken & Wilkinson, 2000, p. 107). For example, a sustainable transport (aviation) system is one for which ecosystem integrity is not significantly threatened and one where polluting substances emitted to the environment shall not exceed its assimilative capacity. A corollary to this principle is that potentially irreversible effects are avoided and adverse global phenomena such as climate change and stratospheric ozone depletion are not aggravated.

General criteria for a more sustainable transport system flow out of such generic considerations. For example, Whitelegg (1997, p. 105) lists the following:

- minimise dependence on fossil fuels
- cut consumption of raw materials
- reduce emissions of CO₂ and other greenhouse gases
- cut pollution to ground water and oceans
- minimise land use requirements
- reduce impact on habitats
- reduce soil erosion caused by transport infrastructure
- stop the use of ozone-depleting substances.

However, more specific considerations then arise in relation to the scale of the changes needed, the required timeframe, the dynamics leading to the possible unsustainability and the nature of the urgency for achieving the sustainability focus (Sutton, 2003). This
is reflected in critical thresholds and environmental targets in order to meet objectives set for “how far and how fast?” (Sutton, 2001; Upham, 2003, p. 14).

In the case of climate change, for example, the Royal Commission on Environmental Pollution (2000a, p. 2) recommends that atmospheric concentrations of carbon dioxide should not exceed a limit of 550 parts per million by volume (ppmv), this being a level approximately double the pre-industrial level and above which dangerous and destructive climate change would be likely. Others have suggested much lower precautionary threshold limits such as 350 ppmv (Sutton, 2001). However, if 550 ppmv is selected as the upper limit, the Royal Commission on Environmental Pollution (2000b, p. 57) concludes that UK carbon dioxide emissions would still have to be reduced from their current level by almost 60% by 2050, and by almost 80% by 2100. The policy implications of this type of objective for the aviation industry are explored further in Chapter 4. The issue is complex given the international nature of the industry and the variety of actors involved, as well as whether other sectors will be willing or able to make more stringent emissions reductions to compensate for the forecast increase in emissions from aviation (Royal Commission on Environmental Pollution, 2001, para. 15).

In addition, in Chapter 2 schemes for sustainability that encompass its non-material dimensions as well as its physical and socio-political aspects are discussed. Similarly, a broad ecological approach to sustainable transport systems suggests that the movement of people and goods occur in a way that encompasses personal or psychological issues as well as social and environmental criteria (Hill, 1999; Organisation for Economic Cooperation and Development, 1999, p. 12). As Lenzen (1999, p. 287) points out, energy consumption and greenhouse gas emissions are not the only issues to consider in deciding how to redistribute passenger and freight movement across transport modes. Cycling, for example, is a health promotion measure and increases people’s well-being. Faster and faster travel opportunities, particularly by air, are not only energy intensive and pollution creating. They also change the nature of time and place, and lead to spatially dispersed lifestyles where a sense of home or place consciousness is likely to become diluted, transient and scattered (Whitelegg, 1997, p. 60).
Ecologically sustainable transport therefore draws on principles other than mobility per se. In the example just given, the health and psychological consequences of a “hypermobile” lifestyle are considered. Access to people, goods and services may be achieved in ways that reduce or eliminate the need for the physical movement of people and goods. Futures visions for sustainable transport thus reframe the way in which transport questions are considered and constitute a paradigm shift mirroring the deeper questioning of sustainability explored in Chapter 2 (Centre for Sustainable Transportation, 1997; Litman, 2003; Organisation for Economic Cooperation and Development, 1997d, p. 35; 1999, p. 11).

**Aviation and climate change**

In relation to aviation and climate change, a major contribution was the publication in 1999 of the Intergovernmental Panel on Climate Change (IPCC) report, *Aviation and the Global Atmosphere* (Penner et al., 1999). Over 100 experts contributed to the report, and it was peer reviewed by another 150 experts worldwide. It concluded that although aviation contributes less to global warming than many other human activities, it does nevertheless generate a significant and fast growing percentage of human generated greenhouse gases. This IPCC report used a range of scenarios to estimate future air passenger travel demand (discussed in more detail further below), and the concept of radiative forcing (a measure of the importance of a potential climate change mechanism in affecting the heat balance of the earth's atmospheric system) to estimate the climate changing potential of emissions. Positive radiative forcing leads to global warming. Whereas the aviation-induced proportion of human induced climate change was 3.5% of the total in 1992, by 2050 it is projected to be up to 7% of the total for the mid-range scenarios, and up to 15% for the high-range scenarios (taking the expected technological improvements into account, such as more fuel efficient engines, and better airframe designs).

A significant issue for aviation concerns the combined effects of all aircraft emissions at the level subsonic aircraft normally fly (10 to 11 kilometres above ground), which are estimated to be about two to four times that based on carbon dioxide alone (Penner et al., 1999, pp. 8, 213). In addition to the direct radiative forcing effects of carbon dioxide, indirect greenhouse gases such as nitrogen oxides (NOx) are linked to the
formation of ozone in the upper troposphere, giving an additional greenhouse warming effect. Further, contrails (line-shaped condensation trails) are triggered by the water vapour emitted from aircraft and are linked to positive radiative forcing effects. The IPCC report also attributes small warming effects to the impacts of water vapour, sulphate and soot particles.

Considerably more uncertainty surrounds the state of knowledge for the warming effects of emissions other than carbon dioxide. Nevertheless, an increase in cirrus cloud cover is associated with aircraft emissions (in particular persistent contrails), and is associated with positive radiative forcing. Evidence provided to the Royal Commission on Environmental Pollution (2002b, p. 16) suggests that the relationship between air traffic and cirrus cloud is becoming more certain. In addition, further support for the positive radiative forcing effects of contrails is provided by a recent study that took advantage of the three-day grounding of commercial aviation in the USA following the 11 September 2001 terrorist attacks (Travis, Carleton, & Lauritsen, 2002). Over the period 11 to 14 September 2001, an anomalous increase of 1°C to 2°C in the daily temperature range was observed. The authors attribute this observation to the absence of contrails in this period, by suggesting that contrails reduce the daily temperature range by reducing the transfer of both incoming and outgoing infrared radiation.

These characteristics of aviation’s emissions have ramifications at both the policy level, and at the personal level in considering the idea of a personal “greenhouse budget” (Lenzen & Smith, 1999/2000). At the policy level, the IPCC report notes that aviation is an example of an industry that needs to take account of greenhouse gas emissions and the climate impacts of ozone and aerosols/clouds when evaluating the industry as a whole. A more specific way of expressing this uses the notion of the Radiative Forcing Index (RFI)—the ratio of total radiative forcing to that from CO₂ emissions alone. With an RFI of about 3, the IPCC report acknowledges that aviation’s role in climate change involves several important contributions beyond that from the release of carbon dioxide alone (Prather & Sausen, 1999, pp. 211, 213). The policy significance of aviation’s augmented climate impacts is also acknowledged in a US General Accounting Office (2000a) report that evaluated the IPCC report, and which was prepared for the Committee on Transportation and Infrastructure in the US House of Representatives.
Of significance at the personal level is the Centre of Sustainable Transportation’s (CST) (2000) analysis of the impacts of a 12,000 km return trip between Toronto and Paris. Given the slightly greater fuel use per passenger-km and the greater impact of burning that fuel at an altitude of 11 km rather than at sea level, each kilometre a person travels in the air is assumed to have the warming impact of three kilometres travelled by car. Assuming average occupancies of cars and aircraft, the global warming contribution of the 12,000 km aircraft flight is therefore concluded to be similar to driving a car for 36,000 km. As the average Canadian travels about 16,000 km per year by car, CST estimates that one such trans-Atlantic round trip is equivalent in global warming impact per passenger to more than two years of average car travel.

When equity and sustainability criteria (as discussed in Chapter 2) are applied to the consumption of aviation, the conclusions are striking. Apportioning the same right to pollute to everyone on the planet in a way that leads to the stabilisation of carbon dioxide emissions suggests that about 3.3 to 3.5 tonnes of carbon dioxide equivalent emissions per year per capita can be released (Lenzen & Smith, 1999/2000; Yencken & Wilkinson, 2000, p. 169). For purposes of comparison, the average per capita emissions of Annex B countries (i.e. industrialised nations that have signed up to emissions reduction targets), was 12.8 tonnes of CO$_2$-e in 1999. Australia had the highest level in the industrialised world at more than double the average, with 27.9 tonnes per capita in 1999 (Turton & Hamilton, 2002).

A study on aviation’s impact on the environment by the European Federation for Transport and Environment (1999, p. 14), used a figure of 1.5 tonnes of CO$_2$ per capita per year as a sustainable and equitable “greenhouse gas budget” (this figure is roughly the same in CO$_2$ terms as the CO$_2$-e figure of 3.3 tonnes referred to above). Taking account of the energy required for household purposes and heating leaves approximately a quarter, that is about 400 kg of CO$_2$, for personal mobility. Based on the fuel used multiplied by a greenhouse effect factor of five, the authors conclude that a Frankfurt-New York return flight (12,400 km in total) translates into six years of climate equivalent car driving, or the using up of one’s climate related transport budget for the next 10 years. The greenhouse effect factor of five seems unduly high, but the example nevertheless makes a useful point in underlining how just one long haul flight
can use up a personal greenhouse budget for several years. Websites are available to allow easy calculation of greenhouse gases associated with a planned trip based on distance, load factors and type of aircraft (e.g. http://www.chooseclimate.org/flying/index.html), with ignorance of the problem being identified as a significant issue.

**Aviation growth trends—past, present and future**

I now provide a detailed analysis of the scale and extent of aviation growth, as such projected growth has given rise to the increasing environmental concerns discussed above. For some, other concerns are paramount, such as the costs of aviation delays and the increasing congestion at major airports. For example, the World Travel and Tourism Council (WTTC) (2003, p. 8) asserts that the economic costs of these delays are enormous—as much as US$6 billion a year at European airports for example. In addition, the environmental costs as measured by unnecessary extra fuel consumption, are considered to be equally high. In WTTC’s assessment, these consequences of aviation growth should be addressed by urgently investing in new aviation infrastructure such as additional airport capacity and the expansion of runways and terminals at existing airports.

For others questioning the unconstrained growth of aviation, on the other hand, such forecasts lead to unrealistic and absurd conclusions. For example, the mid-range air traffic forecasts for the United Kingdom show passenger numbers at UK airports rising from 160 million in 1998 to 400 million in 2020, with aviation consultation documents projecting this forward to 500 million in 2030 (Department for Transport, 2000, para. 3.1; Sewill, 2003, p. 4). Sewill considers these forecasts for demand in 2030 to be quite unrealistic, as aviation would be growing at the rate of a new Gatwick airport every 18 months, or a new Heathrow airport every three years. Similarly Graham (2000) acknowledges that assuming demand is purely a function of time can be very misleading, and argues that limits to air transport growth must occur at some future stage.

Air travel has grown almost 100-fold since 1950, at an average annual rate of 9%. This rate of growth is 2.4 times the average Growth Domestic Product (GDP) growth rate.
Freight traffic, approximately 80% of which is carried on passenger aircraft, has also grown at 11% per annum since 1960 (Organisation for Economic Cooperation and Development, 1997a, p. 7; Penner et al., 1999, p. 3).

International air traffic has steadily increased its share of total world traffic (international plus domestic), increasing from 35% of the total in 1971 to 50% in 1992, to the current 60% of total world traffic. For example, of a total 3,017 billion\(^7\) passenger-kilometres performed in the year 2000, 1,778 billion were for international services (Bureau of Transport and Communications Economics, 1994, p. 42; International Civil Aviation Organization, 2003). Inversely, only about a third of the total (international plus domestic) passengers carried on world-scheduled services are international passengers (e.g. 538 million international passengers of a total of 1,656 million passengers in 2000).

The rate of growth of air traffic has slowed from the earlier 9% per annum rate to about 5% per annum. Forecasts about future aviation traffic levels come from a number of sources. These include international bodies such as the International Civil Aviation Organization (ICAO), national governments such as the Australian examples used in this chapter, non-government bodies such as the World Travel and Tourism Council, and aircraft manufacturers such as Boeing and Airbus.

Some forecasts are short to medium term in nature (five to 20 years), whereas others use a 50- or 100-year timeframe. Typical of the shorter-term forecasts are those released by ICAO in June 2001 (International Civil Aviation Organization, 2001b) for the period through to 2010 (shown here in part in graphic form at Figure 3.3).

The ICAO forecasts in terms of scheduled passenger traffic (in passenger-km) suggested an average annual rate of growth of 4.5% over the period 1999 to 2010, similar to the growth rate for the period 1989 to 1999. International traffic is projected to grow faster than total traffic, at 5.5% per annum for passenger-kilometres and 6.5% per annum for freight tonne-kilometres. Over the period 1999 to 2010, the annual total number of domestic and international aircraft departures on scheduled services is

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\(^7\) Billion = 10\(^9\)
projected to rise by almost a third and the number of aircraft-kilometres\(^8\) flown by almost a half.

![ICAO world air traffic forecasts worldwide for the year 2010](image)

**Figure 3.3.** Air traffic forecasts worldwide for the year 2010 using passenger-kilometres travelled Based on data in International Civil Aviation Organization (2001b).

Aviation industry projections generally are guided by “adaptive planning within the myth of predictability” leading to a “surprise-free expectation of the future, accepting maturity” and calling for “only incremental change to the established system” (Caves, 1995, p. 861). Such forecasts are usually based on the premise that the demand for air transport is determined primarily by economic development, with statistical analysis showing that growth in GDP explains about two-thirds of air travel growth (Henderson & Wickrama, 1999, p. 296). This is reflected in increased business activity and increasing incomes. Aviation demand is strongly linked to rising incomes, with people in higher income brackets showing a much higher per capita demand level. Growth in air travel is thus facilitated by rising incomes, and also by penetration into lower income groups (Hanlon, 1999, p. 17). The latter occurs with the trend to lower fares and the increasing prevalence of low-cost airlines.

Demand for air freight is similarly a function of economic growth, and is further stimulated by increasing trade and the globalisation of business. An increasing demand for overseas products, and in particular, perishable goods such as flowers, exotic plants,

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\(^8\) Aircraft-kilometres are calculated by multiplying the number of number of flights performed by stage distances. The sum of these products gives an industry-wide estimate.
fruit and vegetables is being observed, with civil aviation being used to transport such products over long distances (Organisation for Economic Cooperation and Development, 1997a, p. 37). Fawcett (2000, p. 36) notes that the procurement of such goods, often via the Internet, combined with rapid international air freight to enable fast delivery, is being celebrated as a new high value service sector. However, she considers this development as another example where the economic justification is strongly at odds with the ecological and resource implications.

Gillingwater, Humphreys and Watson (2003) analyse the environmental dimensions of the dramatic increase in air freight volumes linked to global supply chains dependent on air transport. In order to meet time sensitive movements, there is an increasing trend to use all-freighter air freight services. Typically older noisier aircraft such as the narrow-bodied Boeing 727 are used, and these are flown predominantly at night. The night-time impact of such cargo aircraft operations has been increasingly resisted by local communities because of noise nuisance and sleep disturbance, resulting in the imposition of curfews at airports. These authors conclude that “it is clear beyond doubt that if night-time air-freight operations are to continue at airports with nearby residential populations, then ‘business as usual’ is simply not an option for future growth” (p. 158).

The fundamental underlying assumptions of neoliberalism, namely continuing economic growth and rising GDP and incomes, are apparent in Current Market Outlook, the assessment of world air travel demand issued by Boeing each year. Even after the shocks to the airline industry of the terrorist events of 11 September, 2001 and the significant financial losses sustained, Boeing declares in its 2002 Current Market Outlook that “cycles are a regular part of the industry” and that “basic airline industry dynamics have not changed. The globalization of world economies and societies continues”. Further it emphasises that “the major driver of long-term air travel growth is economic growth. International trade, airline service improvements, and declining fares explain additional portions of traffic expansion” (Boeing Commercial Airplanes, 2002, pp. 4, 8, 10). Countervailing critiques of global consumer capitalism with respect to air travel are explored in this chapter and subsequently, but one term that captures the overconsumption quality is “growth fetish” (Hamilton, 2003).
Boeing’s 2002 *Current Market Outlook*’s 20-year projections (2002 to 2021) include the following:

- World GDP is forecast to grow by an average 2.9% per annum. GDP growth in developing regions may average over 4%, with China forecast to have the fastest growing GDP at 5.9% per annum.

- World revenue passenger kilometres (RPKs) are expected to grow at 4.9% per annum (two percentage points more than GDP), with regional forecasts varying from 2% to 9% per annum growth. For example, air travel (RPKs) in China is expected to grow at 7.6% per annum, with globalisation considered a major driver of China’s international travel demand. Oceania (including Australia and New Zealand) is projected to have an average traffic growth rate of 3.4% per annum.

- Cargo traffic growth is expected to grow at 6.4% per annum.

- The number of commercial aircraft (passenger and cargo) is expected to more than double from 15,271 in 2001 to 32,495 in 2021. Of the total number of 23,929 aircraft needed, 6,705 aircraft are expected to be replacements for aircraft retired from service, and a further 17,224 new aircraft are expected to be needed for passenger and cargo traffic growth (that is, about three quarters of the total number of new aircraft required). The largest share of aircraft deliveries is expected to be single aisle (57% of the total in 2021), with the market for B747 and larger aircraft considered to be small (4% of the total number in 2021).

- Where possible, it is considered that airlines will focus on frequent, non-stop services providing point-to-point services. Additional city pairs and frequencies are likely to be added to networks, demanding the maintenance of or reduction in aircraft size, as RPKs grow overall. Low-cost airlines are projected to increase their proportion of market share.
The impact of the low-cost airlines is strong now. An example concerns the passenger traffic across the English Channel to and from the UK. Ferry companies are currently facing a great challenge, as the low-cost airlines have significantly affected their market share. In 1996, 34% of cross-Channel travellers made the crossing by air; by 2000, the proportion crossing by air had doubled to 69% of the total (Peisley, 2003). This significant shift was facilitated by the low-cost airlines challenging the higher pricing for short-haul flights previously set by the established scheduled airlines. The low-cost airlines achieved this by filling their aircraft fully, rather than accepting the 70% load factor\(^9\) used by the scheduled airlines. The strong growth trend of the low-cost airlines is demonstrated by the fact that in the UK, for example, 29% of London Stansted airport passenger traffic was on low-cost airlines in 1998; in 2002, three-quarters of passengers were travelling on low-cost airlines such as Buzz, Ryanair and Go. On this basis, Stansted airport has been given approval for a GBP250 million expansion, including for a new terminal, to increase passenger capacity from 15 million passengers per annum to 25 million (Donne, 2001, p. 22; Peisley, 2003, p. 6).

The models discussed so far are more or less sophisticated extrapolations of past trends, and thus have the disadvantage of not being able to predict turning points (Organisation for Economic Cooperation and Development, 1997a, p. 50). In his extensive analysis of a range of forecasting approaches, including qualitative methods, time-series projections and causal models, Doganis (1991, p. 258) concludes that qualitative or causal techniques are more likely to achieve better outcomes and to better predict turning points than time-series methods. Nevertheless, he acknowledges that there are “so many exogenous and unpredictable factors that may affect air transport demand that forecasts beyond 3-5 years ahead must be thought of as being very tentative”.

The central problem confronting forecasting efforts is that no one can predict the future with any certainty and the only certainty about the future is that the unexpected will happen. As Faulkner (1994) observed, the mechanistic assumptions on which econometric and time series approaches to forecasting are based, are analogous to Newtonian physics in assuming constancy and linearity of relationships. Instead, he argues for the relevance of chaos theory to the forecasting process, and asserts that the

\(^9\) Passenger load factor is the number of passengers carried as a percentage of the number of seats available.
new developments in physics parallel the construction of socio-economic systems as open rather than closed, and as dynamic rather than static.

These issues have been highlighted in the aviation industry by a continuing series of shocks since the June 2001 ICAO projections discussed above. These include the terrorist events of 11 September 2001, ongoing terrorist threats since then, the impacts of the war in Iraq and the worldwide transmission of Severe Acute Respiratory Syndrome (SARS). This series of events resulted in falling demand and increased security costs for airlines, with the world’s scheduled airlines recording an estimated net loss of US$12 billion in 2001 (International Civil Aviation Organization, 2002). Even the short-term forecast of 7.1% growth in world aviation passenger traffic in 2003 faltered, because of the significant negative impacts of SARS on the aviation industry.

*Projected trends for Australian transport, and in particular aviation*

Understanding the trends in the consumption of Australian transport (and in particular aviation) is instructive not only because Australia is a developed nation, but also because of its already high per capita greenhouse emissions by world standards. Analyses of projected energy use and greenhouse emissions from Australian transport have been produced by the Apelbaum Consulting Group (1997), the Australian Greenhouse Office, and the Bureau of Transport and Regional Economics (2002), the latter being an update of earlier work by the then Bureau of Transport and Communications Economics (1995). An overview from the Bureau of Transport and Regional Economics (2003) describes a range of approaches across agencies, including “bottom-up” methods (modelling transport sub-sectors) and “top-down” models (working down to the sector as a part of the total economy). The results from the recent 2002 Bureau of Transport and Regional Economics Report 107 are primarily discussed here—its “bottom-up” projections are more conservative than the Australian Greenhouse Office projections that incorporate “top down” approaches.

The Apelbaum Consulting Group (1997, p. 159) report found that emissions from Australian transport had increased by 22.4 million tonnes or 21% between 1984/85 and 1994/95. Greenhouse gas emissions from domestic air transport grew by 61% during the decade 1984/85 to 1994/95. From 1994/95, annual carbon dioxide equivalent
emissions from domestic air transport were forecast to increase by 121% to 14,090 Gg (1 gigagram = 1 kilotonne) in 2014/15. During the decade 1984/85 to 1994/95, annual CO$_2$ emissions from aircraft servicing Australia’s international air travel doubled, and were forecast to almost triple over the period 1995 (15,543 Gg CO$_2$ equivalent) to 2015 (45,306 Gg CO$_2$ equivalent) (p. 166).

The increasing energy use and fuel consumed by transport are indicators of increasing consumption. In 2002, the Bureau of Transport and Regional Economics (BTRE) revised its base case, or “business as usual” projections of fuel use (and the associated greenhouse emissions). For example, an outline of the current and projected increases in fuel end-use$^{10}$ by domestic Australian transport is shown in Table 3.2. The amounts of oil and gas used by the various modes of transport have been converted to gigalitres of petrol (i.e. automotive gasoline) equivalent in order to allow meaningful comparisons.

Table 3.2. Projected increases in fuel end use by domestic Australian transport

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>1998 (GL petrol equivalent)</th>
<th>2020 (GL petrol equivalent)</th>
<th>Increase 1998-2020 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars</td>
<td>16.9</td>
<td>21.5</td>
<td>27</td>
</tr>
<tr>
<td>Trucks</td>
<td>5.0</td>
<td>7.3</td>
<td>46</td>
</tr>
<tr>
<td>Light commercial</td>
<td>3.7</td>
<td>6.3</td>
<td>70</td>
</tr>
<tr>
<td>vehicles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aviation</td>
<td>2.0</td>
<td>4.9</td>
<td>142</td>
</tr>
<tr>
<td>Other</td>
<td>2.1</td>
<td>2.5</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>29.7</td>
<td>42.5</td>
<td>43</td>
</tr>
</tbody>
</table>

*Note: Values refer to oil and gas end-use (i.e. do not include electricity consumption). “GL petrol equivalent” is gigalitres of petrol (i.e. automotive gasoline) equivalent consumption, on an energy content basis.

The comparisons show that total domestic fuel use is forecast to grow by 43% over the 1998-2020 period. Although fuel use by cars dominates in both 1998 and 2020, there is a decline in their proportional contribution to the total transport fuel use by 2020. Aviation exhibits the greatest modal increase in fuel use over the period with a 142%

$^{10}$ End use refers to emissions resulting solely from vehicle operation. In contrast, full fuel cycle emissions include end use plus those resulting from extraction and refining, power generation and energy distribution.
increase. The modal energy share for civil aviation increases from 6.7% of the total in 1998 to 11.5% in 2020.

Another study by the Australian Bureau of Agricultural and Resource Economics on Australia’s energy projections to 2019-20 confirms these projected trends (Dickson, Thorpe, Harman, Donaldson, & Tedesco, 2001, p. 27). It shows the transport sector to be the largest end user of energy in the Australian economy in comparison with the other sectors used including agriculture, mining, manufacturing, commercial and services, and residential. The projected growth in energy use for transport is 2.3% per annum from 1998-99 to 2019-20. Over this period, the transport sector is forecast to account for around 82% of the total increase in final consumption of petroleum, and 41% of the total increase in final energy consumption across the economy as a whole. In relation to air transport, its share of fuel requirements for the transport sector as a whole is projected to rise from 14.5% in 1998-99 to almost 23% in 2019-20, an annual growth of 4.5%. Strong growth is expected in both the domestic and international air transport sectors, with growth in energy use averaging 4.4% and 4.6% per annum respectively.

The BTRE study above also calculates projected increases in direct greenhouse gas emissions (i.e. CO₂ equivalent emissions based on the direct greenhouse gases carbon dioxide, methane, and nitrous oxide) for Australian domestic transport (Table 3.3). By 2010 (the middle year of the first budget period of the Kyoto greenhouse targets i.e. 2008 to 2012), the total transport emissions under base case or “business as usual” assumptions are projected to be 87.4 million tonnes or 47% above the level for 1990 (the Kyoto target base year). The modelling is based on the fact that Australian transport demand has been shown to be highly dependent on economic growth and population growth. In addition, trends in improving fuel efficiencies are included (e.g. it is assumed that by 2020 domestic aviation will improve its fuel efficiency by 28% in the base case scenario). More optimistic and pessimistic estimates than the base case are also made (Bureau of Transport and Regional Economics, 2002, pp. xviii, 151).

It is apparent from Table 3.3 that transport has an inherently high rate of growth in emissions, in contrast to the calls made for “deep cuts” in greenhouse emissions. An example of the latter is the recommendation from the Royal Commission on
Environmental Pollution (2000a, p. 4) for a 60% reduction from current annual carbon dioxide emissions by 2050. The other feature of particular significance here is that within the aggregate forecast growth in domestic transport emissions to 2020 (about 1.7% per annum), aviation is projected to have the strongest rate of growth (averaging about 4.4% per annum).

Table 3.3. Projected increases in greenhouse gas emissions from Australian domestic civil domestic transport—end use (Gigagrams of direct CO$_2$ equivalent) (Bureau of Transport and Regional Economics, 2002, p. 4).

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>1990 (Gg)</th>
<th>1998 (Gg)</th>
<th>2010 (Gg)</th>
<th>2020 (Gg)</th>
<th>% change 1990-2010</th>
<th>% change 1990-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars</td>
<td>34,220</td>
<td>39,170</td>
<td>47,792</td>
<td>50,110</td>
<td>40</td>
<td>46</td>
</tr>
<tr>
<td>Trucks</td>
<td>9,924</td>
<td>11,779</td>
<td>14,606</td>
<td>17,443</td>
<td>47</td>
<td>76</td>
</tr>
<tr>
<td>LCVs</td>
<td>7,397</td>
<td>8,489</td>
<td>11,547</td>
<td>14,431</td>
<td>56</td>
<td>95</td>
</tr>
<tr>
<td>Aviation</td>
<td>2,565</td>
<td>4,846</td>
<td>7,792</td>
<td>11,922</td>
<td>204</td>
<td>365</td>
</tr>
<tr>
<td>Other</td>
<td>5,569</td>
<td>5,329</td>
<td>5,700</td>
<td>6,303</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>59,676</td>
<td>69,612</td>
<td>87,437</td>
<td>100,208</td>
<td>47</td>
<td>68</td>
</tr>
</tbody>
</table>

Note. Values relate to energy end-use (i.e. do not include emissions from power generation for electric railways). Values relate solely to direct CO$_2$ equivalent emissions (i.e. radiative effects of emissions of carbon dioxide, methane and nitrous oxide). LCV – light commercial vehicle. “Other” includes rail transport, water transport, buses, motorcycles and unregistered off-road motor vehicles. For aviation, only domestic aviation emissions are included here. For Australian aviation emissions, domestic aviation fuel use accounts for 34% of total emissions and bunker fuel use (international aviation) accounts for 66% (see Table 3.4). 1990 was an anomalous year for Australian aviation as it was severely affected by an extended strike by airline pilots.

Of particular importance from a policy perspective for the strong growth in aviation emissions is the way in which greenhouse gases are taken into account. The earlier projections undertaken by the Bureau of Transport and Communications Economics (1995, p. 3) also took into account the effects of indirect greenhouse gases (carbon monoxide, oxides of nitrogen other than nitrous oxide, and non-methane volatile organic compounds). As these gases influence the atmosphere concentrations of the direct greenhouse gases, the earlier reported CO$_2$ equivalent emissions tend to be 10 to 20% higher than those calculated for the three direct gases (carbon dioxide, methane and nitrous oxide) used in the most recent projections (Bureau of Transport and Regional Economics, 2002, p. 2). The latter change was in response to the requirements of the Australian Greenhouse Office, for which the recent report was compiled (D. Cosgrove, personal communication, 16 June 2003).
Of greater significance though is the fact that neither the Apelbaum Consulting Group (1997) report nor the Bureau of Transport and Regional Economics reports take into account the enhanced radiative forcing effects from aviation discussed earlier, which give a radiative forcing effect about three times that from carbon dioxide alone. Given that other policy analyses (Centre for Sustainable Transportation, 2000; Royal Commission on Environmental Pollution, 2002a, 2002b; US General Accounting Office, 2000a) do not ignore this significant issue, it thus appears that the ramifications of the greenhouse emissions from Australian aviation discussed above are considerably understated.

Moreover, when international aviation linked to Australia is taken into account the ramifications are wider still. Air transport accounts for around 14% of total carbon dioxide emissions (CO\textsubscript{2}-e) from Australian fuel use. Of this share of total emissions, bunker fuel use (international aviation) accounts for 66% and domestic aviation accounts for 34%. However, emissions from international aviation are not included within the targets agreed under the Kyoto protocol, and there is no agreement on how to attribute emissions from international aviation to individual countries. The Bureau of Transport and Regional Economics (2002, p. 141) makes its projections for such emissions from the fuel uplifted in Australia. Around 42% of the fuel required for international air passenger movement to and from Australia is uplifted in Australia.\textsuperscript{11}

The familiar upward trending projections over time are apparent for aviation, with total domestic aviation projected to increase its carbon dioxide equivalent emission levels by 139% from 1999-2000 to 2019-20, mainly due to the scheduled airline market. The comparable value for international aviation emission levels (using fuel uplifted from Australia) is an increase of 258% over the same period (Bureau of Transport and Regional Economics, 2002, pp. 154, 166). The comparisons in Table 3.4 for projected emissions in the year 2020 are given in order show aviation’s full contributions vis-à-vis those from total domestic transport (the latter includes only domestic air contributions). Without including aviation’s enhanced radiative forcing component, total civil aviation emissions are projected in 2020 to be 36% of the value for total domestic transport.

\textsuperscript{11} This explains the proportionately larger values for international aviation emissions in the Apelbaum Consulting Group (1997, p. 219) report discussed above, as compared with the Bureau of Transport and Regional Economics (2002, p. 183).
emissions. To the extent that Australia is a representative country in world greenhouse
gas emissions trends, the combination of the rapid growth in the consumption of
aviation transport and the approximately three-fold radiative forcing effects from
aviation at altitude underlines this mode’s significant and increasing contribution to
global warming.

Table 3.4. Projected greenhouse gas emissions in 2020 for Australian aviation in
comparison with total Australian civil domestic transport—end use (Gigagrams of
direct CO\textsubscript{2} equivalent)
Based on data from tables in Bureau of Transport and Regional Economics (2002,
Appendix 3).

<table>
<thead>
<tr>
<th>Total domestic aviation (Gg)</th>
<th>International aviation (fuel uplifted in Australia) (Gg)</th>
<th>Total civil aviation (domestic plus international) (Gg)</th>
<th>Total domestic transport in Australia (Gg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11,921.9</td>
<td>24,318.3</td>
<td>36,240.2</td>
<td>100,208</td>
</tr>
</tbody>
</table>

*Note.* Values relate to energy end-use. Values relate solely to direct CO\textsubscript{2} equivalent emissions (i.e. radiative effects of emissions of carbon dioxide, methane and nitrous oxide). The aviation contribution to total domestic emissions is currently attributed to domestic aviation only.

The projections made rely strongly on the assumptions made. Higher incomes, for
example, lead to increased demand for travel, resulting in higher fuel consumption and
emissions. Increased load factors and larger aircraft, however, would partially
counteract this increase in fuel consumption. This is partially addressed by sensitivity
analyses that were undertaken, where the values for the underlying variables (such as
economic growth, population growth and fuel intensity) and the resulting emissions
projections are different from those used in the base case. However, the Bureau of
Transport and Regional Economics (2002, p, 167) also acknowledges that the
projections do not include any constraints on growth. If demand behaviour changes
markedly, for example by changes in consumer confidence, habits or travel mode-
preference, or if telecommuting replaces a significant share of business travel, then the
projected growth in aviation emissions would be unlikely to reach the levels forecast.
Predictions of traffic demands and emissions beyond the year 2015 are less certain because the probability of unforeseeable changes in key factors increases with time. The IPCC report (Henderson & Wickrama, 1999) presents a range of possible scenarios to investigate long-term projections to the year 2050, with a scenario being described as “a set of assumptions devised to reflect the possible development of a particular situation over time” (p. 310). The focus on forecasts is de-emphasised in this scenario development, although evaluation criteria are applied to check the plausibility of the various scenarios under consideration.

An example of a medium-range scenario for aviation demand from the IPCC report, prepared by the Forecasting and Economic Analysis Sub-Group (FESG) of the International Civil Aviation Organization (ICAO), is given in Figure 3.4.

**Figure 3.4.** World air traffic demand scenario to 2050 (Revenue passenger kilometres RPKs)
Based on International Civil Aviation Organization (ICAO) data for scenario Fe in Henderson and Wickrama (1999, p. 312).

This scenario (labelled ‘Fe’ by ICAO) is based on higher growth rates than their base case scenario, but is given here as an example as it is consistent with industry projections, and is below the higher projections of the US Environmental Defense Fund.
scenarios. Detailed analysis and evaluation of a range of scenarios from a variety of sources are covered in the IPCC report, with gradients flatter and steeper than the curve illustrated here. Although more exacting approaches than simple linear correlations between explanatory variables are used, the difficulties of constructing long-term scenarios are clearly acknowledged (Henderson & Wickrama, 1999, p. 320):

Long-term (beyond 20 years) projection of aviation traffic demand, fleet fuel burned, and fleet emissions are inevitably speculative. Difficulty in forecasting technological developments that might be appropriate for the long term, possible shifts in traffic demand, and myriad uncertainties resulting from human society’s development over the period in question all conspire to make long-term projections unreliable—sometimes astoundingly so.

Nevertheless, some representative examples of scenario data from the IPCC report drawing on studies by the International Civil Aviation Organization (ICAO), the Environmental Defense Fund (EDF) (Vedantham & Oppenheimer, 1998), and the UK Department of Trade and Industry (DTI) are shown in Table 3.5. The full range of studies reviewed was larger, with the EDF study, for example, producing 10 scenarios in all. The significant differences in projected traffic demand are explained by the varying underlying assumptions, for example in relation to economic growth and population growth. The ICAO Forecasting and Economic Analysis Sub-Group (FESG) study calculated three air traffic demand scenarios, which when combined with two different engine technology scenarios, produced a total of six emissions projections. (Three are listed in Table 3.5, with the first technology scenario (1) giving greater fuel efficiencies, and the second (2) assuming a more aggressive NOx reduction strategy.)

All of the 2050 scenarios suggest large increases in fuel consumption by aircraft with their associated carbon dioxide and other emissions. For example, the high ICAO scenario (Fe2) has fuel consumption increasing from 139 to 772 Tg yr\(^{-1}\) over the period 1992 to 2050. This would account for 13% of the total transport energy usage in 2050 and need 15% of the world’s liquid fossil fuel production. The high EDF (Edh) scenario shown in Table 3.5 has an increase in fuel consumption from 179 Tg yr\(^{-1}\) in 1990 to 1,689 Tg yr\(^{-1}\) in 2050. A still higher EDF scenario (Eeh) (not shown in Table 3.5) has fuel consumption increasing from 179 Tg yr\(^{-1}\) in 1990 to 2,297 Tg yr\(^{-1}\) in 2050. The latter case would imply aircraft accounting for 39% of transport energy usage and 45% of the world’s liquid fuel production (Henderson & Wickrama, 1999, p. 328).
Table 3.5. Summary data for the year 2050 from some long-term aviation scenarios
Based on data in Henderson and Wickrama (1999, p. 329).

<table>
<thead>
<tr>
<th>Scenario name</th>
<th>Traffic demand ($10^9$ RPK)</th>
<th>Calculated fuel burned (Tg yr$^{-1}$)</th>
<th>Calculated CO$_2$ (as C) (Tg yr$^{-1}$)</th>
<th>Calculated NO$_x$ (as NO$_2$) (Tg yr$^{-1}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base case ICAO (Fa1)</td>
<td>13,934</td>
<td>471.0</td>
<td>405.1</td>
<td>7.2</td>
</tr>
<tr>
<td>UK Dept of Trade and Industry (DTI)</td>
<td>18,106</td>
<td>633.2</td>
<td>544.6</td>
<td>4.5</td>
</tr>
<tr>
<td>ICAO high (Fe1)</td>
<td>21,978</td>
<td>744.3</td>
<td>640.1</td>
<td>11.4</td>
</tr>
<tr>
<td>ICAO high (Fe2)</td>
<td>21,978</td>
<td>772.1</td>
<td>664.0</td>
<td>8.8</td>
</tr>
<tr>
<td>Environmental Defense Fund base case (Eab)</td>
<td>23,257</td>
<td>1,143.0</td>
<td>983.0</td>
<td>7.9</td>
</tr>
<tr>
<td>Environmental Defense Fund high (Edh)</td>
<td>33,655</td>
<td>1,689.4</td>
<td>1,452.8</td>
<td>11.6</td>
</tr>
</tbody>
</table>

In evaluating the range of scenarios, an investigation by the US General Accounting Office (2000a) found that experts in the aviation, scientific and environmental communities all agree that the aviation industry will continue to grow globally and contribute increasingly to human-generated greenhouse gas emissions. However, they differ in their estimates of the rates of growth. Whereas some of the aviation industry representatives interviewed consider the mid-range scenarios for traffic projections and emissions to be too high, environmental groups like the Environmental Defense Fund in the USA (Vedantham & Oppenheimer, 1998), and environmental think tanks such as the Centre for Sustainable Transportation (2000) in Canada, argue that the medium and high-range scenarios are more consistent with industry projections, and with the energy projections of agencies such as the National Aeronautics and Space Administration (NASA). Thus, the ICAO scenario (Fe) shown in Figure 3.4 and Table 3.5 is closer to the projections of the UK Department of Trade and Industry than the base case ICAO scenario (Fa).

The IPCC report used three plausibility checks to evaluate the range of scenarios. These were: (a) the fleet size required to carry the projected traffic in 2050; (b) the possible constraints on airport and infrastructure development (the scenarios assumed
that sufficient infrastructure and capacity would be available); and (c) the implications of the demand for aviation fuel. On this basis, the authors conclude that the highest EDF scenarios are less plausible, as they would require radical developments in aircraft fleet size and associated infrastructure. Similarly, low-growth scenarios are likely to be exceeded given the present state of the industry and its planned development (Henderson & Wickrama, 1999, p. 329). The ICAO (FESG) scenarios are considered to fall within the plausible range of outcomes. In agreement with this assessment, Whitelegg (2003), a prominent academic in the transport field who has put the “no growth” case for aviation, considers that the most likely growth path is in the range between the ICAO base case (Fa in Table 3.5) and the higher EDF base case (Eab in Table 3.5) (Whitelegg & Williams, 2001, p. 8).

A more recent study (Olsthoorn, 2001), using an entirely different methodology from the IPCC report studies, provides further collaboration for the judgments above. Here, the methodology draws on relationships between the sales of bunker jet fuel, world crude oil prices and global GDP. Four scenarios were used to investigate the increase in CO₂ emissions from international aviation from 1995 to 2050. Three of these, with varying degrees of global development, are exemplified at one extreme by a Schumpeterian world globalisation model in the narrow economic sense (GDP growth of 3.1%; Trade to GDP in 2050 of 39.4%). A fourth Ecological scenario focused on environmental issues in contrast to the other three scenarios, and gave priority to energy efficiency and sustainability issues, with less emphasis on economic growth (GDP growth of 1.6%; Trade to GDP in 2050 of 19.8%).

The range of increases in global CO₂ emissions from jet fuel consumption from 1995 to 2050 vary from a 187% increase for the Ecological scenario to a 513% increase for the Schumpeter (globalisation/liberalisation) model scenario. Olsthoorn notes this is a similar finding to that from the UK Department of Transport and Industry (DTI) study. The latter study estimates the CO₂ emissions from world aviation would increase by 100-500% from 1995 to 2050. Again, the high growth estimates from the EDF study (up to 1,100% increase from 1990 to 2050) are brought into question, although the lower growth base case EDF scenarios are comparable.
The future mobility of the world population—another view

Using a model that addresses regional and global long-term scenarios, Schafer and Victor (2000) have examined “how much people will move around in the distant future” and “what modes of transport they will use”. They used their model to project future mobility for 11 world regions between 1990 and 2050. Their estimates of historical and future global mobility (measured in passenger-kilometres, pkm) for each transport mode for the years 1960, 1990, 2020 and 2050 are shown in Figure 3.5. The model is an integrated one, in the sense that it takes into account competition between the various modes of transport (buses, trains, cars, and aircraft).

![Figure 3.5. Historical and estimated future total global mobility by mode of transport](attachment:image.png)

Of particular interest in relation to aviation futures, is the model’s use of a significant travel theory that assumes that budgets exist for both travel time and money. Thus, if people spend a constant share of money on travelling, rising incomes will predictably lead to a rising demand for mobility. Surveys from various cities and countries throughout the world confirm that people commonly spend a constant share of time on travel, typically a little over one hour per person per day. As total mobility rises, travellers switch to faster modes of travel to remain within this fixed travel time budget.
The model suggests that all transport modes except for aircraft will be in relative decline by 2050, when aircraft will provide 36% of global mobility and cars 42%. Although some modes are in relative decline, the absolute mobility for all modes will increase. These researchers claim that high-speed mobility in 2050 will be 18 times its 1990 level. In North America, high-speed transport (mainly aircraft, but also high speed trains) is projected to supply 71% of the mobility share by 2050.

This study concludes that high-speed modes of transport will replace slower modes. This follows from the underlying theory related to growing economies in each region stimulating greater travel demand, with the fixed travel time budget requiring travellers to shift to faster modes of transport. Shafer and Victor’s model assumes that transport systems behave in a deterministic fashion, with increasing mobility following access to higher speed modes of transport. Of course, their conclusions depend on the validity of the travel time budget theory. Although some researchers have questioned this theory, Mokhtarian and Salomon (2001), in considering both sides of the debate, conclude that the empirical evidence supports at least a modified version of the travel time budget theory.

Shafer and Victor’s model is also technologically deterministic, with visions of large subsonic aircraft carrying 1,000 people progressing to craft travelling at supersonic and hypersonic speeds. “The world would essentially become a global city, the subcenters of which are connected by high-speed links” (Shafer, 1998, p. 467). In essence, the conclusions from this particular avenue of research point to future societies with very high levels of mobility—“hypermobile” societies by current standards.

The notable modal shifts that have been going on in passenger transport since the end of the Second World War provide collaboration for the above theory, as shown in the modal shares of Australian non-urban travel since that time (Figure 3.6).
The total mobility for all modes has increased with time, with rail losing out to cars as motor vehicles became widespread and as the road system was developed. At the same time, air travel has grown rapidly. This shift to air travel accelerated further in the 1990s when air travel was deregulated.

Analyses of the recent and projected contributions to global warming from various modes of transport worldwide indicate that aviation will surpass the global warming impact of cars by 2030 (Centre for Sustainable Transportation, 2000, p. 2; Organisation for Economic Cooperation and Development, 2002a, p. 24).

The globalisation of tourism—a political and economic context for world aviation futures

The consumption of aviation travel and tourism became integrally linked during the latter half of the twentieth century. After the Second World War, developments in aircraft technology, including the introduction of commercial jet aircraft in the 1950s, were an important driver in the growth of tourism. The expansion of tourism by air has been described as being “beyond the wildest expectations of travellers at the beginning of the twentieth century” (Swinglehurst, 1998, p. 92). Thus, international tourist arrivals increased from 25 million in 1950 to 664 million in 1999, corresponding to an average
annual growth rate of 7% (World Tourism Organization, 2000). Wheatcroft (1994, pp. x, 8), writing for the World Tourism Organization (WTO), states that the WTO has long recognised that aviation and tourism are interdependent segments of a single travel and tourism industry. Further, “aviation and tourism must continue to work together for the optimum development of world travel”.

The tourism industry operates as an interrelated network of the following, mostly transnational, businesses and organisations within the context of economic globalisation (Knowles et al., 2001):

- airlines and other linked modes of travel
- travel agents and tour operators
- international hotels and other accommodation
- theatres and entertainment
- a diverse range of businesses that provide supplies and services to the above.

Consequently, the boundaries between tourism, travel, leisure and accommodation are now quite unclear (Knowles et al., 2001, pp. 4, 51). For example, airline passengers are encouraged to join frequent flyer programs with rewards related to distance travelled (Hanlon, 1999), and “fly-buy” schemes linked to credit cards underline the link between the consumption of both travel and non-travel items. The driving force behind such travel and tourism developments is primarily the global economic system, with the process of globalisation also being facilitated by forces of social and cultural change that are linked to the development and impact of information technology and the mass media (Aronsson, 2000). Indeed, increased economic globalisation assumes increasingly mobile societies. Local, previously relatively isolated and inaccessible places are now subject to global processes, and these have diverse economic, cultural and ecological consequences.

Thus, the context for changes in tourism and travel is one of globalisation and international business motivation, supported in turn by compliant political systems. The World Travel and Tourism Council (WTTC) (Department of Industry Science and Resources, 2001, p. 1) estimated that the travel and tourism industry:
• contributed 11.7% to the world’s GDP in 1999

• directly or indirectly accounted for almost 200 million jobs worldwide, or 8% of the world’s total employment in 1999

• will employ 254 million people by 2010.

In a position statement on air transport and freer world trade, the WTTC calls for a liberalisation of trade, transport and telecommunications. In relation to air transport in particular, the Council states: “a freeflowing [sic], competitive air transport system is fundamental to this development. It will fuel markets through price competition and service innovation” (World Travel and Tourism Council, 1997, p. 1). A more recent statement (World Travel and Tourism Council, 2003, p. 6) says: “we must look beyond the immediate outlook, towards a future vision of substantial air travel growth and to make the investments essential for its achievement”. Some elements of the associated WTTC action plan to achieve this vision include the presentation of persuasive arguments to show how air travel can be part of a sustainable economy without penal taxation; putting the case for the urgent need for new aviation infrastructure, including long-term airport plans for the next 20 to 30 years for all regions; and a worldwide public relations campaign to gain the support of “opinion formers” for such an action plan, including support from the policy agendas of governments.

In the early 1990s, air arrivals accounted for 70% of tourist arrivals in at least 20 major countries that are popular with tourists, with 10 such countries (including Australia, New Zealand and Japan) reporting almost all international arrivals by air (Wheatcroft, 1994, p. 9). This relationship is not as strong in Europe, where cars are more commonly used to make the relatively short trips across borders, and air travel accounts for only a quarter of international arrivals.

In keeping with the World Tourism Organization’s bias towards the “economic objectives of tourism policies [as] paramount” (Wheatcroft, 1994, p. 3), the same author concludes that many governments are recognising the need to modify protectionist aviation policies in order to facilitate the growth of tourism, both domestically and internationally.
Understandably, the terrorist events of 11 September, 2001 in the USA had a strong negative impact on travel and tourism, although the World Travel and Tourism Council’s (2001) longer-term forecasts after 11 September were still very strong. Nevertheless, perceived threats to tourism led to the formation of an industry coalition, with the WTTC, of travel and tourism associations from around the world (representing airlines and airports, manufacturers, hotels and restaurants, tour operators and retail agents, travel related services, and credit card and rental companies). Thus, the tragic events of 11 September have both made more transparent and galvanised the web of business and economic interests surrounding aviation travel in the context of a global economic system.

More recently, just as the tourism and travel industry was beginning to overcome the downturn linked to the events of 11 September, 2001, it was challenged by the ramifications of further significant reductions in travel related to the 2003 war in Iraq and the spread of the disease Severe Acute Respiratory Syndrome (SARS). International travel fell 15 to 20% during the war, and US airlines sought US$3 billion from the US government in order to survive financially (Sheehan, 2003). Other airlines, for example Qantas and British Airways, announced job cuts in response to the downturn (BA cuts back as Iraq war bites, 2003; "Qantas staff hit: 1400 to lose jobs," 2003). The SARS related reduction in tourism to tourism-intensive economies such as China, Hong Kong and Singapore also significantly affected a variety of tourism, travel, entertainment and retail businesses. Global financial analysts at Morgan and Stanley expressed this in April 2003 as a 0.4% reduction to their Asian growth forecast for 2003 (Roach, 2003).

Tourism forecasting

The use of tourist arrivals and tourist receipts as indices of global travel forecasts is one way of estimating demand in the future and of understanding past trends, and the World Tourism Organization (2000) collects these for this purpose. These data show that the number of international tourist arrivals (i.e. arrivals from abroad) has increased by an average annual growth rate of 6.9% since 1950, from 25 million international arrivals in 1950 to 664 million in 1999 (Figure 3.7). Parallelling this increase is the increase in

Figure 3.7. International tourist arrivals and tourism receipts, 1950-1999

The usual upward trending graph of international arrivals and receipts from tourism followed an anomalous path after the terrorist events of 11 September, 2001, the Bali attack on 12 October, 2002, and the war in Iraq and the spread of SARS in 2003. The World Tourism Organization (2002a, p. 2) commented that “it is difficult to find a concrete confidence crisis that can compare with what the world experienced in 2001”. However, WTO still tends to promote an optimistic assessment of future trends, reporting that the 693 million international tourist arrivals in 2002 corresponds to a decrease of 0.6% or 4 million down from the 697 million arrivals in 2000. The general tenor of argument used by business driven interests is that after terrorist shocks and other such events, recovery occurs relatively quickly, and air travel rises eventually to new heights of activity, as pent-up demand due to postponed travel is observed. Even with such setbacks it is argued that tourism proves to be a “resilient and stable economic sector” with confidence “that the growth of tourism will return to normal” (World Tourism Organization, 2002a, p. 2; 2002b, p. 1).

The World Tourism Organization’s (1999) Tourism 2020 Vision program of research is an extension of its earlier work on tourism forecasting, which produced a series of forecasting reports for each of six WTO regions and a global volume (World Tourism Organization, 1995). The 2020 Vision program analysed survey responses from 85
countries and 50 WTO-designated tourism “visionaries”, who were selected from tourism and travel companies, suppliers to the tourism industry, and researchers, writers, publishers and academics in tourism, economics and politics.

For the medium term, an average annual growth rate of international tourism arrivals of 4.1% for the period 1995 to 2020 is forecast, with the numbers of international tourism arrivals expected to reach one billion by 2010 and 1.6 billion by 2020 (see Figure 3.8). This forecast was reaffirmed despite the events of 11 September, 2001 (World Tourism Organization, 2001).

![International tourist arrivals worldwide 1995-2020](#)

**Figure 3.8.** Actual and projected international tourist arrivals worldwide Based on data in World Tourism Organization (1999).

The Vision program also predicts that from 1995 to 2020 there will be a rise in the long-haul share of arrivals, with tourists travelling further afield. Hence the intraregional/long-haul travel ratio is expected to increase from 82:18 in 1995 to 76:24 in 2020. Of the 1.6 billion worldwide arrivals in 2020, 1.18 billion are expected for intraregional travel and 377 million are expected to be long-haul travellers. This corresponds to an average worldwide annual growth rate of 3.8% for intraregional travel and 5.4% for long-haul travel.

As foreshadowed above, an aspect of tourism forecasting that is problematic concerns the long-term volatility of tourism demand related to a variety of shocks from external events. Examples include the worldwide petroleum shortages in 1973-74 and 1979-80;
the Chernobyl nuclear accident in 1986 coupled with the US-Libyan conflict; the Gulf War in 1991; the terrorist events of 11 September, 2001 in the USA; and the 2003 war in Iraq and the global spread of the disease SARS. These events significantly reduced international travel and tourism following their occurrence, as well as impacting on domestic tourism. Such sporadic events are usually impossible to forecast, and their potential effects are obscure (Frechtling, 2001). Nevertheless Frechtling’s work encompasses a range of qualitative and quantitative methods that extend beyond extrapolative or time series methods, and adopts a view of the future as being neither totally predictable nor unpredictable. In his view (p.7), forecasts are seen to be useful and feasible by considering the future to be somewhat predictable and somewhat alterable. Further, complexity is acknowledged in that tourism demand is seen at times to be volatile, with a wide range of factors influencing tourism behaviour.

Of particular relevance to Australia is the WTO region labelled East Asia and the Pacific. This covers the subregions of North Eastern Asia, South Eastern Asia and Oceania. Tourist arrivals in the East Asia and Pacific region grew at an average of 7.4% per year in the decade 1990-2000, in spite of financial crises and violence in many countries. This puts growth in the East Asia and Pacific Region well above the world average growth rate of 4.3% per year (Bar-On, 2001). Looking ahead, WTO forecasts 195 million arrivals in this region by 2010 and 397 million arrivals by 2020, corresponding to an average increase of about 6.5% per year from 2000 to 2020, the highest regional growth rate (Bar-On, 2001; World Tourism Organization, 1999, 2002a). Of the 1.56 billion tourist arrivals forecast worldwide for 2020, the East Asia and Pacific region is expected to contribute about 25%. These projections are driven by expected large increases in China, Hong Kong and Macau and by strong growth in South East Asia.

In the case of Australia, international tourist arrivals are closely linked with the global international tourist market (although Australia occupies a comparatively minor quantitative position in the world travel market). Further, an expected increase in the Asia and Pacific region over the next decade is likely to benefit Australia through intraregional travel (Hamal, 2000).
In the ten years from 1989 to 1999, international tourist arrivals to Australia more than doubled from 2.1 million to 4.5 million visitors (Department of Industry Science and Resources, 2001). However, although numbers increased by 10.6% to 4.9 million arrivals in 2000, subsequent years had decreases (2001 was –1.5% from 2000; 2002 was –0.3% from 2001) as a result of travellers’ reluctance to travel in times of uncertainty. As a result of the series of negative shocks to the travel sector since 2001, the Tourism Forecasting Council (TFC) expected international travel to Australia to fall by 5.3% to around 4.6 million visitors in 2003, the lowest since 1999 and the third year in a row that inbound travel has contracted (Tourism Forecasting Council, 2003). Nevertheless, the TFC suggested that inbound travel to Australia would increase by 9.8% to just over 5 million visitors in 2004, assuming that confidence for international travel returns. Further, assuming a continuation of the previous “normal” trend, international tourist arrivals are expected to grow at about 5% per annum to reach 6.8 million visitors in 2010. This represents a significant downward shift from the forecast 9.4 million visitors for 2010, as made in the similar TFC report immediately after 11 September (Tourism Forecasting Council, 2001, p. 3).

Outbound travel was similarly forecast to fall significantly by 4.2% in 2003, but is expected to strongly recover in 2004, increasing by 8.7% assuming the usual confidence levels to travel return. Outbound travel is projected to reach 4.6 million resident departures by 2012, with average growth of 2.9% between 2002 and 2012 (Tourism Forecasting Council, 2003). To put this trend in perspective in relation to its resource and greenhouse implications, a related CSIRO study of Australian tourism trends (Benghezal, Foran, & Baker, 2000, p. 131) estimates that international air departures in 2020 would require about 230 petajoules per year for fuel. This represents about one quarter of the current requirements for the total transport task (passenger plus freight) for the Australian economy. Projecting further ahead, the study suggests that by the year 2050, the energy required for international departures could exceed 400 PJ per year.

Another study conducted by the CSIRO (Foran, Bartram, & Cumpston, 2000) investigated Australian inbound tourism to 2020, but used a different set of modelling assumptions than the Tourism Forecasting Council. The more conservative forecast of 11.2 million arrivals by 2020 (compared with 4.2 million in 1996) serves to highlight
the variability in visitor numbers that could be created by a worldwide economic recession, or sudden increases in oil prices. Given the range of factors involved in forecasting tourism demand, it is not surprising to find quite different forecasts depending on the models and variables used. For example, the earlier mentioned forecast for Australian inbound tourism by the Tourism Forecasting Council projected 9.4 million tourist arrivals by 2010 (Tourism Forecasting Council, 2001). This can be compared with the figure of 11.2 million arrivals by 2020 in the CSIRO study.

The CSIRO study recognised the dangers of simple models in such a complex area, suggesting that the problem of unrepresented variables is often severe. Nevertheless it used a relatively simple model that explains about 90% of the variations in visitor numbers using GNP per capita, population, and settler ratios, to make projections for 2020. However, the authors comment (Foran et al., 2000, p. 39): “at best, statistical models can find strong patterns in the data consistent with expert views on the nature of the industry and which may have some predictive value”.

Ramifications

Aviation travel is clearly inextricably bound up with larger economic and political processes, including that of economic globalisation—and in particular the globalisation of tourism. However, transport, and in particular aviation travel, as a subsystem of tourism, has been largely unexamined systemically, especially in relation to ecological sustainability. Rather, aviation is often viewed simply as a strong instrument for the promotion of economic globalisation (World Travel and Tourism Council, 1997). An analysis of the tourism literature suggests that it is primarily constructed within a framework emphasising business and economics (Carter et al., 2001). To assess trends and developments in tourism research, 474 papers from seven journals were reviewed, covering the periods 1987-89 and 1997-98. The authors conclude that (p. 278):

A paradigm that is solely focused on travel, business and the tourist may address the issue of economic sustainability, but will not develop the theory necessary to underpin environmental sustainability …. The more radical shift to resource management thinking will foster the necessary paradigm shift.
Given that a broader ecological framework in relation to tourism is only just emerging (France, 1997; Holden, 2000), it is thus not surprising that the environmental ramifications of tourist travel, and air travel in particular, have been neglected. Page (1999, p. 7) also notes that both transport and tourism studies generally fail to provide “an explicit and holistic framework” in which to assess the transport of tourists. A contrasting approach is the model provided by Aronsson (2000) for understanding tourism, as well as research on this issue, using a time and space geographical orientation (Figure 3.9). Three main issues are considered namely: (a) lifestyle and other conditions favouring or restricting travel, (b) the journey itself (tourist travel), and (c) the conditions for tourism at the destination and its impacts. He observes that the predominant research on tourism has been related to the destination, with the next most common area related to lifestyle and demand factors. He too concludes that the second element of the model, the journey itself, has been the least researched area (Aronsson, 2000, p. 9). (One proviso here is that transport researchers have done considerable work, although without any particular reference to tourist journeys.)

![Figure 3.9. The tourist system: a time and space geographical perspective (Aronsson, 2000, p. 18).](image)

Only recently have papers begun to appear suggesting that tourist travel (including air travel) is a major source of environmental problems, thus linking the notions of sustainable tourism and sustainable mobility (Hoyer, 2000). The author cites one study of a large tourist region in Austria that concluded that 40 to 60% of the environmental loads linked to tourism are from the transport of tourists between their homes and the
Tyrol tourist region in Austria, as well as from local transport within the destination area. In the case of aviation, Hoyer argues for strong measures, including environmental taxes, to reduce the volume of international tourist travel by aircraft. This is because of the increase in the global impacts of such activity and the large tourism contribution to such international and long-distance flights. More radically, Hoyer argues for new forms of tourism other than those based on auto- and aero-mobility, as well as questioning the priority given to time efficiency as a value. Such measures naturally are inimical to the objectives of the aviation industry. For example, the Scandinavian Airlines System (SAS) opposes the use of environmental taxation in spite of its notable efforts to reduce environmental impacts. Nevertheless, the management of SAS admits that future growth in air transport, largely linked to tourism, will only increase environmental impacts.

Later work (Hoyer & Naess, 2001, p. 467) focuses on the issue of increasing travel to international meetings and conferences as “one of the environmentally most worrying changes in the mobility of post-industrial society”. The authors contrast the globalisation and regional competition issues that encourage cities and institutions to put themselves on the conference map, with the environmental and social consequences involved. As discussed earlier, the radiative forcing index for aviation points to a multiplier effect of at least 2.7 for CO$_2$ emissions from aircraft, meaning that for each individual conference participant a global warming impact results that is typically equivalent to at least one, if not two or more years of total mobility for all other purposes in terms of comparative impact, depending on the distance travelled.

This raises important ethical issues, not only in relation to the more widespread adoption of the practice, but also in terms of the sustainable consumption issues raised in Chapter 2. For example, building on the above work, Becken (2002b) asserts that the consequences of international air travel are still ignored by ecotourism researchers, by analysing the energy demands of delegates’ long-distance travel to an Ecotourism Summit in Quebec in 2002. Her calculations suggest that for the 1,164 delegates from 133 countries, the energy use is equivalent to the emission of 2,057 tonnes of CO$_2$. The largest energy use was associated with travel from Indonesia. With a delegation of 21, Indonesia thus ranked fourth after China, international organisations and Nigeria in its overall energy use. Becken concludes that the energy use for air travel to the
Ecotourism Summit could sustain for a full year 2,095 Nepali citizens, 432 world citizens or 90 Canadians.

Another study by Becken (2002a) on international passenger travel to New Zealand found that national energy use would increase by 6% if international air travel were to be included in national inventories. This energy use corresponds to an additional 1.9 million tonnes of carbon dioxide emissions. Although concentrating on energy use and CO₂ emissions per se because of the uncertainties associated with the full impact of aircraft emissions, she does acknowledge that her approach is a conservative one and that the impacts on the atmosphere are possibly considerably underestimated. Recent policy discussion in the UK involving the Departments of Transport and Treasury and the Royal Commission on Environmental Pollution (2003a) confirms the likely underestimation inherent in Becken’s methodology (see Chapter 4).

As part of a study by CSIRO on the opportunities and challenges for Australian tourism in the longer term, the primary energy and greenhouse gas emissions for the tourism sector were estimated at the national level (Benghezal et al., 2000, p. 109). In 1995, tourism contributed around 80 million tonnes of CO₂ equivalent of greenhouse emissions. For comparative purposes, total industrial activity and personal consumption in Australia contributed 575 million tonnes of CO₂ equivalent greenhouse gases. Across a range of consumption categories linked to tourists, the largest category for primary energy consumption for both international and domestic tourists is air transport. Two categories of tourist consumption, “air transport” and “recreation and other services” each account for around 23% of the total domestic and international tourist greenhouse emissions (or 46% of the total for both categories). The authors underline the significance of these findings given that the externalities of world greenhouse issues are increasingly likely to be internalised in the structure of every industry, and especially one in which transport and air travel are integrally involved.

“Sustainable tourism” is therefore becoming a contested concept like sustainability, being interpreted differently by different groups with opposing values. Just as sustainable consumption in Chapter 2 was constructed along a spectrum of possible value positions, so too Holden (2000, p. 174) summarises a range of orientations for tourism varying between two polarised positions. At one end are “reformists” whose
values and actions are aligned with the *status quo*. At the other extreme are “structuralists” who hold a more radical view of tourism development. The latter challenge the paradigm on which economic, social and political development is based, questioning the values of society as much as those of tourism. This questioning of the *status quo* in relation to ecological sustainability, economics and tourism is encapsulated in the simple schema shown in Figure 3.10.

<table>
<thead>
<tr>
<th>Business as usual/technocentric</th>
<th>Shallow ecology</th>
<th>Redesign/econcentric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth oriented economy/trade liberalisation/economic globalisation</td>
<td>Modified economic growth</td>
<td>Reduced scale economy within ecological framework</td>
</tr>
<tr>
<td>Neo-liberal economics</td>
<td>Environmental economics</td>
<td>Ecological economics</td>
</tr>
<tr>
<td>Mass tourism/multinational company decision-making</td>
<td>Sustainable tourism/responsible tourism</td>
<td>“Structuralist” models of tourism (questioning the values and scale of tourism)</td>
</tr>
</tbody>
</table>

**Figure 3.10.** Schema comparing ecological sustainability, economics, and tourism

Organisations such as the World Tourism Organization (WTO) are associated with the pole concerned with mass tourism and strong economic growth, and especially with the globalisation of economic activities such as the growth of international tourism and long-haul tourist travel (Organisation for Economic Cooperation and Development, 1997a, p. 37). It is true of course that some of the language used by WTO is typical of the “reassurance” and “balance” orientation characteristic of sustainable development and sustainable tourism discourses. For example, in a document on international tourism, WTO speaks of “the continued need to combine sound economic development with the protection of natural resources”. Similarly, the need for limits on tourism development is acknowledged by “reorienting the industry’s priorities and practices towards an acceptable balance between viable growth and environmental sustainability over the long term” (World Tourism Organization & WTO Education Network, 1997, p. 362). However, the generally strong commitment to a conventional economic paradigm seemingly oblivious to ecological or social constraints, is reflected in the opening
Tourism clearly counts as one of the most remarkable economic and social phenomena of the last century. It will undoubtedly keep this position for the century to come. Every year a bigger portion of the world population takes part in tourism activity and for the majority of countries tourism has developed as one of the most dynamic and fastest growing sectors of the economy.

Even after the events of 11 September, 2001, the World Tourism Organization (2001, p. 9) looked forward to “a return of consumer confidence in the travel industry” as the desire to travel for leisure or business reasons is a “social paradigm … now deeply embedded in our modern lifestyles”.

Nevertheless since the 1990s, the image of tourism has been changing, to some extent, from a “smokeless industry” to one implicated in an array of global and local ecological concerns (Organisation for Economic Cooperation and Development, 2002a, p. 9). This is reflected in terms such as “eco-tourism”, “green tourism”, and “sustainable tourism” and in a number of recent books e.g. Holden (2000) and journals e.g. *Journal of Sustainable Tourism*. Although some are anxious to present these alternative forms of tourism as more sustainable by labelling them “appropriate”, “responsible”, and “soft”, Wheeller (1997, p. 67) has argued that such labelling distracts us from addressing “the real problem of mass tourism—the massive volume and, globally, the growing absolute number of tourists”, with all of its associated cultural and ecological impacts (McLaren, 1998). The issue of the volume of tourists as an aspect of the transport subsystem within tourism is depicted in Figure 3.11.

![Figure 3.11. The tourism system: a transport perspective with volume of tourist travel](image-url)

Adapted from Page (1999).
Moreover, an OECD case study on tourism travel argues that the scale and extent of tourism-related travel are integrally linked with the rising number of air departures to far-off destinations (Organisation for Economic Cooperation and Development, 2002a, p. 50). That is, the environmental impacts of tourism-related travel will increasingly be a function of the overall distances travelled and the amount of aircraft emissions associated with the enhanced radiative forcing discussed previously. Swarbrooke (1999, p. 291) also raises the major resource issues linked to the rise of long-haul holidays, and expresses concern that with long-haul travel becoming cheaper, “tourists are not being asked to pay the real cost of their long-haul trip”. Combining the significant volume of people and demand pressure with an increasing propensity to travel further, as with long-haul holidays, is thus a prescription for significant ecological impact.

On the other hand, the Royal Commission on Environmental Pollution (2002b, p. 23) has also drawn attention to the particular problems associated with short-haul flights (800 km or less), which have a much higher proportional fuel use per passenger than medium- and long-haul flight distances. The high rate of fuel burn during take-off and landing represents a disproportionate fuel usage for short flights, with for example, 20% of the fuel used for a 500 km flight between Stansted and Edinburgh, being required to get airborne and land. Such profligate fuel use is used to support policy arguments encouraging modal shifts, for example to rail, given the considerable environmental benefits achievable. The Commission suggests this approach both for domestic travel within the UK and for the shorter journeys to Europe.

Sustainable tourism scenarios and principles as generally framed to date therefore do not appear to be getting to grips with the ecological ramifications of growth scenarios for the future. In the WTO publication on international tourism discussed above, for example, the kinds of questions asked are still primarily those such as “where will tourism growth occur?”, “what kinds of experiences will meet the demand?”, and “who will benefit from tourism growth?” (World Tourism Organization & WTO Education Network, 1997, p. 362-364). On the other hand, critiques questioning the economic growth paradigm and associated tourism concepts typically ask questions such as “Is tourism as we currently encourage it, an inherently viable industry in which to vest our national interest and infrastructural priorities?” (Fawcett, 2000, p. 36).
The decline of conventional oil and its significance for aviation

Another major energy issue that has significant implications for aviation, in addition to the question of climate change, is the continuing availability of conventional oil.\textsuperscript{12} There is a growing literature pointing to a near to medium term supply problem. The main source of this view is a group of retired oil geologists freed from corporate commercial and political constraints e.g. Campbell and Laherrere (1998), Deffeyes (2001). Such a perspective is also increasingly appearing in a range of popular social and scientific analyses e.g. Heinberg (2003), Rifkin (2002). It is further supported by specialist groups such as the Oil Depletion Analysis Centre associated with the University of Reading in the UK (Bentley, 2002), and in Australia at Murdoch University (Fleay, 1999).

The above analyses essentially point to a near to medium term rapid decline in conventional oil production, a relatively modest contribution from non-conventional oils to partially offset conventional oil’s decline, and a decline in conventional gas production from about 2020. Another experienced geoscientist Les Magoon has coined the term, the “Big Rollover”, for the point in time when the world demand for conventional oil outstrips the capacity to produce it. This peak in production followed by a steady decline is generally estimated to be around the 2010 or thereabouts, although various estimates between 2003 and 2020 have been suggested ("Oil production curve cause for concern," 2001; Robinson, 2001). Given the central role of oil in modern economies, and given that oil currently provides 90% of transport fuel, Magoon and others conclude that the arrival of such a time will be a major turning point in history. The critical issue is not an immediate running out of oil but rather the discontinuity created when humankind’s ascent up the “oil production” mountain flips over to the descent down the mountain.

A complex range of issues surrounds this issue, including the reliability of forecasting. For example, when M. King Hubbert in 1956 predicted correctly that oil production in the USA would peak in the early 1970s, almost everyone inside and outside the oil

\textsuperscript{12} Conventional oil is oil that can be pumped from the ground, usually under its own pressure, at relatively low cost. Such light oils are also known as “cheap oil”. In contrast, non-conventional oil derived from deposits of tars, bitumens and heavy oils is expensive to produce.
industry rejected his analysis (Deffeyes, 2001, p. 1). Similarly, now that analysts have applied Hubbert’s method to world oil production with an increasing consensus on an emerging oil crisis, such questions seem to be ignored by the popular press and mainstream politicians. This is partly due to the word “decline” being politically incorrect in the present culture of continuing growth (Hamilton, 2003). Against this contention, however, is the often-put argument that the cause of the 2003 war in Iraq was linked in part to an interest in longer-term influence over oil supplies and to the US transportation sector’s heavy dependence on oil (Heinberg, 2003; Roberts, 2003). With the arrival of the “Big Rollover”, the geopolitical consequences of rising oil prices and the fact that demand will not be met, are likely to be far-reaching. They include the likelihood of inflation, recession, and international tension, given that the remaining reserves are primarily in the Middle East (Bentley, 2002, p. 203).

In addition, definitional problems including the reliability of official statistics, have been critiqued. Thus the notion of “proved reserves”, for example, gives rise to “reserve growth”, with OPEC misreporting its oil reserves because its quotas depend upon reported reserves (Campbell & Laherrere, 1998, p. 61). The Association for the Study of Peak Oil, a network of scientists in universities and government departments, particularly in Europe, is focusing on such complexity, and two international workshops have now been held, one in 2002 (http://www.isv.uu.se/iwood2002) with a second one held in May 2003 (http://www.peakoil.net). In contrast, a group of interests advising the US Government, including for example, the US Geological Survey, are still giving official projections for global oil supply for the next 25 years that are regarded as absurdly optimistic by the sources described above (Bentley, 2002, p. 200; Niler, 2000). Others in the “anti” group e.g. Adelman (2003) have critiqued the work of Campbell and Laherrere and Bentley (2002), suggesting that their conclusions cannot be tested, as they draw on the proprietary and unpublished data base of Pertroconsultants (now called IHS).

Nevertheless, it is significant that conservatively inclined bodies such as the International Energy Agency (IEA) (1998) prepared a paper for the G8 Energy Ministers’ Meeting in 1998 that adopted a position akin to the Campbell and Laherrere
It forecast a peak in conventional oil of 78.9 million barrels per day in 2012 (Figure 3.12). In Figure 3.12, world demand for liquid fuels has been extended to 2030 at the average growth rate of 1995-2020 to illuminate the longer-term oil supply picture. The projections assume ultimate recoverable reserves of conventional oil of 2.3 trillion barrels. If a higher level of oil reserves is assumed, namely 3 trillion barrels, the production peak and associated rise in world oil price then occurs in the year 2020.

**Figure 3.12.** Oil supply profiles for the world 1996-2030 using business as usual projections (International Energy Agency, 1998).

The IEA analysis assumes that the use of non-conventional oil expands rapidly after 2015 to meet the increase in demand for liquid fuels and to compensate for the decline in conventional oil production. However, the agency recognises that to produce large and increasing volumes of oil from non-conventional sources would require many major multi-billion dollar projects. Those raising concerns most strongly about oil and gas depletion, on the other hand, argue that there are significant constraints preventing non-conventional oil from fully offsetting conventional oil’s decline. These include: (a) non-conventional sources not coming on stream fast enough to fully compensate for the

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13 Bentley (2002, p. 201) notes, however, that in the IEA 2000 *World Energy Outlook*, the agency had retracted its world peak around 2015, forecasting instead that global oil production would be able to meet rising demand to the year 2020. In the Oil Depletion Analysis Centre’s view, this forecast is unrealistic.
decline, (b) the sheer scale and cost of the mining and processing required, (c) significant environmental problems including a relative increase in greenhouse gases, and (d) questions related to net energy analysis (Bentley, 2002, p. 203; Fleay, 1999, p. xi).

In relation to aviation in particular, the Centre for Sustainable Transportation (CST) (2000, pp. 1, 4) in Canada considers that the two factors likely to curtail the aviation growth envisaged by the industry are the need to curb greenhouse gas emissions and the lack of availability of low-cost aviation fuel, a consequence of the end of cheap oil. In contrast to the industry projections discussed earlier, CST concludes that a more likely scenario is that aviation activity will actually decline over the next 30 years, and that the rapid airport expansion now occurring worldwide constitutes an unwise investment in the wrong kind of infrastructure. Similarly, Fleay (1999, p. 33) argues that “commercial aviation is most vulnerable to the coming decline of conventional oil, the transport mode least able to adapt”. He questions the validity of an Australian Department of Transport and Regional Development report projecting increases in airline passenger movements at Sydney Airport from just over 20 million in 1995-96 to 63.2 million in 2024-25. By ignoring the availability of cheap fuel in its assessments, he concludes that the report is grossly deficient (p. 47). A more recent projection as part of the airport’s new masterplan predicts a near trebling in passenger numbers between 2003 and 2023 to 68.3 million, with an associated 412,000 aircraft movements a year (Robins & Davies, 2003). Further, Fleay is sceptical about the ongoing viability of tourism and the associated hospitality industry, given that these industries depend on cheap transport. The ramifications of rising oil prices for transport and tourism, including international air travel, are likewise highlighted in a CSIRO study of Australian tourism to the year 2020 (Benghezal et al., 2000, p. 60).

The outcome of a detailed evaluation of aviation by the Intergovernmental Panel on Climate Change in relation to fuel options was that “there would not appear to be any practical alternatives to kerosene-based fuels for commercial jet aircraft for the next several decades” (Penner et al., 1999, p. 10). In addition, this report and others indicate that the average fuel cost across the industry is about 11-15% of operating costs, but has been higher during times of high fuel prices (e.g. nearly 30% in the early 1980s). The high cost of fuel has also been a significant factor in poor operating profits (Gauldie,
The global oil crisis in the early 1970s had long-term effects on the aviation industry, particularly in stimulating the development of more fuel-efficient aircraft, and it is acknowledged that the availability and cost of fuel will continue to exert strong pressures for fuel efficiency (Gauldie, 2001, p. 3; Penner et al., 1999, p. 25). However, the growth in demand for commercial aviation has consistently exceeded increases in fuel efficiency, with the problems becoming more serious as efficiency improvements become more difficult to achieve. Based on past trends, further improvements in engine and airframe efficiency are likely to reduce fuel consumption per revenue passenger kilometre by 1% per year for the next 15 to 20 years. This contrasts with the anticipated long-term growth in commercial airline revenue passenger kilometres of 3 to 5% per year (National Research Council Committee on Aeronautics Research and Technology for Environmental Capability, 2002, pp. 10, 30).

A comprehensive study that investigated the implications of this rising demand in relation to the finite resources of kerosene, derived from crude oil, is that undertaken by Allen (1999). The study recognised that the future of aviation cannot be isolated from other transport modes that together create the major problem of crude oil replacement in the years ahead. The study sought to answer the following questions (p. 413):

- Is the future oil shortfall sufficient to restrict aviation traffic and growth in the next 50 years?
- If so, what is its substitute?
- Can a substitute be obtained cheaply enough to free aviation from future kerosene shortages?
- Is it paramount to change to liquid hydrogen fuel to avoid future fuel shortage in aeronautics, incidentally conferring possible environmental advantages?

Two cases (a base case and a high case) were used for air traffic through to 2050, corresponding to average growth rates of 3.23% and 5% respectively. The fuel efficiency of the world fleet was assumed to grow at 1% per annum. The analysis shows that the combined road and air transport demand for oil by 2050 would exceed by a large amount the total annual crude oil supply, the exact amount depending on the traffic growth. It is assumed in the projection that the proportion of total oil for road

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and air transport grows from 37% in 1990 to 50% in 2050. Neither this improved proportion nor efficiency improvements could keep pace with the combined effects of reducing oil supplies and growing traffic. The study also makes reference to other work from the oil depletion literature pointing to the 2010-2015 period as being critical, and makes a similar finding in its estimates as well.

A significant conclusion is that the crude oil shortfall is likely to restrict aviation traffic and growth, particularly in the next 50 years. In the shorter term (the next two decades), another study by the Institute of Air Transport (Raynaud, 1996, p. 116) suggests that the rising demand for jet fuel could exceed the maximum quantity obtainable by simple distillation, and that it may become necessary to produce part of the jet fuel required by the market by cracking heavy fuel. Hence, the production cost would inevitably go up. In summary, the report states: “there is a strong likelihood not only that the price of crude [oil] will increase, but the price of jet fuel will go up at an even faster rate”.

The combination of the need to reduce greenhouse gas emissions, and the likely impact of oil depletion in the next two decades, is therefore likely to act as a very significant constraint on the growth of aviation. If, as often mooted, concerns about greenhouse gas emissions result in the application of a commercial aviation fuel tax in order to internalise the environmental costs of air travel, then the end of cheap oil would clearly further exacerbate the economic viability of airlines. Current aviation growth scenarios begin to look problematic, as the technology is so tied to oil, and in addition the introduction of alternatives such as hydrogen-powered aircraft, is likely to take decades.

This is because of the lead-time required for new aircraft designs, incorporating, for example, the larger fuel tanks required for hydrogen. In addition, new infrastructure for the production and supply of hydrogen would be required, and existing aircraft have a typical life expectancy of at least 25 years (Penner et al., 1999, p. 10, 11). The latter issue suggests that both kerosene and hydrogen fuel systems would need to be in operation simultaneously for a certain transition period (Nijkamp et al., 1998, p. 111). Although many industries may be able to adapt to ever-increasing oil prices, aviation appears to be particularly vulnerable and unable to substitute alternative fuel sources or to put new technologies in place in the necessary timeframe.
In the early 1970s, studies on alternative fuels were carried out by most of the major aircraft manufacturers in the USA, Europe and the former USSR. As the main driving force for these efforts was the oil price crisis in the 1970s, most of the activities were discontinued when oil prices declined again in the 1980s (Pohl & Malychev, 1997). Such activities have resumed in recent years with projects such as the German-Russian Project Cryoplane (Birkenstock, 1998), inspired by the foreseeable depletion of oil and concerns about greenhouse gas emissions. It has been argued that liquid hydrogen produced on a renewable energy basis is the only candidate aviation fuel known today that would completely eliminate CO₂ emissions by aviation (Lewis & Niedzwiecki, 1999, p. 258).

However, in addition to the unsolved questions related to new aircraft designs for hydrogen, the massive implications in regard to hydrogen production, storage and distribution are considered a major obstacle, likely to impede the introduction of hydrogen aircraft for several decades (Armstrong et al., 1997, p. 7; E.U. lauds Airbus hydrogen aircraft plans, Boeing not on board, 2002; Nijkamp et al., 1998, p. 111). For these reasons in particular, Allen and his colleagues (Allen, 1999; Armstrong et al., 1997) consider that liquefied hydrogen will not be introduced for large-scale use as an air transport fuel during the next 50 years. Rather, they believe that synthetic fuels manufactured from natural gas are a more likely alternative for meeting crude oil shortages. Similarly, Lee (2003, p. 175) comments that although there are still several obstacles to overcome with the use of biomass-derived fuel, synthesized kerosene is already produced in South Africa by SASOL, indicating it has potential as an alternative fuel.

With the potential use of hydrogen as a fuel, the Royal Commission on Environmental Pollution (2002b, p. 28) also notes that switching from kerosene to hydrogen would replace carbon dioxide from aircraft with a three-fold increase in emissions of water vapour. Thus the uncertainties over contrails (condensation trails) and cirrus cloud formation, and the greenhouse gas properties of water vapour at higher altitudes, raise questions about whether hydrogen-powered aircraft would reduce the contribution of air travel to global warming. This underlines the difficulty of any easy “technical fix” for air travel.
Futures studies is vision oriented...However, a vision cannot be expressed in strategic language. Using metaphors is perhaps the best way to enter alternative future realities (Inayatullah, 2002, pp. 5, 88).

Like planning, policy analysis is more technical in its orientation...Policy analysis is goal oriented...Goals or objectives can be operationalized (Inayatullah, 2002, p. 5).

Chapter 3 focuses on empirical and interpretive approaches to aviation futures, concentrating on current growth-oriented predictions for aviation futures together with an analysis of major ecological and resource issues likely to constrain such growth. In the current chapter, I apply a critical futures approach (in particular causal layered analysis) to contrasting visions of aviation futures.

The purpose is to create distance from current categories in order to question the future, rather than to better define it. Inayatullah (1998a, p. 815) argues that the usefulness of causal layered analysis “is not in predicting the future but in creating transformative spaces for the creation of alternative futures”. This approach thus attempts to make problematic trends in the literature, and to elicit other scenarios of the future. The issue is not only what other trends could have been considered. Here we question how an issue (such as rapidly growing air travel) was constructed as a trend in the first place, and consider the “cost” of that particular social construction (Inayatullah, 2002, p. 25).

In contrast, the other major area addressed in this chapter is policy. This is more pragmatic and goal oriented in comparison with the vision orientation of the futures approach. Public policy is made not only by politicians but also by a range of other stakeholders including public service departments and other official bodies, businesses, unions, the media and community movements. Policy is therefore an “instrument of
governance”, and an “outcome of the competition between ideas, interests and ideologies that impels our political system” (Bridgman & Davis, 2000, p. 3). The policy approach is therefore closer to categories taken for granted.

Nevertheless, the initial stages of a typical “policy cycle” can still allow for pragmatic questioning of status quo assumptions and priorities, as is demonstrated by the work of the Royal Commission on Environmental Pollution in the UK. For example, under issue identification we can ask: “Is this an appropriate issue for government?” and “Are there feasible solutions to the problem?”. Under problem analysis we can ask: “Has the issue been accurately formulated?” and “Is there a superior alternative?” (Bridgman & Davis, 2000, p. 154).

Although there is some duplication of themes between the futures and policy sub-areas of this chapter, the vision orientation of the former and the pragmatic and goal orientation of the latter need to be borne in mind.

**Applying causal layered analysis to aviation futures**

Causal Layered Analysis (CLA) is a futures research method that focuses on vertical layers of analysis, in contrast to other techniques such as scenario-building that direct attention to alternative horizontal discourses.

CLA was developed by Inayatullah (1998a), and layered methodology is the subject of a special issue of the journal *Futures* (August 2002). In this issue, he explains the need for this deeper and more holistic analytical approach, because “conventional methods used to forecast, to interpret and to create desirable visions of the future are of little use if they are unable to unpack worldviews, ideologies and discourses, not to mention archetypes, myth and metaphors” (Inayatullah, 2002, p. 479).

*Causal layered analysis (CLA) in a nutshell*

CLA integrates analysis at four levels:
• The “litany” level or official public description of an issue, as might appear in the media. Quantitative trends are often used for political purposes, and conventional accounts of reality predominate.

• The social science analysis level seeks to expose and explain the social causes and factors involved (economic, political, technological, ecological and historical). Technical and economic analyses from policy institutes characterise this level.

• The discourse analysis/worldview level goes deeper to the level of assumptions, beliefs, and frameworks. Here, discerning the deeper issues that inform and constitute the discourse/s is what matters. Solutions often centre on consciousness transformation and in rethinking the politics of reality.

• The myth/metaphor level goes even deeper, focusing on archetypal stories and the unconscious. It draws on heart rather than head, and visual and body images from gut level emotional experience engage mythical frameworks of knowing.

This approach acknowledges that the way in which one frames an issue changes the policy solution, and recognises that language analysis must be part of any comprehensive study. The various layers lead to varying conceptions of which actors are involved in creating transformations. By moving up and down the levels of analysis, diverse ways of knowing are brought to bear on any issue.

_Causal layered analysis applied to aviation futures scenarios_

A summary of a CLA for aviation futures is provided in Table 4.1. It encompasses both a horizontal dimension via a range of scenarios, and applies the CLA depth approach to each scenario, using the four levels of reality described above. Given the chaotic and complex nature of futures conceptions, and of unknown factors, the scenarios and corresponding vertical levels are expectedly tentative and not entirely mutually exclusive. Horizontally, there can be some interaction across scenario boundaries, as each scenario “can represent a different way of knowing” (Inayatullah, 1998a, p. 821),
### Table 4.1. Future of aviation—causal layered analysis

<table>
<thead>
<tr>
<th>Vertical levels</th>
<th>Growth forever</th>
<th>↔ VARIOUS Sustainable development</th>
<th>Redesign (ecological/spiritual)</th>
<th>SCENARIOS Inner travel</th>
<th>➔ Cyber-revolution</th>
<th>Crash</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Litany</strong></td>
<td>Tourism growth Mass tourism Growth forever</td>
<td>Sustainable tourism/responsible tourism</td>
<td>Questioning values and scale of tourism and hypermobility</td>
<td>Low impact Low travel</td>
<td>Electronic revolution</td>
<td>End of civilisation/Crash Travel problematic</td>
</tr>
<tr>
<td><strong>Social science analysis</strong></td>
<td>Free market forces Economic growth Trends of single variables extrapolated into future Mobility Markets, energy, technology</td>
<td>Ecological restructuring of capitalism Responsible Future oriented Green technology e.g. hydrogen powered planes</td>
<td>Global limits Nature Organic balance Complexity of human-nature interconnections Analysis and redesign of systems</td>
<td>Social responsibility Culturally sensitive Gaining wisdom</td>
<td>Communication networks IT and Email Anti-globalisation movements</td>
<td>Clash of cultures The “big rollover”—oil reserves running out Terrorism Ecological limits exceeded e.g. erratic climate events Infectious diseases e.g. SARS</td>
</tr>
<tr>
<td><strong>Discourse analysis/worldview</strong></td>
<td>Economic globalisation</td>
<td>Sustainable development Social progress</td>
<td>Ecocentric/redesign Change of consciousness Spirituality Personal/communal</td>
<td>Taoist</td>
<td>Virtual reality</td>
<td>Crash Limits to growth</td>
</tr>
<tr>
<td><strong>Myth/metaphor</strong></td>
<td>Sky is the limit Endless holiday Bums on seats Time is money Faster, farther away, bigger, more; the “freedom to fly”</td>
<td>Reassurance We can have it all Progress—but environmentally benign</td>
<td>Gaia Conscious evolution Planet earth is limited Nature can’t be bullied and will come back to bite us We can’t eat money Time flexible</td>
<td>Wisdom by staying at home (Tao Te Ching) Inner knowledge/inner travel Keeping the balance Pacific time Time is eternal</td>
<td>World Wide WebInstant communication Chaotic connections</td>
<td>Doom and gloom Armageddon Good vs. evil Overshoot and collapse Cancer analogy “Nature has no reset button”</td>
</tr>
</tbody>
</table>
and is not a watertight compartment with a definitive “take” on truth. Vertically, uncovering the myths and metaphors shaping our reality now can help in understanding how we got to where we are. To investigate where we want to go, we can then experiment with alternative metaphors and visions. Hence, CLA is used here to question conventional framings of aviation futures, and to open up new possibilities.

*The “growth forever” scenario*

The “growth forever” scenario is typical of the upward projections for tourism predictably favoured by the World Tourism Organization. If there is a myth of nature underlying it, it is very robust (nature seen as brute matter). As Dryzek (1997) observes, the metaphors and language are generally mechanistic and the language privileges entities like consumers, markets, prices, energy, and technology. Free market forces and economic globalisation underlie this worldview. A leading researcher in the transport area expresses a typical market-based neoliberal economic viewpoint: “A major criterion for measuring the success of our air transportation system should be our ability to use air travel as a competitive advantage in a global economy” (Kenneth J. Button & Taylor, 2000).

Another tactic of the “no limits” metaphor of economism is the naïve extrapolation of single variable trends into the future. As shown in Figure 3.8 in Chapter 3, for these people the “sky is the limit”. Such extrapolation indefinitely into the future is in keeping with the mechanistic assumptions of this discourse, as is neglect of the existence of ecosystems, where by definition many factors interact (Dryzek, 1997, p. 52).

At the myth level, this projection of past trends into the future has been profoundly critiqued by Mumford (1971, p. 172) in his earlier assessment of the industrial (now globalising) era: “There is only one efficient speed, *faster*; only one alternative destination, *farther away*; only one desirable size, *bigger*; only one quantitative goal, *more*”.

An example at the metaphor level is provided in a newspaper advertisement placed by Qantas (2003), offering return economy airfares from Canberra to a variety of
destinations across the world including, for example, Hong Kong, Frankfurt and New York. The advertisement is boldly headed “global sale”, thus linking the ideas of economic globalisation and consumption that are central to this scenario. Rather than suggesting any threat to the global commons because of the profligate energy consumption and pollution involved, the term underscores an opportunity for easy mobility across the globe on “sale terms”. The “freedom to fly”, unencumbered by ecological constraints, is assumed and encouraged.

In critiquing this modern worldview, Spretnak (1997, p. 5) suggests that the “deep structure of our age is not economism or technocracy” although the progress notion underlying this worldview does accord economic expansion and technological innovation central importance. In her view the “deep structure is modernity”, which “has imposed devastating discontinuities between humans and the rest of the natural world, between self and others, and between body and mind” (p. 5).

“Time is money” and “time pressure” characterise the idea of a growth-addicted society that is running out of time. In his book “Faster: The Acceleration of Just About Everything”, Gleick (1999, pp. 9, 11) addresses the modern-day “psychology of hurriedness” and observes that the “modern economy lives and dies by precision in time’s measurement and efficiency in its employment”. Air travel, like other modern institutions, is a web of time and motion, so that the goal of time saving and the achievement of maximal efficiency are ever-present (p. 218). The state of mobility typifies the late-modern or postmodern consumer world, with “the shrinking of space abolish[ing] the flow of time” (Bauman, 1998, p. 88). Bauman gives an example of hypermobility in his reference to a woman employee of an international trade company. She spoke five languages and owned three apartments in three different places. As an associate described her (p. 90):

She constantly migrate[s], and among many places, and always to and fro. She does it alone, not as a member of a community, although many people act like her … The kind of culture she participates in is not a culture of a certain place, it is the culture of a time. It is a culture of the absolute present.
The “Inner travel” scenario in Table 4.1 provides an interesting contrast to the “growth forever” scenario. Its Taoist underlying worldview is no doubt characteristic of scenarios that represent a call to return to the simpler, less complex ways of the past. The association with inner journeys of a mystical rather than materialistic kind, is reflected in the following quote from the Taoist classic the *Tao Te Ching* by Lao Tzu (Bahm, 1958/1979, p. 46):

> Without going out-of-doors, one can know all he needs to know. Without even looking out of his window, one can grasp the nature of everything. Without going beyond his own nature, one can achieve ultimate wisdom. Therefore the intelligent man knows all he needs to know without going away, And sees all he needs to see without looking elsewhere, And does all he needs to do without undue exertion.

At this myth/metaphor level, the wisdom of staying at home undoubtedly represents part of the solution to so-called “travel demand management” approaches suggested in the literature on sustainable transport. It is certainly an image worth considering in contrast to the one of wealthy eco-tourists jetting into “green eco-resorts” in deepest Peru, burning tonnes of carbon dioxide during the process.

In addition, the notions of “hurry sickness” and living “in the buzz” (Gleick, 1999, p. 9, 10) associated with the “growth forever” scenario can be contrasted with a focus on “living in the now” characteristic of a more contemplative approach that respects the rhythms of nature, as encapsulated in Taoist philosophy. In studies of the phenomenology of tourism (Jamal & Hollinshead, 2001), travel and tourism are thus now often constructed as capturing much of the restlessness of modern/postmodern consciousness and the ephemeral nature of the modern, runaway world.

Even for earlier times, de Botton (2002, p. 222) draws on the perceptions of John Ruskin who “deplored the blindness and haste of modern tourists, especially those who prided themselves on covering Europe in a week by train (a service first offered by Thomas Cook in 1862)”.

As Ruskin expressed it (quoted by de Botton, p. 222):
No changing of place at a hundred miles an hour will make us one whit stronger, happier, or wiser. There was always more in the world than men could see, walked they ever so slowly; they will see it no better for going fast. The really precious things are thought and sight, not pace.

Although part of the “Inner travel” scenario may imply a yearning for the past, Elgin and LeDrew’s (1997) work on global consciousness change draws on national surveys by Paul Ray in the USA, in which Ray identified a group of “cultural creatives” who may represent a new and distinctive social force. Representing about 10% of the US adult population, this group supports values and practices linked to ecological sustainability, self-actualisation and spiritual practice. According to Elgin: “The core cultural creatives are building ways of living that connect inner and outer, material and spiritual, into a meaningful whole” (p. 19).

Similarly, Inayatullah’s (1993) analysis of alternative scenarios for the future of tourism posits one scenario linked to structural and psychosocial changes. In this case, the dominant structures move away from a corporate and capital-intensive focus to, for example, employee ownership of tourism centres. People become more socially and ecologically conscious and the meaning of tourism at a personal level evolves beyond “fragmented selves in search of wholeness or defeated selves desiring to forget” (p. 5).

Of course, there have been good reasons behind people’s motives for travel over millennia. Dessaix (2000, p. 9) has grouped these into two broad clusters of reasons, namely the “quest for salvation” and acquiring “knowledge of the world”. The quest for salvation typically involved a journey for healing, or visits to sites of a numinous presence such as temples. At the heart of the quest lay a desire to escape from everyday reality to the presence of a higher reality or its symbols. The search for knowledge included, for example, merchants journeying for commercial reasons. Although present day travellers have similar underlying motivations to those in earlier times, Dessaix argues, nevertheless, that the modern versions have often become trivialised. Today, the search for bliss is often more on a mundane than transcendental plane and has been dubbed “having a good time”. Similarly, “a year’s voyage to Ambon to trade for spices has turned into an overnight flight to Frankfurt for a lunch with business contacts” (p. 10).
Bauman (1998) further highlights the stratification of the postmodern, consumer society on the basis of “access to global mobility” (p. 87). Thus although tourists have become wanderers and globalisation is geared to their desires, many other people have been transformed into vagabonds. The latter are refused the right to become tourists by the erection of new walls (called “immigration” or “nationality” laws) barring the movement of these people. The vagabond as shadow side of the tourist is emphasised by Bauman’s description of the vagabond as the “alter ego of the tourist” and as a “flawed consumer” (pp. 94, 96). In summary, Bauman states (p. 92):

The tourists move because they find the world within their (global) reach irresistibly attractive—the vagabonds move because they find the world within their (local) reach unbearably inhospitable. The tourists travel because they want to; the vagabonds because they have no other bearable choice.

The notions of identity and meaning thus become critical, and policies emanating from identities constructed around the idea of “freedom to fly” contrast with the idea of wisdom attained “without going away”.

The “redesign (ecological/spiritual)” scenario

In the “redesign (ecological/spiritual)” scenario, in contrast to the single variable and mechanistic assumptions of the “growth forever” scenario, global limits are recognised and the myth of nature is one of a sensitive organic balance to be respected. Furthermore, nature is conceptualised not simply as a resource base, but as a web of complex interrelated ecosystems exhibiting non-linear relationships. Bright (2000), for example, has presented a number of case studies to demonstrate how human pressures on the earth’s natural systems increasingly lead to unanticipated surprises as a result of discontinuities and synergisms from several combining phenomena.

At the social science analysis level, even considering just one extra phenomenon, the likely impacts of depleting world oil supplies, presents a much different picture than that under the “growth forever” scenario. An overview of the issue of climaxing oil production and its significance for aviation is provided in Chapter 3. As discussed there, many experts in this area consider that the peak in world oil production followed by a steady decline is likely in the next decade or so (Fleay, 1999). Such an imminent
decline in the world’s supply of oil calls for radical changes in the economic principles guiding societies. More specifically, however, rising oil prices are likely to have significant implications for air travel, and the viability of associated industries such as tourism.

Of particular relevance to aviation futures is the field of tourism, where Faulkner has underlined the limitations of the linear, mechanistic framework of orthodox economics that has dominated areas such as tourism demand analysis and forecasting (Faulkner & Valerio, 2003). He sought rather to apply chaos theory and complexity in tourism research, addressing issues where non-linearity, spontaneity and surprise are evident. In contrast with the linear assumptions of the “growth forever” scenario, an example of non-linearity includes the slow-down in the growth of a maturing market as demand approaches saturation. Further, he asserts that chaos theory and the study of numerous events demonstrate that “the only certainty about the future is that the unexpected will happen” (p. 173). The unexpected 1975 oil crisis is one example, with this single event having precipitated a global recession and an associated slump in world travel.

At the myth/metaphor level of the ecological/spiritual scenario, feminine images abound, as in the idea of “returning to nature”, and in the Gaian notion of the development of a planetary self-reflective consciousness—where the planet and cosmos are perceived as “fundamentally alive” rather than just brute matter. The matching identity of people is that of conscious co-creators in a unified “conscious evolution” (Hubbard, 1998). Such a worldview has links with the Romantic tradition, which values the emotional life of individual people, and seeks a value of “harmony between humans and nature”. To the extent that consumption is recognised, it is seen to be conscious, rather than the conspicuous and profligate consumption characteristic of the “growth forever” scenario.

A related evolutionary perspective is presented by Skolimowski (1994), who draws on a variety of sources from Teilhard de Chardin to the “new physics”, to describe a participatory scheme that is central to the “Third Western Project” (p. 71). Such a scheme is based on a “metaphysics of becoming” (p. 29) and is characterised by “participatory thinking”. Our responsibility for shaping the destiny of the world is thus integrally linked with an evolving spirituality and change of consciousness. As he says:
“The nature of our mind is the nature of our knowledge is the nature of our reality” (p. 37) and “The unfolding universe is at the mercy of our mind/imagination, for it is our mind/imagination” (p. 36). At the myth/metaphor level holism and unity are emphasized. As Skolimowski further states (p. 142):

Ecology and ecological thinking must be seen not as separate parts of a whole, not as another movement concerned mainly with the environment; but as an essential part of the process of the transformation of consciousness. Ecological thinking writ large becomes participatory integral thinking.

In a similar way, Inayatullah (1998b; 1999) has focused on non-western perspectives, where progress is considered more in spiritual rather than materialistic terms. In analysing the work of the social philosopher P. R. Sarkar, for example, he contrasts the way in which Sarkar’s approach is “fundamentally different from many futurists who see progress primarily as increased economic productivity, a better standard of living”. For Sarkar, the future is conceived in holistic and mystical terms and as “part of humanity’s evolutionary development”, with problems being solved “though changes in how we see ourselves and how we see the world” (Inayatullah, 1999, p. 23). The marked contrast between the “redesign (ecological/spiritual)” and the “growth forever” scenarios of the future thus parallels the different ways in which futures are constructed. In Sarkar’s case, history and future are dialectical, and progress is only possible in the spiritual realm; whereas the “growth forever” vision of the future is aligned with “the predominant Western epistemological (linear, secular, empirical, individualistic, and liberal-democratic) tradition” (p. 22).

Moving back to the systemic level of this scenario, the focus is on “fundamental redesign”, to encompass ecological notions such as collaboration, mutualism, and synergy. Such “deep” approaches contrast with “shallow” approaches such as “efficiency” and “substitution”, which commonly dominate status quo scenarios (Hill, 1999, p. 203). Relevant to policy making is Hill’s contention that the commonly used triple bottom line framework, by focussing on just economic, social and environmental factors, naively excludes the personal, thereby downplaying the power of the individual to contribute to change. This privileges economic and monetary priorities over a broader values-based system of decision-making. It also promotes the consumer, who is on a restless search for attractions and temptations.
A more useful model encompasses ecological, personal (including “spiritual”) and social (including economics, politics etc) issues. The link between the personal and communal is also reasserted. Rather than place being considered unimportant “except as a springboard from which the … ideology of progress would launch its grand trajectory”, Spretnak (1997, pp. 8, 27) argues that addressing the “modern ideologies of denial” involves “reincorporating the knowing body, the creative cosmos, and the complex sense of place into the ways in which we think about life”.

“Sustainable development” scenarios vis-à-vis “fundamental redesign”

Shallow approaches are typical of the “sustainable development” scenario, which at its base rests on metaphors of “progress” and the notion that “we can have it all” (Dryzek, 1997, p. 132). Thus, although quieter and much more fuel efficient aircraft are no doubt sensible optimisations of the use of current technology, the “rhetoric of reassurance” never gets to grips with the fundamental changes required by a genuine ecological scenario. For example, as discussed in Chapter 2, even if substitution strategies such as hydrogen-powered aircraft eventually prove to be viable on design and ecological grounds, they could still leave existing consumption patterns in place.

The “fundamental redesign” scenario looks for much deeper solutions. Such a framework often views the “sustainable development” scenario as an attempt to validate the business as usual, globalising agenda. In contrast, it draws on new understandings from ecology and psychology to enable the redesign, and is profoundly different from the usual “tinkering” approaches that aim to improve efficiency within flawed designs (Hill, 1999).

The “redesign” scenario recognises that in the medium term, future growth in air traffic is expected to far outstrip any efficiency gains. Need-reduction and desire-reduction strategies go hand in hand with ideas such as “access rather than mobility” (Organisation for Economic Cooperation and Development, 1997d). Access rather than mobility suggests less need for the movement of people and goods, for example where improved telecommunications provide increased access to others without the need for physical travel.
In a “redesign” scenario, investment and production could be locally focussed, so that the international movement of goods and materials is greatly reduced, as is the need for long-distance business travel (Korten, 1999, p. 130). The current world trading system is increasingly one associated with increasing energy use and greenhouse gas emissions, with concerns about carbon emissions from transport, especially air freight, suggesting it is well behind the improved performance in other sectors (industrial, commercial, residential). Instead of perpetuating high levels of air and sea freight, exports and the associated greenhouse emissions could be greatly reduced by moving to more regional production (Vanek, 2001). The critique of “free trade” with its negative ecological and ethical consequences therefore invokes models of community-based economics that avoid the increasing pollution consequences of expanding trade (Goldsmith, 1999; Rees, 1994; van Veen-Groot & Nijkamp, 2000).

Community-based economics is a pragmatic alternative to the global economy and builds community bonds while addressing community needs. Spretnak (1997, p. 99) asks why one would buy biscuits, for instance, that have been shipped thousands of miles across the country, contributing to resource depletion and pollution, when biscuits made in local bakeries facilitate local employment and draw on supplies and services from other local businesses. Such a model also taps into the ecological wisdom underlying the redesign scenario. For example, buying foods grown in the climate in which one lives can provide other advantages. Laura and Ashton (1991, p. 76) note how nature has finely tuned the food supply to harmonise with our environmental needs, citing evidence suggesting that polyunsaturated oils make people more susceptible to skin cancers from sun exposure in hot climates. Sunflower seeds when grown in a hot climate produce a much lower level of polyunsaturated oils compared with those grown in cold climates. Hence buying food produced locally is likely to have ecological, health, and local economic and social advantages.

Another example of a project emphasizing redesign to encourage environmentally sustainable transport (EST) in OECD countries accords environmental criteria a strong place in visioning alongside other policy goals (Organisation for Economic Cooperation and Development, 1999). Therefore, factors such as people’s health, ecosystem integrity and the prevention of further climate change are given strong priority in planning. Generally, transport in 2030 is characterised by a massive shift from less
sustainable to more sustainable modes such as rail transport, accompanied by a relative
decrease in transport activity. That is, participants in the project consider that 40% of
the task of meeting EST criteria would be met by improvements in technology, while 50
to 60% of this task would be met by demand-side management measures.

Given that environmentally sustainable mobility requires changes in behaviour and
innovative approaches at all levels of society, the OECD project envisages continuing
public education campaigns to help support lower levels of travel, and to support more
environmentally sustainable consumption. Other features (in contrast to business as
usual scenarios) include the following:

- Long-distance air passenger travel is substantially reduced. Aircraft in use are
  more efficient conventional types, and rigid airships may be used for specific
  purposes.

- Long distance freight movements are substantially decreased.

- There is much greater use of non-motorised means for short distance trips
  together with necessary supporting infrastructure.

- There is a significant decrease in car ownership and use with many cars running
  on hybrid-electric engines.

- Changes in the form of settlements are implemented in order to reduce the need
  for movement of people and freight.

- Greater use of telecommunications is made to avoid passenger travel and the
  movement of goods.

- Regional production is favoured in order to avoid long-distance freight
  movement.
To be more specific, the German case study for the project lists the following indicators to meet the EST measures, as compared with the business as usual conditions in 2030.

<table>
<thead>
<tr>
<th>Transport mode</th>
<th>Increase/decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-motorised transport</td>
<td>+ 78% (pkm)</td>
</tr>
<tr>
<td>Light rail/bus transport</td>
<td>+ 170% (pkm)</td>
</tr>
<tr>
<td>Heavy rail, passengers</td>
<td>+ 247% (pkm)</td>
</tr>
<tr>
<td>Cars, motor bikes</td>
<td>- 69% (pkm)</td>
</tr>
<tr>
<td>Rail freight</td>
<td>+ 348% (tkm)</td>
</tr>
<tr>
<td>Inland waterway</td>
<td>+ 24% (tkm)</td>
</tr>
<tr>
<td>Trucking</td>
<td>- 87% (tkm)</td>
</tr>
<tr>
<td>Air traffic</td>
<td>- 93% (pkm)</td>
</tr>
</tbody>
</table>

The main winners under business as usual conditions are those who build infrastructure and equipment such as airport builders and aircraft manufacturers, the tourism industry, airlines, freight hauliers, and participants in the process of globalisation, especially those with the freedom to cross international boundaries. Various environmental and social indicators, on the other hand, suggest negative features such as:

- more polarisation (greater disparity between rich and poor)
- more dispersal of people (and additional urban sprawl)
- people who are obese and much less fit (less exercise in daily routines)
- more noise (from additional aircraft movements near populated areas)
- less democracy (as government and industry players influence the decisions affecting people’s lives).

In the redesign scenario, the main winners are considered to be those who value a cleaner, safer, healthier, more peaceful and more convivial society. Although some economic sectors will lose, others are likely to benefit. For example, the German case study above envisages airlines as losing 90% of their production as compared with the business as usual scenario. However, these losses can be partly offset by increases in more environmentally benign transport industries—thus the railway industry gains 120%. The EST scenario is also considered to be more socially inclusive, protecting those who get left behind in the business as usual scenario, such as those who travel little.
Most importantly, the EST scenario introduces the term “hypermobility” to underline the fact that it is possible to have too much of a good thing. Although most historians of transport have equated increasing mobility with progress, and consider the car and the aircraft as instruments of liberation, others associate the ongoing commitment to these transport modes with social and environmental destruction. Technological progress in the latter case is viewed as part of the problem, not the solution (Organisation for Economic Cooperation and Development, 1999, p. 98). The EST scenario aims to break free of the “lock-in” of ideas and interests associated with the business as usual pathway. Rather it seeks to embrace new goals that value things such as community relationships, a sense of place, and healthy practices such as exercise. Inevitably, it is linked to the “politics of transformation”.

The “cyber-revolution” scenario

One of the important elements of redesigning the system is “interregional electronic communication” where much physical travel is replaced by relatively low cost electronic communications linking individuals across the planet (Korten, 1999, p. 130). In addition, easily accessible and high-quality videoconferencing is suggested as an option for eliminating the need for much medium and long-distance air travel to meetings. By necessity following the events of 11 September, 2001 there was strong demand for videoconferencing systems (McGeorge, 2001; Schauer, 2003, p. 69).

A further example of a developing technology that could replace physical travel is teleimmersion (Aedy, 2002, p. 1), which is particularly useful for design in projects related to engineering or medicine. The technology enables an engineer, for example, to be physically present in Australia, but to be immersed a “in a three dimensional … interactive virtual environment in real time” in the northern hemisphere, as part of a group design effort. Although the need for physical visits is not entirely removed, a project can nevertheless be sustained using a lower frequency of physical visits, say once a quarter or once every six months.

The argument as to whether real products and services (including physical travel) will be replaced by virtual ones has been called the substitution hypothesis (Schauer, 2003, p. 13). On the other hand, an increasing focus on new technologies and the service
sector leading to a “clean economy” also casts information technology in a role as a stimulator of additional consumption patterns, along with the associated negative ecological consequences. This latter idea is encapsulated in the term addition hypothesis. Although Schauer acknowledges that both information technology (IT) scenarios are possible and both represent extremes of different kinds, he considers that current global trends suggest that development is more likely to occur along the lines of the addition hypothesis.

In addition, the IT industry itself has considerable ecological consequences including the energy use associated with the use of IT as well as a growing waste problem. IT devices contain harmful materials such as chrome, nickel, tin, cadmium and halogenated organic compounds. The story of the paperless office is a further example of the missing realisation of the potential environmental benefits of information technologies (Schauer, 2003, p. 18).

One can also raise significant personal issues linked to sustainability with respect to this scenario. Some argue that in an age of computer communication, “communities” of cyberspace, or “cybercommunities”, are pivotal, as characterised in the “virtual” mobilisation of anti-globalisation movements. The easy organisation of protests is also seen in the phenomenon of “swarming” where mobile phones alert others in a network when and where a protest will be enacted (Garreau, 2002). Instant communications and the seemingly chaotic creation of order out of chaos are strong underlying metaphors. Thus 93% of children in Australia currently use the Internet and “childhood friendships grow in an electronic force field” with mobile phones and messaging providing greater “here and now” contact than the Internet (Cameron, 2003). However, Spretnak (1997, p. 118) considers that computer-based technologies amplify the scientistic notion of thinking as data processing, and are associated with “a fragmented sense of time” rather than “the time cycles of the ecological and cosmological realm”. In her view an IT emphasis carries the risk of closing off multiple ways of knowing that may be essential for our long-term survival.

For these reasons, Korten (1999, p. 131) believes that cybercommunities can only be an important adjunct to communities of place, as healthy functioning depends on one’s participation in a biocommunity, which by its nature is necessarily place-based. Given
the much higher priority on meaningful relating to self and others in the myths underlying the “redesign (ecological/spiritual)” scenario, “a life confined to cyberspace is a life without roots, human touch, responsibility, mutual dependence, place, or permanence”. Similarly, Schauer (2003, p. 60) addresses the complex relationship between virtual and real worlds, along with the associated risks. For example, an exaggerated dependence on virtual realities “could lead to the illusion that finally the so-called environmental problems in the so-called reality are inconveniences which we can get rid of with a click”.

To the extent that a cyber-revolution scenario provides alternative visions of transport and communication futures, it is also necessary that a critical perspective on cyberspace is adopted to act as “an antidote to the plethora of material which argues that cyberspace is inevitable and necessarily good and wonderful” (Sardar & Ravetz, 1995, p. 698). Sardar considers that Western civilisation has been obsessed with new territories to conquer, with cyberspace being the “new continent artificially created to satisfy Western man’s insatiable desire to acquire new wealth and riches” (p. 697). Further, Ravetz argues that “the momentum of cybertechnology does not allow time for reflection, viable dissent or a change of direction” (p. 696).

The “crash” scenario

Lastly, the “crash” scenario represents the shadow side of the “growth forever” scenario, drawing on myths such as the “tragedy of the commons”, “overshoot and collapse”, and cancer analogies eating at runaway growth. Such a scenario presents images of increasing ecological dysfunction, as in erratic climate patterns and their consequences. Insurance companies have increasingly recorded this in their bottom lines and the financial toll relating to disasters is now reaching huge proportions (Abramovitz, 2001).

In recent years, for example, various media have presented images and text to show record floods in England and Europe ("Europe counts cost of record river heights," 2002), fierce fires in Canada, the USA, Europe and Australia ("Massive wildfire consumes rainforests," 2002), a large death toll from a heat wave in France (Keaten, 2003), and a severe drought in Australia (Moloney, 2002a). The metaphor of “climate
“chaos” appears apt given this picture of increasing climate instability. In Australia, the number of natural disasters has increased by 20% in the past 20 years according to the Bureau of Transport Economics (Neal, 2003). Further, a report prepared by a number of expert bodies including the Australian National University National Centre for Epidemiology and Population Health expects the projected rise in temperatures over the next 50 years to result in a substantial increase in heat related deaths, in the absence of adaptive measures. The number of people exposed to flooding is expected to double over the same period, as is the number of extreme rainfall events, together with the frequency and intensity of food- and water-borne diseases (McMichael et al., 2003).

In this respect, countries with economies that are highly dependent on tourism may face great challenges because the resources upon which tourism rests are regionally, nationally and globally climate-dependent. Tourism and recreation are sensitive to climate change because part of the industry is closely associated with nature (Moreno & Skea, 1996, p. 384). More specifically, WWF-UK commissioned the University of East Anglia’s Climate Research Unit to analyse the potential impact of climate change on 10 of the world’s favourite destinations. The report concludes that the negative impacts, including heat waves, droughts, forest fires, rising seas, flash floods and diseases, could turn profitable tourist destinations into most undesirable holiday locations. Further, the tourism industry is not just a potential victim of global warming, but also contributes to it, given that air travel is a fast growing source of greenhouse gas emissions (WWF-UK, 1999).

Other possibilities under the “crash” scenario include the ramifications of depleted resources as in the “Big Rollover” for oil reserves, suggested as a major turning point in history (Robinson, 2001). As discussed in Chapter 3, this is the point, estimated to be around 2010, where humankind’s ascent up the “oil production” mountain flips over to the descent down the mountain. The geopolitical ramifications are vast, with the likelihood of inflation, recession, and international tension, given that the remaining reserves will be primarily in the Middle East (Bentley, 2002, p. 203).

Further, the “crash” metaphor and 11 September, 2001 are now etched into people’s memories as a symbol of the conflict between terrorism on the one hand, and economic globalisation’s symbols, as in the destroyed World Trade Centre towers, on the other.
In the terrorist attacks on the symbols of world trade power in New York, a hijacked airliner served as a “fuel air bomb”. Although greater attention is now being given to aviation security, Wilkinson (1999, p. 156) foreshadowed such risks in 1999 when he wrote that:

While the improved aviation security measures in certain countries have certainly deterred and prevented many attacks, it is clear that the major international terrorist players have the resources, sophistication and ruthlessness to find the weaknesses in global aviation security and to commit mass murder on the airways on a scale we have not seen before.

Such risks continue today. A terrorist attack anywhere will mean this factor could re-emerge and depress air travel and tourism related industries. Wilkinson and Jenkins (1999, p. 2, 3) note that although airlines are still an extremely safe means of transport, an analysis by Professor Merari in their book finds that just over 10% of all recorded acts of international tourism were directed at aviation targets. Even prior to the 11 September attacks, the vulnerability of aviation’s operations to terrorist attacks was apparent in their assertion that “if the public develop a real fear of flying and no longer trust the will and capability of governments and aviation authorities to prevent and deter terrorist attacks, they will desert the airways in droves”. Of crucial importance is the public’s perception of the risks involved.

Two issues in particular have heightened the public’s concern since 11 September, 2001. One is the widespread acknowledgement of a shift in emphasis from hijacking “toward large-scale indiscriminate violence” (Wilkinson & Jenkins, 1999, p. 5). The other is the terrorist’s “gaining of dramatic world-wide publicity” combined with an ever-present media analysis of subsequent terrorist attacks and/or potential threats, including those involving aviation. The live and unedited transmission on television screens worldwide, of the events of 11 September, underscores this point.

A more recent example is pertinent here. In the latter part of 2003, heightened concerns were raised about the threat to commercial passenger jets posed by shoulder-launched missiles, also known as Manpads (McLennan & Peake, 2003; "Security alert for passenger jets,” 2003). This terrorist strategy received publicity on 28 November, 2002 when an Israeli airliner was narrowly missed by two such missiles when taking off from
Mombasa, Kenya (Huggler, 2002). The history of the use of these weapons shows that destructive missile hits have been occurring at the rate of once or twice per year for over 20 years and cannot be ignored. There are hundreds of thousands of these missiles throughout the world, and thousands are believed to be in the hands of terrorist groups (Schaffer, 1999).

The dramatic upsurge of extreme Islamist fundamentalist movements means that terrorism is portrayed by such groups as a holy war against the USA, Israel and other Western countries, particularly those seen as allied with the USA. As Wilkinson (1999, p. 148) observes, the USA is “now the favourite target for all the violent groups that bitterly resent and oppose American values, culture, foreign policy and actions anywhere in the world”. Similarly, David Kay, a United Nations weapons inspector in Iraq in 1991-92, described terrorists as acting on the perception of the USA as the agent of spreading “Disney-fication, McDonald-ization, and vulgarisation worldwide” (Mann, 2001, para. 2).

These issues have been heightened by the 2003 war in Iraq, with two thirds of those in New York fearing further terrorist attacks on the city ("New Yorkers fear new terror attack: Poll," 2003). Prior to the war in Iraq, the British Joint Intelligence Committee considered that al-Qaeda and associated groups continued to represent by far the greatest terrorist threat to Western interests, and further concluded that the threat would be heightened by military action against Iraq (Allard & Fray, 2003). Others too consider that the “war on terror” will lead to more terrorism, and portray terrorism as “the dark reflection of Globalism” (Ellis, 2003).

The “doom and gloom” metaphors underlying the “crash” scenario are symbolised in the case of terrorism by the suicide bomber, willing to die for the cause. The links with the “cyber-revolution” scenario are readily apparent as well. Hence the trends towards greater globalisation, (as with communications, the electronic transfer of funds and the growth of air travel), have greatly facilitated the ability of terrorist groups to operate transnationally (Wilkinson, 1999, p. 149).

In 2003, the combined effects of the war in Iraq and the spread of the disease SARS demonstrated how these catastrophic influences, on top of the previous crisis following
11 September, 2001, can act as a “tipping point” for the financial viability of many airlines. With the International Air Transport Association having estimated losses to the airline industry post-11 September as US$30 billion, the International Civil Aviation Organization has called on governments to provide more financial and other assistance to the airline industry (UN agency urges government support for airlines, 2003).

The rapid spread of SARS across the globe was facilitated by international air travel, with the World Health Organization (WHO) acknowledging that this is the first time in its history that travel advice has been issued for specific geographical areas because of an outbreak of infectious disease (World Health Organization, 2003a). SARS is a new disease, first recognised in February 2003 in Hanoi, Vietnam. Fear of the spread of SARS was repeatedly symbolised in newspaper photographs showing people wearing masks designed to curb the spread of the virus. SARS thus increased people’s fear of flying, on top of more pragmatic travel advice from WHO to postpone non-essential travel to particular locations such as parts of mainland China, Hong Kong and Toronto in Canada (World Health Organization, 2003b). The indeterminate nature of this infectious disease, and its strong impacts on major hub airports such as those in Hong Kong and Singapore, led Standard and Poor’s Ratings Services to classify SARS as a greater threat to airports’ performance than the war in Iraq (Iyer, 2003).

An important lesson from this epidemic is that, depending on the geographical coverage and duration of this or other infectious disease outbreaks, a “crash” scenario is clearly possible, and international cooperation as part of a preventive strategy is imperative. An editorial in a leading medical journal (BMJ) has warned that the rapid dissemination of SARS around the world should be considered a rehearsal for the next pandemic of influenza (Zambon & Nicholson, 2003). Ironically, air travel in the case of SARS enabled the disease to spread globally. On the other hand, air travel and the speed of electronic communications worldwide also facilitated the rapid response to it.

At the metaphor level of the “crash” scenario, this particular epidemic has been portrayed as “nature’s terrorism”, a threat of unknown proportions extracting a considerable economic and social toll on the countries and regions most affected (Laurance, 2003).
Conclusions from the CLA analysis

The dominant thinking about the growth of demand in the aviation industry is that it is indisputable and good. Similarly, “growth forever” scenarios as expressed in the globalisation of tourism, and the related expansion of hotels, airlines, and consumerism generally are considered in the same light. At present, industrial societies appear to be locked in to an aviation and transport planning mindset dominated by business as usual, pro-growth assumptions.

Other scenarios presented here challenge these assumptions and the underlying worldview. Ecological and environmental considerations related to a “return to nature” challenge the status quo scenarios, and also conceptions of what it means to be human. For example, consumer identities immersed in a frenetic and increasingly fast “hypermobility” have been contrasted here with images from perennial traditions such as Taoism, and more feminine priorities towards caring and relating in meaningful ways.

The implications vary with the audience:

- Politicians and policy makers involved in the rapid expansion of airports and airport developments around the world might look again at whether economies and airport developments must become increasingly integrated. Such developments are predicated on the continuing expansion of aviation, and many of the infrastructure developments may turn out to be unwise investments (Centre for Sustainable Transportation, 2000). What if world oil production peaks around 2010, as many experts think? What if another infectious disease spreads globally, aided by modern air travel?

- Transport and tourism policy makers and planners might consider the implications of “need reduction” and “demand management” strategies for aviation travel, including switches to other modes of travel that are less ecologically demanding, and towards meeting the needs for access rather than mobility.
In an age where videoconferencing and other rapid communications are available, how much business travel is really needed? Is the corporate sector indulging in obsolete work practices, which from an environmental perspective can readily be redesigned?

Are the costs of consuming seasonal foods and purchasing flowers and books via the Internet using rapid international freight delivery justified, given the associated greenhouse emissions?

How might the aviation industry itself contribute to ecologically sustainable transport futures? For example, investment in fast train services rather than aircraft is more greenhouse friendly, particularly for short haul travel.

Is tourism as we currently encourage it, an inherently viable industry in which to place our national interest and infrastructural priorities? (Fawcett, 2000). The industry has high energy and greenhouse impacts, and is likely to face constraints as a result of rising oil prices, and as the externalities of greenhouse issues are internalised in the cost structure of every industry (Benghezal et al., 2000).

- All of us, especially those in industrial societies, might reconsider our priorities. Images of “big is best” and of “freedom to fly” need to be contrasted with ecologically responsible and slower ways of life. Ways of being in the world that emphasise relating, learning and community can be more healthful, meaningful and ennobling. In contrast, a person rewarded for the number of “frequent flyer” points earned might be encouraged, even required, to assume responsibility for his or her contribution to greenhouse gas emissions.

Causal layered analysis has been used here to analyse contrasting visions of aviation futures. Such a process suggests the possibility of reframing and rethinking people’s need to travel and of rethinking tourism, especially international tourism. It also raises the potential of redesign at every level within this problematique, and the issue of including the “personal” in policy considerations, and certainly of a more ennobling view of the personal than one predicated merely on consumerist priorities.
Policy approaches for aviation within a sustainability framework

The nature of policy reform

The short-range orientation of policy analysis as compared with the long-range orientation and visioning associated with futures studies is explored in Chapter 2. There the idea of a “Policy Reform” futures scenario, as one of a number of scenarios proposed by the Global Scenario Group (Raskin et al., 2002), is discussed. Although policy reform is an essential aspect of transition strategy, such an approach tends to be associated with incremental adjustments and a reformist orientation that fails to challenge the consumerism underlying wealthy societies. Further, the reform vision requires a high level of political will and social consensus that is not currently present. On the other hand, the “Great Transition” scenario is guided by a sustainability philosophy that seeks to change the character of global civilisation. It depends on a broad global social consensus currently being initiated by civil society, and is inspired by a larger vision encompassing quality of life and a strong ecological sensibility.

An analysis of policy reform, to the extent that it can form a useful part of a transition strategy, is nevertheless undertaken here, as such proposals appear in an increasing range of documents calling for the reform of transport and aviation in particular. Typically, a policy cycle begins with a stage of identifying issues. This is followed by the subsequent stages of policy analysis, the identification of appropriate policy instruments and consultation with the range of government and community stakeholders. As ideas are tested and support is gathered, the later stages are more action oriented and centre around coordination, decision-making, implementation and evaluation (Bridgman & Davis, 2000).

In the case of the expansion of aircraft traffic at Sydney Airport, for example, the following package of instruments is typical of that used to achieve particular policy objectives (Bridgman & Davis, 2000, p. 68):

- legal instruments such as the regulation of aircraft noise levels and the application of airport curfews
- *financial approaches* such as cash transfers for the insulation of the worst noise-affected houses, or the building of an additional runway to increase carrying capacity of the airport
- *advocacy approaches* where interest groups influence the direction of policy. For example, a “no aircraft noise” lobby presses for a new airport located outside the Sydney city area, and then feasibility studies for an extra airport are undertaken in order to shift the noise, and at the same time allow the expansion of capacity
- *policy through government action* such as where Airservices Australia is instructed to review operation procedures and develop a long-term plan.

However, in the same way that various analyses of sustainability and economics reflect a range of discourses (see Chapter 2), Vigar (2002, p. 16) has analysed for transport how particular discourses have the effect of framing reality and how the associated networks of stakeholders or “discourse coalitions” are implicated in the way particular discourses are transmitted, understood, and gather momentum. The media, for instance, constitutes one of the institutional sites or “policy arenas” where policy issues are discussed. This wider trend toward “interpretive” approaches in policy analysis is analogous to the depth approach used in the causal layered analysis approach. The unpacking of “storylines” and “practices” is useful in showing how a policy discourse that frames a particular view of reality is hegemonic and has paradigmatic influence in a policy area.

*Discourses and networks influencing policy reform in aviation*

In the transport field, the “predict and provide” approach has been particularly influential in just this way, with the ongoing and unquestioned growth of aviation evident in the selection of policy instruments used in the Sydney Airport example above. Whitelegg (1997, p. 88) describes aviation as an “outstanding example” of the “predict and provide” model of transport planning:

> Individual airlines and airport operators are deeply committed to the year-on-year expansion of aviation without limit, and are prepared to invest large amounts of money to achieve this objective. Such a commitment to growth is fundamentally at odds with policy commitments to sustainable development.
Aviation as a whole is non-sustainable and individual airport expansion plans are likely to breach local environmental capacities.

Vigar (2002, p. 190-193) demonstrates how the “predict and provide” paradigm has been increasingly discredited during the 1990s particularly in relation to road building, with a gradual perceptual shift occurring from “roads as solution” to “roads as a problem”. A reframing towards a “new realism” is becoming apparent. Thus, where the “predict and provide” model constructs “changes in travel demand as an expression of underlying social and market dynamics” and as being inevitable without serious consequences (particularly economic), a “new realist” approach argues that “travel demand can be influenced by public policy” and that travel demand management is an appropriate policy response. Further, the “new realist” approach moves beyond a narrowly defined transport policy approach to encompass a much wider set of health, social and environmental concerns.

Another way the discourse on aviation is currently constructed is around the effects of liberalisation and competition, with more recent attention to the impacts of globalisation. The latter trend, linked to free trade, has meant the increasing exposure of air transport to free market forces, resulting in mergers, acquisitions and/or strategic alliances among the largest air carriers (Fan, Vigeant-Langlois, Geissler, Bosler, & Wilmking, 2001). Although the current debate on transport and social change is increasingly concerned with issues of sustainability (European Federation for Transport and Environment, 1999; Upham et al., 2003; Whitelegg & Haq, 2003), “these broader sustainability issues have had relatively little impact on the academic study of air transport, either in European or North American contexts” (B. Graham, 2003, p. 211). Rather, the preoccupation of current policy-making is “with the regulation of imperfections in the liberalized, competitive and increasingly globalized market place” (p. 211). In the USA especially, and in international bodies such as the International Civil Aviation Organization (ICAO) (Seidel & Rossell, 2001), the emphasis is on strategies that mitigate the impacts of aviation without questioning its unconstrained growth (Hennigan, 1999). As Graham observes (p. 213), “policies and strategies that might curb or diminish the environmental externalities of air transport are likely to be swamped by those promoting its development”.

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An example of air transport framed as an essential “input into a rapidly growing international and global economy” is provided from an academic perspective by Button and Taylor (2000, p. 209). They consider that international air transport is an essential ingredient for the success of tourism in many countries and further argue that many businesses also rely on air freight to provide “quality service to customers and to operate just-in-time production management”. Although acknowledging that many bilateral agreements for air services between countries have been liberalised, they also note that a number of barriers to free markets in air transport still exist. As they see it (p. 210):

For air transportation to be truly global and for the skies to be cleared of market impediments issues such as allowing full cabotage, the expansion of foreign ownership rights, and less restricted access to many airports still need to be addressed in many countries.

Other organisations integral to aviation are committed to this position. The liberalisation and globalisation agenda is apparent in the stance taken by the International Air Transport Association (IATA), representing 275 airlines worldwide. As might be expected from private companies with profit making motives, air transport is considered to be the “lifeblood of the global economy—from travel and tourism to delivery”. After the terrorist attack of 11 September, 2001, IATA and its members declared an ongoing commitment “to an increasingly liberalised, global market where airlines compete openly and fairly to meet customer demand. The current crisis threatens not only this but the industry’s ability to drive the world economy” (Jeanniot, 2001). Similarly, the World Travel and Tourism Council is an example discussed in Chapter 3. It argues for a substantial program of aviation infrastructure expansion over the next 20 to 30 years, enlisting the support of governments to achieve this goal (World Travel and Tourism Council, 2003). Likewise in the UK, a group of business, trade union and tourism interests has joined with the aviation industry to lobby for much increased investment in airport capacity. This so-called “Freedom to Fly” coalition includes British Airways; Virgin Atlantic; BAA, which operates seven UK airports; the Confederation of British Industry; the TGWU transport union; Amicus, a manufacturing union; and the British Tourist Authority (Done, 2002).
Governments around the world too have generally accepted two sets of arguments about aviation. Whitelegg (2003, p. 236), a transport academic who has put the sustainability arguments limiting aviation, encapsulates the essentials of these arguments. The first is the assumption that it is difficult or impossible for a national government to intervene because, by definition, aviation is an international industry. The second is that aviation is good for the economy. He considers that both sets of arguments are “fatally flawed”.

The typical stance taken by governments is apparent in the UK Government’s recent inquiry into the future of aviation (Department of the Environment Transport and the Regions, 2000). The arguments put are part of the “semantics of sustainability” with the political interpretation of sustainability tied to the metaphor of a “three-legged stool” of economic growth, social progress and environmental protection (McLellan, 2003, pp. 225, 226). This position wants “to have its cake and eat it too”, or as the consultation document expressed it: “Defining a framework that will maximise the beneficial effects of aviation and minimise the negative effects will not be easy” (Department of the Environment Transport and the Regions, 2000, p. 11). On the one hand the consultation document makes a variety of references to the UK’s aviation industry providing “a substantial contribution to our national economy” (p. 21). In addition (p. 14):

The Government has a general presumption in favour of liberalising aviation services. Increasing free and fair competition between airlines is the most effective way of securing benefits for consumers, and promoting economic efficiency and innovation. Greater commercialisation … has given governments less control, but a more important role in ensuring fair competition and maintaining standards”.

On the other hand, the same document puts the following questions for consideration as part of developing a framework for future development of the industry (p. 24):

Should the Government choose policies that respond to the demands of consumers and allow current growth patterns to continue, while mitigating the negative effects as far as possible? Or are the costs of this approach too high and should we therefore choose policies to limit these negative effects?

The contradictions between air transport globalisation, liberalisation and ecological sustainability suggest that an alternative policy discourse, together with the necessary
discourse coalitions, is needed to reframe the way in which aviation is considered and discussed. Graham (1995, p. 262) summarises the current discourse by asserting that the air transport industry, controlled by free market principles and economic interactions occurring at a global scale, “is a sustainable proposition, only if it is accepted that airline competition is the fundamental priority to be pursued at the expense of all the other spheres of economy and society”. However, the analysis above reinforces how strongly the status quo discourse linked to aviation growth and globalisation is embedded in institutional frameworks and networks.

The elements of a developing discourse on aviation that recognises sustainability issues appear in a recent book on “sustainable aviation” coordinated by the Centre for Aviation, Transport and the Environment at Manchester Metropolitan University (Upham et al., 2003). The editors acknowledge that there is only limited agreement between representatives of different sectors as to whether aviation can be made sustainable or whether its current reliance on fossil fuels and the magnitude of its ecological and other impacts will limit its ability to play a broad role in modern societies.

Those most closely aligned with challenging the prevailing growth paradigm include academics such as Professors Whitelegg (1997; 2003) and Graham (1995; 2003) and environmental NGOs such as the Aviation Environment Federation (Aviation Environment Federation, 2001; Johnson, 2003) and the European Federation for Transport and Environment (Schell, 2003). The latter group, more commonly known as T&E, is the principal umbrella group for around 40 non-government organisations in 21 countries in Europe working on transport and environment issues. It has been particularly active on aviation and environment issues as reflected in a number of its publications e.g. European Federation for Transport and Environment (1999).

Typical of the NGO critique of the aviation industry’s promotion of ongoing growth in air travel is the publication Flying into Trouble produced by a number of prominent environmental organisations (Aviation Environment Federation, 2001, 2002). These include the Aviation Environment Federation, Friends of the Earth, the National Society for Clean Air, and Transport 2000, with support from local groups such as HACAN Clearskies, Gatwick Area Conservation Campaign, and Manchester Airport.
Environment Network. Essentially the critique argues that current aviation trends are environmentally unsustainable, socially unacceptable, democratically damaging and economically flawed. These groups argue that achieving a sustainable transport future with a place for aviation rests on fundamental changes to the aviation industry. The following main approaches are proposed as part of a new policy vision (Aviation Environment Federation, 2001):

- putting the environment at the heart of aviation policy
- reducing aviation’s impact on the environment
- putting the interests of airport neighbours first
- managing the future demand for air travel
- accurately assessing aviation’s contribution to the economy and regional development
- imposing a moratorium on all new airport development.

At the local level, the case study of Canberra airport in Chapter 5 suggests that a network of local government bodies with an interest in competing land use and planning issues linked to aviation, together with community groups especially concerned about aircraft noise issues, will increasingly form part of a discourse coalition pursuing a new agenda on aviation issues.

With respect to political parties, it is not surprising that Green Parties are most aligned with a new policy agenda for aviation. For example, the Swedish Green Party Programme (Miljopartiet de Gröna, 1997, p. 46) refers to the issue of air traffic in its policy statement on communication. The policy states: “the extensive air traffic … must be strongly questioned both because of the energy it consumes and the effect on the environment, and also with regard to global distribution”. In addition, it asserts: “No more airports or extensions of airports ought to be permitted”. The challenge to the prevailing growth paradigm is also clearly stated in the UK Green Party’s response to the UK Government’s recent inquiry on the future of aviation. The concluding paragraph states (UK Green Party, 2001):

The Green Party is the only political party that is prepared to address the issue of air travel. Only the Green Party is prepared to challenge the conspiracy between
New Labour and the aviation industry which seeks to grow air travel irrespective of the costs to people and the environment.

Naturally, such a stance is bound to generate strong resistance from the aviation industry. In this regard, Caroline Lucas (2001) reports on her experiences as a Green Party Member of the European Parliament and in particular as author of a report for the Parliament’s Transport Committee on the impact of the aviation industry on the environment. The report—designed to implement a range of measures to address aviation’s growing contributions to climate change—“was the target of intense lobbying by airlines, aircraft manufacturers, airport operators and freight companies”. Lucas remarks: “I found this level of attention extraordinary” (p. 45).

Perhaps more surprising is the role taken by two official bodies in the UK, namely the Sustainable Development Commission and the Royal Commission on Environmental Pollution. Both bodies have argued for a much wider-ranging public debate on the objectives of a sustainable policy for aviation and airport development (Royal Commission on Environmental Pollution, 2002a). I now consider the Royal Commission’s role in some detail, as it is an instructive example in many ways for the formation of a new policy paradigm.

The role of the UK Royal Commission on Environmental Pollution in policy development and reform

The Royal Commission on Environmental Pollution has taken a strong role in challenging the status quo position of the UK Government and the aviation industry. In a special report entitled The Environmental Effects of Civil Aircraft in Flight (Royal Commission on Environmental Pollution, 2002b), it expresses deep concern about the global impacts of the rapid growth in air travel. The following extract from a news release associated with the publication of the report is unequivocal in its emphasis. Moreover, it points to a significant issue of either denial or at the very least a lack of awareness on the government’s part (Royal Commission on Environmental Pollution, 2002a):

Emissions from aircraft are likely to be a major contributor to global warming if the present increase in air traffic continues unabated. The government shows
little sign of having recognised that action to reduce the impacts of air transport is just as important as action in other sectors contributing to climate change. The problems are challenging but it is imperative that environmental priorities are not simply sidelined as being too difficult. If no limiting action is taken, the growth in air transport will proceed in fundamental contradiction to the government’s stated goal of sustainable development.

Similarly, in relation to the question discussed above from the government’s consultation on the future of aviation, the commission strongly questions the offered choice between either expanding aviation to respond to consumer needs or putting more restrictive policies in place. The commission’s response states that the consultation document “fails to recognise the magnitude of the threat posed by climate change” and “significantly misrepresents the importance of aviation’s growing contribution to climate change” (Royal Commission on Environmental Pollution, 2001, paragraphs 9 and 12). Both its special report on aviation (Royal Commission on Environmental Pollution, 2002b) and subsequent analysis reinforce its earlier position that “aviation’s impacts on the global environment, and climate change in particular … represent an overarching constraint on the future growth of air transport” (Royal Commission on Environmental Pollution, 2001, para. 7).

A number of characteristics of the commission are pertinent here. Established in 1970, it is an independent body, appointed by the Queen and funded by the government. It has produced 23 in-depth reports on a range of environmental issues since its first report in 1971. Its terms of reference indicate that a primary function “is to contribute to policy development in the longer term by providing a factual basis for policy-making and debate, and setting new agendas and priorities” (Royal Commission on Environmental Pollution, 2003b, inside front cover). It therefore seeks to be authoritative, innovative, and also influential, as its full reports are presented to Parliament. Moreover, the members of the commission have strong academic backgrounds and experience across a wide range of natural and social sciences. A degree of independence is built in, as the members serve part-time and as individuals, not as representatives of organisations or professions. A full-time secretariat provides research and administrative support.

In contrast with the short-term focus of much policy analysis, the commission’s approach is longer term, making it similar in that sense to futures visioning. Further, it
also considers the “economic, ethical and social aspects of issues alongside the scientific and technological aspects” (Royal Commission on Environmental Pollution, 2003b, inside front cover). In its detailed examination of climate change in its 22nd report, a full chapter is devoted to the process of adopting a long-term strategy (Royal Commission on Environmental Pollution, 2000b, chap. 10, p. 181). The commission acknowledges that cutting carbon dioxide emissions by 60% by 2050 requires changes that are far-reaching and that will take many years to achieve. It also acknowledges the need for much greater awareness, and much greater debate about the challenge of climate change. Such public awareness takes time to build, but is necessary to support the deep and sustained cuts in emissions. The ethical choices are about “trying to avoid the dangerous modifications of the world’s climate” (p. 196) as “to knowingly cause large-scale disruptions to climate would be unjust and reckless” (p. 198). Foresight is thus a strong feature of its policy approach.

The contradiction between the implications of an expanding aviation industry and a commitment to cut greenhouse emissions is highlighted quite specifically in a commission news release analysing a consultation paper released by the UK Department for Transport and Treasury (Royal Commission on Environmental Pollution, 2003a). The consultation paper from Department of Transport/Treasury does acknowledge a Radiative Forcing Index (RFI) for aviation of 2.7, meaning that aircraft in flight have a radiative forcing effect about 2.7 times greater than from carbon dioxide alone. As discussed in Chapter 3, this is in keeping with authoritative estimates of an RFI of about 3 from both the Intergovernmental Panel on Climate Change report Aviation and the Global Atmosphere (Prather & Sausen, 1999, p. 211, 213) and more recently from the Royal Commission on Environmental Pollution (2002b, p. 15). This appears to be a step forward in recognising the climate impacts from aviation, given that NGOs such as the Centre for Sustainable Transportation in Canada already take this enhanced radiative forcing factor into account, whereas government agencies such as the Bureau of Transport and Regional Economics in Australia do not. This issue is discussed in Chapter 3 in relation to the trend analyses for rising greenhouse gas emission levels from aviation over time.

However, although the commission welcomed the adoption of the Radiative Forcing Index of 2.7 by the UK Department for Transport and Treasury, the commission noted
that the Department for Transport/Treasury consultation document failed to take it into
account in one important respect—the calculations for how much aircraft are likely to
contribute to global warming in the future. The Department for Transport consultation
document predicts that, even with the most conservative figures for growth in air travel,
by 2020 aviation will be contributing 10% of the UK’s carbon dioxide emissions. The
commission recalculated the figures to reflect the use of the RFI of 2.7. If the 60% 
reduction in radiative forcing by 2050 (from 2000) in the government’s Energy White
Paper (Royal Commission on Environmental Pollution, 2003b, p. 8) and also the Royal
Commission’s 22nd report is assumed, and if air travel expansion goes unchecked, the
commission’s calculations suggest that about a quarter of the UK’s climate change
budget by 2020 would come from aviation (Table 4.2). The same calculations suggest
that by 2050 up to three quarters of the UK’s climate change budget could come from
aviation. The unchecked expansion of aviation would then put the UK’s goal of
achieving 60% cuts in emissions out of reach, and emphasise that the “United Kingdom
cannot demonstrate that it is serious about doing its part to address this [climate change]
threat” (Royal Commission on Environmental Pollution, 2000b, p. 198). The revised
figures from the calculations are shown in Table 4.2 (Royal Commission on
Environmental Pollution, 2003a).

Table 4.2. Allocation of UK contribution to radiative forcing, assuming 60% reduction
in radiative forcing by 2050, and using Radiative Forcing Index for aircraft in flight as
2.7 (Million tonnes carbon-equivalent) (Royal Commission on Environmental Pollution,
2003a).

<table>
<thead>
<tr>
<th>Year</th>
<th>Aviation</th>
<th>Economy without aviation (i)</th>
<th>Total Economy (ii)</th>
<th>% Aviation share (iii)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>22 (iv)</td>
<td>150</td>
<td>172</td>
<td>13</td>
</tr>
<tr>
<td>2020</td>
<td>41</td>
<td>115</td>
<td>156</td>
<td>26</td>
</tr>
<tr>
<td>2030</td>
<td>51</td>
<td>95</td>
<td>146</td>
<td>35</td>
</tr>
<tr>
<td>2050</td>
<td>51 (v)</td>
<td>17 (vi)</td>
<td>68</td>
<td>75</td>
</tr>
</tbody>
</table>

Note:
(i) Assuming radiative forcing index of 1 for emissions from other activities covered by Energy
White Paper. The figure for the totality of human activities is estimated as between 1 and
1.5.
(ii) Including aviation.
(iii) As percentage of total economy including aviation.
(iv) Rounding to whole numbers in this table, as compared with RCEP data.
(v) Growth from 2030 to 2050 assumed to only keep pace with technological improvements.
(vi) Assumes 60% reduction in total radiative forcing from 2000.
This example illustrates that way in which careful analysis as a basis for policy-making can influence other agencies locked into a status quo policy discourse. It further demonstrates the value of an organisation with the credentials and official standing to influence mainstream networks. In contrast, many NGOs and Green Parties are more easily portrayed as the radical fringe. Another example is the commission recommendation to reduce carbon dioxide emissions by 60% by the year 2050, subsequently accepted by the UK Government in its Energy White Paper (Royal Commission on Environmental Pollution, 2000b; 2003b, p. 8). Likewise, the special report on aviation (Royal Commission on Environmental Pollution, 2002b) was produced and published within a contracted six month time period in order to influence the outcome of the UK Government’s White Paper on the future of aviation.

It appears that some success in the direction of this challenge may have been achieved. As a report in the Daily Telegraph of 3 December, 2002 states (Royal Commission on Environmental Pollution, 2003b, p. 14):

This report has entirely changed the airport debate. The problem of where to put some whopping new airport is suddenly reduced to a secondary and consequent question. The question is not where to have it, but whether to have it all.

In relation to the tensions between globalisation, liberalisation and ecological sustainability, the Royal Commission’s analysis is sufficiently rigorous and deep to confront these competing issues in terms of “strong” sustainability. Thus it addresses not only substitution strategies (as with its recommendations for a modal switch to rail in place of short-haul air travel), but also deals with strategies to resolve the fundamental problems of growth and environmental impact.

Its 18th report on Transport and the Environment (Royal Commission on Environmental Pollution, 1994), for example, devotes a full chapter to air transport and graphs the consequences for carbon dioxide emissions under a number of scenarios. The rising curves for aviation’s carbon dioxide emissions through to the year 2040 from 1990 become progressively less steep in the following order: business as usual, improvements in load factors, improvements in technology, all improvements excepts reduction in demand, reduction in demand through lower growth, and all measures in combination (p. 73). Even with the gains in technical and operational efficiency, one study cited
suggests that worldwide carbon dioxide emissions from air transport would triple by about 2040, with gains in efficiency being overwhelmed by the growth in demand. Reflecting a strong sustainability approach, the commission states that (p. 73):

The conclusion reached is that management of demand will be the most critical factor in the long term in limiting carbon dioxide emissions from air transport: it is suggested that this might be achieved through a progressive reduction in business travel and air freight, and slower growth of tourist travel.

Since that report was published, the commission suggests that “the case for action to limit climate change has become even more compelling” and “that some form of demand management must be implemented in order to avoid long-term damage to the environment” (Royal Commission on Environmental Pollution, 2002a). This underlines again the need to fundamentally question aviation growth scenarios, and to put into place an alternative discourse and its associated practices.

Paradigm and policy shifts over time—recognising the need to reduce travel

The need to reduce travel has been suggested as a final stage in the transition from the “predict and provide” paradigm to what has been called the “new realism” in transport planning (Bannister, 1997, p. 439; Vigar, 2002, p. 191). Although Bannister considers the stages of this transition more specifically for decision-making on road building, the stages are equally applicable to aviation. The stages used are:

Stage 1: Consensus that the projected growth is not sustainable. The demand-led approach to transport planning and the construction of new or extended infrastructure is no longer considered feasible or desirable.

Stage 2: There is a realisation that proposed road schemes or new or upgraded airports are not going to solve the problem. Even if substantial infrastructure is added, congestion on the roads and in the sky will only get worse.

Stage 3: Discussions about the limitations of the use of the car or plane take place. The costs of travel are substantially raised so that demand can match supply, and particular users and modes of transport are given priority.
Stage 4: Public and international awareness of the environmental consequences occurs.

Stage 5: There is a recognition that the only way to improve both the environment and congestion is to reduce the need to travel. This is where the planning systems and governments have an important role to play.

Bannister’s assessment, in relation to cars and road building at least, is that industrial societies have generally passed through stages 1 and 2, with general consensus that the road solution is not feasible or desirable. In 1997, he suggested that a shift from stage 3 to stage 4 was taking place. The greatest potential is in stage 5, where travelling shorter distances and using cars less are integral to a positive action program. With respect to aviation, the analysis above and the case study presented in Chapter 5 suggest that the later stages are being explored and publicised by a range of NGOs, community groups and official bodies like the UK Royal Commission on Environmental Pollution. However, it would appear that public and international awareness of aviation’s growth consequences (stage 4) lags behind that of cars. Further, denial in relation to limiting the further growth of aviation is still widely evident in government, the aviation industry and tourism bodies.

Policy measures for restructuring and redesigning aviation and air travel

Policy measures for aviation that take into account its constraints, especially its impacts on ecological sustainability, are increasingly being discussed. A core theme or approach is demand management or reduction of the need to travel by air transport. As the earlier causal layered analysis showed, this can take a variety of forms such as substitution of air travel by information technology or reducing the desire for long-distance travel for pleasure.

Publications from non-government organisations and policy institutes are generally leading the way, although as outlined above some official bodies are exerting strong influence as well. Some ideas are broad, challenging fundamental tenets of society as organised at present, and have consequent significant implications for aviation. Others are more specific to aviation per se e.g. an en route environmental charge based on carbon emissions. I begin with some of the broader issues:
(a) The decoupling of transport and economic growth should be regarded as a priority. The European Federation for Federation and Environment (2001a, p. 3; 2001c) has actively pursued this measure, given that transport’s CO₂ emissions are among the fastest rising of the sectors, and given the need for Europe to meet its Kyoto commitments. The decoupling notion addresses the assumption that the overriding justification for air transport growth is economic, be it tourism, freight or business related. Whitelegg (1997, p. 57) notes that the EU’s Common Transport Policy Action Programme assumes additional transport infrastructure and cheaper transport, but “nowhere does it ask if our economic and social objectives can be served through the use of less tarmac, less concrete and less fossil fuel consumption”. That is, it is possible to have economies that prosper without the need for a large transport infrastructure.

(b) Approaches that critique the social and environmental costs of the transport components of globalisation and favour local production and consumption. This issue is related to (a) but focuses on the long-distance implications of air transport integral to the globalisation model. Whitelegg (1997, p. 76) considers that distance has been transformed into a commodity that is consumed at an increasing rate, with such consumption being possible through the allocation of large amounts of energy and large amounts of public expenditure. This drive to consume large distances is inherent in global tourism and air travel, and also the logistics of “just-in-time” freight transport.

This policy approach makes a clear distinction between two positions. The first is linked to the current availability of relatively quick and cheap transport and the erosion of space-time constraints on a global scale. The contrasting position questions the social and environmental implications associated with the first one. For example, home grown apples bought in Great Britain use 3,000% less energy and produce 87% less CO₂ than apples imported from New Zealand (European Federation for Transport and Environment, 2003a). The social theorist John Ralston Saul suggests that trade has worked in fundamentally the same way over the past 2,500 years and that global corporations are no more equipped now to take the public good into account (Jackson, 2000). Taking the full social and environmental costs of globalisation into account is thus an important part of the shift to alternative models of global development.

NGO’s and governments are the bodies required to drive this shift. The Royal
Commission on Environmental Pollution (2002a), for example, expresses particular concerns about the rapid growth in air freight, with its high fuel use and carbon dioxide emissions per tonne-kilometre. It suggests that air freight must be reserved for high value, and usually perishable goods, and questions the trend to allow the development of “express parcel hubs”.

A “strong” approach to sustainability calls for the reconstruction of logistics and the promotion of regional production systems to minimise the distance travelled by goods (Whitelegg, 1997, p. 212). For example, rethinking the just-in-time concept could save considerable volumes of air transport and the associated emissions (European Federation for Transport and Environment, 1998, para. 3.2.1). Where transport is required, closer attention to issues such as reliable delivery in preference to 12-hour delivery times has the potential to enhance ecological sustainability and the quality of life of local communities.

A well-publicised example in relation to local production involved the production of strawberry yoghurt in Germany (von Weizsacker et al., 1997, p. 117). It demonstrated the high transport intensity associated with the manufacture and distribution of the product and underlines the importance of developing a strong local economy that reduces reliance on long-distance transport. It also emphasises that many reductions in resource use are not technical in nature. In this case, for example, strawberries, milk and other ingredients can be produced and processed locally and glass jars can be returned to local or regional markets. In addition, savings can come from decentralised dairies. This, of course, challenges the prevailing market orientation supported by artificially cheap transport.

(c) Reframing tourism is another significant area related to the decoupling of transport and economic growth and which challenges the assumptions underlying globalisation. The major resource and environmental issues linked to tourism, and in particular the associated air transport, are discussed in Chapter 3. These issues are increasingly challenging tourism’s integration within the structure of modern economies. The Royal Commission on Environmental Pollution (2003b, p. 24) is considering the topic of tourism and the environment as a possible “priority for enquiry” in light of these concerns.
The task of reframing tourism presents a significant challenge. Two generations of OECD citizens have become accustomed to relatively inexpensive long-haul travel, with leisure travel accounting for up to 80% of air travel (European Federation for Transport and Environment, 1999, p. 29). Environmental considerations generally rank low in consumer criteria for choosing a holiday destination and the means for getting there, and tourism marketing rarely seeks to provide information on the environmental impacts stemming from travel (Organisation for Economic Cooperation and Development, 2002a, pp. 6, 37). Air tourism is unlikely to be avoided by decrees or moral appeals, and will depend in part on increasing public awareness (see sub-section k below). In addition, governments typically view tourism as a way of boosting the economy and therefore ignore its environmental and greenhouse impacts.

Some of the ways in which tourism might therefore be reframed include promoting information on the environmental impacts of travel, promoting other forms of leisure activity, and promoting domestic tourism (Organisation for Economic Cooperation and Development, 2002a, p. 44). The Better World Club (http://www.betterworldclub.com), for example, is a travel company that acknowledges the environmental impacts of travel, offering hybrid and electric rental cars and the use of carbon offsets to help counter air travel greenhouse emissions.

The desire for long-distance travel can be countered by improving the local environment and leisure facilities. In addition, promoting longer vacations, while keeping vacation entitlements constant, can lead to fewer tourism trips. However, countervailing trends are currently working against this, and policies will need to address these in order to reduce the frequency of trips undertaken. Governments also need to account for greenhouse gas emissions from tourism related travel (including air travel and “fly/drive” packages). This necessarily means addressing the contradictions between policies specifically promoting greenhouse gas reduction targets on the one hand, and tourism policies that generate new emissions on the other.

(d) Challenging aviation’s privileged position in society is necessary in order to facilitate policy-making that addresses ecological constraints. At present policy-making is strongly influenced by the prevailing vested interests. Sewill (2003, p. 6) asserts that the aviation industry spends more on advertising, public relations and lobbying than any
other UK industry. For example, MPs are regularly entertained and flown around the world, and linkages with the package holiday industry and travel correspondents are vigorously pursued in order to promote a glorified image of foreign holidays. Another example cited is the lobbying that succeeded in having international aviation excluded from the Kyoto Protocol.

One strategy used by the aviation industry to entrench its position is through the use of economic studies that support the economic contribution of aviation to the economy and regional development. Such positive economic benefits are strongly assumed, for example, in the recent UK consultation document on the future of aviation (Department of the Environment Transport and the Regions, 2000, chap. 5), which draws freely from an industry backed study by Oxford Economic Forecasting. Similarly, orthodox economists in the transport field typically support the economic benefits of aviation. For example, Button and Taylor (2000) find in their examination of a relatively large number of US airports, a positive link between the economic structure of surrounding areas and the availability of international air services to the EU market.

In the case study of Canberra airport in Chapter 5, such studies supporting the positive economic benefits of the airport’s development to the local Australian Capital Territory (ACT) region are evident too. These studies are also used to target politicians and bureaucrats, with local authorities generally subscribing to the thesis that a new or expanded airport is a way of bringing prosperity to a region. For example, a recent study in Canberra undertaken by ACIL Tasman is described by the airport owners (Canberra International Airport, 2003a) as an “independent study that assesses the economic importance of the Airport to … the region” with ACIL Tasman specialising “in providing high quality economic, policy and strategic analysis and advice to government and business”. In summary, the report concludes:

Growth of activity at the Airport has a trend increase which is substantially higher than growth in the economy of the region … We expect this trend to continue as Australian incomes continue to grow and as low cost airlines create downward pressure on fares.

On the other hand, NGOs and some academics have increasingly questioned the validity of such studies, especially in those instances where the airlines and airport operators’
associations provide financial and moral support for them (Aviation Environment Federation, 2001, 2002; Sewill, 2003; van de Pol, 1998; Whitelegg & Williams, 2001). The nature of these linkages is often unexposed, which has significant implications in regard to a lack of effective public participation and review, and more broadly in terms of the effective operation of democracies. The critiques generally emphasise the narrow economic focus of studies such as the Oxford Economic Forecasting one referred to above, and assert that aviation’s social and environmental impacts need to be accounted for in any sort of balanced evaluation. Thus broad based studies that take into account the relationship between transport and the economy (discussed in sub-section a above) adopt a more critical and holistic approach. For example, a positive finding is that jobs lost from restricting the aviation industry can lead to the expansion of employment in other areas (Aviation Environment Federation, 2002, p. 5; Whitelegg & Williams, 2001, pp. 23-25).

Further, broad based approaches are cognisant of the fact that rising incomes and artificially low fares are strong drivers of the demand for air travel. Political support for the aviation industry in the form of direct subsidies from government means that the costs of technology and infrastructure are not fully reflected in airfares. In addition, indirect subsidies such as the lack of a tax on aviation fuel and the absence of value added tax (VAT) on air travel are significant. Sewill (2003, p. 18) has estimated the value of the tax subsidy to the aviation industry in the UK at GBP9.2 billion per year, with a “fair tax package” consisting of GBP5.7 billion per year for fuel tax, GBP4.0 billion per year for VAT, and GBP0.4 billion per year for duty free sales.

Consequently, NGOs working in this area recommend that all forms of financial support for the aviation sector cease and also support the abolition of all tax subsidies to the sector (Aviation Environment Federation, 2001, p. 6; European Federation for Transport and Environment, 1999, p. 40; Whitelegg & Williams, 2001, p. 31, 36). In Australia, a Greenpeace (2001, section 5) submission to a government fuel taxation inquiry observed that duty exemptions ensure that aviation fuel and kerosene is taxed at 2.8 cents per litre whereas engine and burner fuel use is taxed at 38 cents per litre. As this overstimulates aviation compared with other transport modes, Greenpeace therefore recommended increasing excise duty on aviation fuel.
(e) *Economic incentives specific to aviation* are therefore an important part of restructuring the economy. More broadly, Brown (2001, chap. 11) considers that fiscal restructuring is a vital component of building an “eco-economy”, as tax policy is systemic in nature. Current fiscal systems, via subsidies and taxes, reflect the goals of an era where the rapid and competitive exploitation of resources was a priority. However, if taxes raise the price of fossil fuels to reflect the full cost of their use, this sends an appropriate signal throughout the economy, affecting all energy-related decisions and behaviours. Appropriate price signals are an important part of bringing aviation into line with ecological constraints.

A commonly suggested mechanism to achieve this is the imposition of a tax on aviation fuels, as this would then reduce the demand for air travel. However, a feasibility study of a possible European aviation charge came to the conclusion that, of a variety of possible charging mechanisms, a Europe-wide emissions charge would best address market distortions (European Federation for Transport and Environment, 1998). Further, a fuel tax faces legal obstacles, whereas an emissions charge can be introduced under existing arrangements. The Royal Commission on Environmental Pollution (2002b, para. 5.9, p. 32) also supports this emissions charge approach.

The level of emissions would be determined from the amount of fuel consumed, with the “polluter pays” principle suggesting that airlines be the organisations responsible for its payment. The Royal Commission on Environmental Pollution (2002b, paras. 5.12 and 5.13, pp. 32-33) suggests it is likely that, to have a significant effect on demand, the level of the charge would need to be substantial. Further, the airlines would be obliged to pass on some at least of the emissions charge through a rise in airfares. This could be used as a form of eco-labelling, with a “climate protection charge” on air tickets increasing public awareness of the environmental costs associated with aviation.

The issue of addressing greenhouse emissions from aviation is a complex one, given the global nature of international aviation. A few examples are discussed here. Action at this level is optimal for reasons of environmental effectiveness, but is hindered by the fact that renegotiation of the Chicago Convention and other subordinate bilateral agreements is complicated and unlikely to achieve consensus on global action (Royal Commission on Environmental Pollution, 2002b, para. 5.8, p. 32). Emissions trading is
also increasingly under discussion for the aviation sector (Pastowski, 2003). The Royal Commission on Environmental Pollution (2002b, paras. 5.33 and 5.34, pp. 35-36), for example, argues for the inclusion of aviation emissions in an emissions trading scheme, but with the proviso that international aviation emissions be included in national emission totals. Further, the enhanced radiative forcing associated with aviation needs to be accounted for, with the aviation industry needing to acquire three carbon permits for each unit of carbon it actually emits. Normally, emissions trading schemes for climate policy are restricted to CO₂ emissions.

In addition, there are particular concerns arising from market-based schemes in relation to developing countries. These countries argue against emissions reduction obligations on moral grounds and also on the basis that it could affect their economic development. One study (M. D. Davidson & Wit, 2002) investigated six market-based options for controlling greenhouse gas emissions from international aviation, with the most promising being one that is limited to all traffic within and between developed countries (Annex B countries), regardless of the nationality of the carrier. It is argued that such a scheme would neither affect developing countries negatively nor would it lead to unequal competition.

As considered under sub-section (d) above, eliminating state subsidies and removing the fiscal distortions linked to tax benefits are other important measures for redesigning economic incentives. However, given that many public subsidies are hidden, and others are carefully disguised to reduce their public visibility, issues of accountability and democracy become critical as well.

(f) Modal shifts are needed from air transport to less energy-intensive modes such as rail. This principle is consistent with a broader approach to sustainable transport where less damaging forms of transport substitute for more damaging forms of transport, as with the modal transfer of freight from road to rail. Given that it is a substitution approach, it is closer to “weak” sustainability approaches, but nevertheless has significant implications for greenhouse gas emissions.

One area of particular importance, recently emphasised again by the Royal Commission on Environmental Pollution (2002b, para. 4.39, p. 30) is the disproportionately high
environmental impact of short-haul air journeys (800 km or less) for the distance travelled (in this case within the UK and to nearer parts of Europe). In contrast, the commission suggests that for rail travel, carbon dioxide emissions and fuel use per passenger-kilometre are typically at least an order of magnitude lower than for air travel. For freight the comparisons are even more marked, with carbon dioxide emissions and fuel use for rail freight a factor 20 to 100 lower. Hence the earlier mentioned commission conclusion that air freight “must be regarded as a particular luxury reserved for very high value, and usually perishable, goods” (para. 4.41, p. 30).

Because of the sustainability advantages of rail, the commission considers it essential for governments to encourage a modal shift from air to high-speed rail, especially for short-haul air trips where rail can be a viable competitor (pp. 33-34). Janic’s (2003, p. 146) review concludes that on short-haul station-to-station distances (300-600 km) high-speed rail has managed to take a significant proportion of traffic from air transport. Similarly, Patterson and Perl (1999) have demonstrated a “TGV effect” by identifying significant reductions in aviation passenger traffic with the introduction of the TGV fast train service in France. For example, there was a 17% average annual drop in Paris-Lyon air passenger traffic in 1981-1984. Likewise, with the TGV’s introduction, air passenger growth rates for Paris-Bordeaux fell from 10-12% to a 0.3% annual increase. The authors point out the advantages of airlines sharing in the economic benefits of such intermodal innovation. Clearly, airline and train ownership do not need to be mutually exclusive, and new institutional arrangements can be initiated (Perl, 1998). Interestingly, some airlines such as Lufthansa in Germany are now initiating and expanding “air-rail” services to substitute for some short-haul air routes (Janic, 2003, p. 142).

The IPCC special report on aviation estimates that up to 10% of travellers in Europe could be transferred from aircraft to high-speed trains (Penner et al., 1999, p. 12). The European Federation for Transport and Environment (1999, p. 31), on the other hand, is more optimistic about the potential for modal shifts from air to rail, in view of the fact that 68% of the total 7.5 million flights in Europe in 1998 were for distances under 1,000 km and 45% of the total were flights less than 500 km.

Rail has not competed well with air in the UK, because of a failure to invest in rail and
as a result of neglecting environmental externalities in the cost of air transport. In contrast with an approach that encourages airport expansion and proliferation, the Royal Commission on Environmental Pollution (2002a) has called for a policy shift by the UK Government, in order to facilitate the shift from air to rail. In particular, this applies to internal travel in the UK and some intra-European journeys. Similarly, in Australia there has been impoverished investment in rail infrastructure because of a lack of political will and because government funding decisions have not been directed at integrated transport outcomes that aim to optimise social and environmental impacts (P. G. Laird, Newman, Bachel, & Kenworthy, 2001, p. 91).

In addition, when visioning alternatives, governments and politicians in Australia appear to have been captivated by highly expensive Very Fast Train proposals such as the French TGV or various Maglev proposals, which are not likely to receive the necessary government or private sector funding to be realised (P. G. Laird et al., 2001, p. 32; "Not time for big schemes in transport," 2002). The multi-billion dollar funding required for such projects with dedicated tracks or guide-ways is compounded by significant concerns about energy, noise and land take associated with the running of trains at more than 300 km/h (Royal Commission on Environmental Pollution, 1994, p. 207; von Weizsacker et al., 1997, p. 123). Fortunately, a much less expensive solution is available in the form of Pendolino or tilt train technology, so-called because these trains can tilt on existing or upgraded curved tracks in a way that allows them to maintain high speed.

Tilt trains are now an established technology in several European countries as well as Japan, particularly for regions where economic considerations do not permit the construction of dedicated track for Very High Speed Trains. In the USA, Amtrak started running its new Acela tilt trains in 2000, between Boston, New York and Washington. With a top speed of 240 km/h, these trains can cover the 362 km journey from New York to Washington in around two and a half hours (P. G. Laird et al., 2001, p. 33). Amtrak aims to capture 70% of the air/rail market on this route.

The case for the use of tilt train technology in Australia has been put strongly, particularly for linking Sydney, Canberra and Melbourne (P. Laird, 2002, 2003; P. Laird, Michell, & Adorni-Braccesi, 2002). This technology provides a cost effective
solution in contrast with the high-tech alternatives. It was introduced successfully in Queensland in 1998, with upgraded and straightened track on the Brisbane-Rockhampton line. The economic advantages of faster and heavier freight trains on the upgraded line facilitated the use of passenger tilt trains. Travelling at speeds of up to 170 km/h, these passenger trains carried their millionth passenger in 2002, and have provided effective competition for short-haul air services. The success of the service ensured its extension to Cairns in 2003.

(g) The optimisation of aircraft technology and of aircraft operations using air traffic management (ATM) systems and procedures are two areas with the potential to reduce the amount of fuel burned and hence reduce emissions. As these are specialised and technical areas, two consecutive chapters in the Intergovernmental Panel on Climate Change (IPCC) report Aviation and the Global Atmosphere are devoted to them (Bekebrede, 1999; Lewis & Niedzwiecki, 1999).

In terms of the efficiency-substitution-redesign (ESR) model discussed previously, such measures relate to efficiency improvements and the mitigation of climate change. In this respect, Pastowski (2003, p. 186) provides a useful summary of the main actors and the range of options for reducing aviation’s impact on the climate (Table 4.3).

**Table 4.3.** Options and main actors involved in climate policy in civil aviation (Pastowski, 2003, p. 186).

<table>
<thead>
<tr>
<th>Overall objective</th>
<th>Stabilising the global climate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sectoral objective</td>
<td>Limiting GHG emissions from civil aviation</td>
</tr>
<tr>
<td>Determinants/options</td>
<td>Emissions per seat-kilometre</td>
</tr>
<tr>
<td>Intermediate determinants</td>
<td>Aircraft technology</td>
</tr>
<tr>
<td>Actors involved</td>
<td>Aircraft industry</td>
</tr>
<tr>
<td>Policies (governments, international)</td>
<td>Actor-oriented policies</td>
</tr>
<tr>
<td>NGOs</td>
<td>General sector-oriented policies</td>
</tr>
</tbody>
</table>
In general, increasing the technical efficiency of an aircraft in use or increasing the operational efficiency of air traffic may be contrasted with more fundamental demand management approaches designed to reduce the need for or the frequency of travel. However, the relationship between these approaches is more complicated. For example, the IPCC report cites studies on the environmental benefits of a more efficient air traffic system and notes that emissions from aviation can be reduced, with one study for the International Civil Aviation Organization (ICAO) suggesting a possible reduction in annual fuel consumption of 6-12% (Hennigan, 1999, p. 343). On the other hand, in keeping with the Jevons Principle discussed previously, Pastowski (2003, p. 183) cites studies showing a “rebound effect”, associated with technical and operational improvements that have led to improvements in energy intensity and overall fuel use. Consequently, the cost reductions have been passed on to customers, in turn driving further demand. In sum, the overall effect of the efficiency gains in air traffic management may be a negligible decrease in emissions or even higher emissions.

In Australia, Airservices Australia is the national provider of air traffic management and related services to the aviation industry. It is implementing the Australian component of ICAO’s global plan for an integrated air traffic system, known as a communication, navigation, and surveillance/air traffic management (CNS/ATM) system (Australian ATM Strategic Management Group, 2001). The system will, for example, replace the existing fixed air routes with options for airlines to fly directly to their destination with the same level of safety (Cooke, 2003b). Airservices Australia (2002b) has also promoted the environmental benefits of its air management systems. For example, the introduction of one procedure alone called “reduced vertical separation minima” was assessed as achieving a 250,000 tonne reduction in CO₂ emissions with a $20 million reduction in fuel costs for the airlines per annum.

However, more efficient air traffic management as well as the commitment to expand Airservices Australia’s business do not address the fundamental demand management approaches considered necessary by the Royal Commission on Environmental Pollution (2002a). Airservices Australia (2002a, pp. 5, 7) is a statutory corporation “driven by society’s rising demand for environmentally responsible, safe and competitive transport”. It also has a “mission to be the preferred global partner for air traffic and related aviation services”. Its financial results are closely tied to growth and downturns
in the aviation industry, with just over 90% of its income in each of the years 2000-01 and 2001-02 coming from regular air passenger transport. In the latter year, for example, $70 million less in revenue was received from the airlines because of the collapse of Ansett and the 11 September terrorist attacks in the USA (p. 42-43).

In a way that also avoids the issue of demand management, a 2003 World Environment Day presentation to the staff of Airservices Australia by the former chair of the Victorian Environment Protection Agency suggested carbon offset approaches as a possible “sustainability opportunity” for the aviation organisation, akin to that used by Greenfleet in the case of cars (B. Robinson, personal communication, 5 June, 2003). Such an approach seeks to remove CO$_2$ emissions from the atmosphere through tree planting, rather than focusing on reducing greenhouse gas emissions arising from aviation. Greenfleet (http://www.greenfleet.com.au) calculates that the average car requires the planting of 17 trees each year to absorb the CO$_2$ emitted from it. About 12,000 individuals and 40 car fleets, including those of the Victorian and Queensland governments, are currently supporting Greenfleet’s tree planting program in five states of Australia (O’Clery, 2002).

Carbon sequestration programs of this kind have been critiqued on a number of grounds. For example, complex feedbacks between the climate and the terrestrial carbon cycle create a high degree of uncertainty for future predictions because of the effects of increased temperatures on photosynthesis and soil respiration (Edinburgh Centre for Carbon Management, 2002, p. 1). First results from the Jasper Ridge Global Change Project at Stanford University indicate that elevated CO$_2$ actually reduces plant growth when combined with other likely consequences of climate change such as higher temperatures, increased precipitation or increased nitrogen deposits in the soil (Schwartz, 2002). In relation to the Kyoto Protocol, there is also uncertainty about how much of the CO$_2$ stored in suitably certified plantations will be able to generate an emission credit, this being closely related to the guaranteed duration of storage (The Australia Institute, 1999, p. 9). More immediate practical concerns have focused on a lack of attention to the survival rate of plantings by Greenfleet, with the suggestion that the organisation is driven by the need to plant large numbers of trees to generate publicity and further funding (Stodart, 2003).
In relation to the optimisation of aircraft technology, technological development to continually improve aircraft engines and airframes is supported by major bodies (Hennigan, 1999, p. 335; National Research Council Committee on Aeronautics Research and Technology for Environmental Capability, 2002, p. 1; Royal Commission on Environmental Pollution, 2002b, p. 34). However, it is also widely acknowledged that such improvements are likely to be outstripped by the projected increases in air transport. The National Research Council committee asserts that current research efforts in the USA are falling well behind the intensifying severity of the problem.

In relation to future developments, the Royal Commission report (p. 37) considers that many industry ambitions are overly optimistic. Although incremental improvements are possible and supported by the commission, radically new airframe designs such as the blended wing-body (with up to 30% less fuel burn) are likely to take several decades to significantly affect the industry. Modernised versions of older technologies such as airships (zeppelins) are poised for a return to the skies sooner, although the renamed “hybrid air vehicles” are filled with helium. At this stage, the prime uses appear to be for heavy freight and for monitoring not easily accessible sites. For heavy freight, airships are much faster than ships and cheaper than conventional aircraft. CargoLifter estimates that the heavy-lifting market is worth a billion dollars a year in the USA alone, and considers that airships could easily take one-tenth of that market (Scott, 2001).

The discussion in this sub-section serves to highlight Pastowski’s (2003, p. 190) contention that employing policy options in isolation can result in counteracting or rebound effects in the development of other options. A broad range of policy approaches implemented at various political levels, with demand management integral to the overall framework, is therefore theoretically most likely to be successful.

(h) Regulatory approaches such as the setting of environmental limits and curfews at airports, and stringent, legally binding targets for a progressive reduction in noise and emission levels are ideally required. However, as the case study in Chapter 5 shows, although governments prefer to see problems resolved at a local level, local authorities often do not currently have the necessary powers to do so. Minimum standards for the control of air and noise pollution under the guidance of an environment (rather than
transport) agency appear to have the best chance of meeting community needs, although local discretion for higher standards should also be possible.

The market-based orientation of many governments and the increasing privatisation of airports are, however, at odds with an interventionist regulatory approach. For example, the Royal Commission on Environmental Pollution (1994, para. 5.40, p. 75) expressed concerns that the deregulation of the airline industry in the USA had damaging effects on the environment. Deregulation in effect encouraged the use of smaller aircraft and led to lower load factors, thus causing greater emissions per passenger-kilometre. With respect to regulatory intervention, the close link between Airservices Australia and its revenue-providing airline customers (as discussed in sub-section g above) points to the need for a more independent regulatory authority.

The International Civil Aviation Organization (ICAO) (2001a) has established standards for aircraft noise (the most recent being its chapter 4 standards) and aircraft emissions (Annex 16) and considers that its ongoing stringency requirements have “pushed” aircraft engine technology (Hennigan, 1999, p. 344; MacBurnie, 2001). Others consider that ICAO is too closely allied to the economic interests of the aviation industry and that there are many barriers to it producing appropriate responses to facilitate environmental objectives (Schell, 2003, p. 230). In contrast, about 27% of respondents (mainly airlines, airports and some councils) to the Department for Transport (2001, para. 90) consultation in the UK considered ICAO to be the best body to manage negotiations on environmental impacts at an international level. However, many also thought there was a need for ICAO to speed up its decision-making processes.

(i) Within a demand management framework, governments need to consider airport developments and extensions much more critically than is the case at present. The full ecological and social consequences of airport development need to be critically evaluated, and local communities need to be able to exercise their rights to effectively challenge the principle and location of airport expansion. Further, planning systems need to give much greater attention to the ecological sustainability and quality of life issues associated with aviation. These issues are explored in more detail in the case study of Canberra airport in Chapter 5.
(j) Substitution of air travel by telecommunications and information technology is one element of redesign with the potential to reduce the need for physical travel. As introduced in the discussion under causal layered analysis, business air travel in particular can be replaced in part by videoconferencing, improved transmission of multimedia information and new technologies such as teleimmersion. Use of such technologies can be included as part of a corporation’s environmental performance audit.

Moriarty and Kennedy (2000) point out, however, that information technology (IT) can act to either augment or replace travel, depending on the circumstances. They conclude that net reductions in travel are not guaranteed if present transport policies continue, particularly with low travel costs prevailing. Only if concerns about oil depletion or global warming intensify, together with policies that encourage travel reduction, will IT be a means of helping to solve these problems. In the next decade or so, air travel is likely to be particularly affected by higher international oil prices, and the likelihood of government imposed carbon taxes. With real travelling costs thus likely to rise, telecommuting and other forms of “virtual transport” will likely become important ways of reducing real transport’s mounting environmental impacts. In addition, as occurred with the events of 11 September, 2001, accentuated security concerns may also increase the demand for videoconferencing systems.

A review by the Centre for Sustainable Transportation (2001, p. 10) in Canada calls for further research to address both IT’s transport-reducing and its transport-increasing effects. CST acknowledges that telecommuting is often used as an example linked to travel reduction, but suggests that IT-induced travel activity needs greater investigation. For example, IT can help a business serve a much wider area (including worldwide), thereby increasing freight activity. To the extent that IT enhances efficiency, it can also enhance the wealth of businesses and individuals, which in turn usually increases transport activity. In addition, IT can reduce transport costs e.g. the cost of purchasing an airline ticket, and thereby increase transport activity.

The development of e-commerce is predicated on the assumption that highly fragmented goods need to be delivered globally within a tight timeframe and at low cost. Home deliveries, in particular, consist of frequent, small just-in-time shipments.
This leads to less consolidated deliveries and more freight traffic, resulting in greater social and environmental impacts. An OECD seminar dealing with the impacts of e-commerce on transport (Heuer, 2001) concludes that governments need to realise that e-commerce may result in increased freight transport demand (including air freight). Further, transport policies need to move on from purely infrastructural, engineering and regulatory approaches to consider policies concerning telematics, taxation, physical planning and social and environmental policies.

(k) **Behaviour change by individual people is essential if aviation’s emissions and impacts are to be reduced substantially.** As one element of influencing behaviour change, the European Federation for Transport and Environment (1999, p. 40) contends that citizens and businesses need to be better informed about the environmental consequences of flying. In addition, accurate information on the environmental performance of the aviation industry is not currently available to the general public, interest groups, scientists and even policymakers, because of the restrictions maintained by the aviation sector.

One UK study addresses people’s attitudes to air travel there, using a sample of 1,850 randomly selected adults representative of the British adult population, and drawing on questions included in the Office of National Statistic’s February 2002 Omnibus survey (Lethbridge, 2002). In answer to the question “do you think that air travel harms the environment?”, 62% of respondents thought air travel did harm the environment, 22% thought it did not, and 17% said they did not know. The group of respondents who said that air travel did harm the environment were then asked “in what way do you think that air travel harms the environment?” Respondents could mention as many issues as they liked, and were not prompted with ideas. Although 87% of respondents mentioned pollution and 46% nominated noise, much smaller proportions mentioned greenhouse gases/carbon dioxide (15%) or climate change/global warming (12%).

As earlier discussion reveals, the provision of information and increasing awareness on this issue has progressed to some degree through the work of NGOs and bodies such as the Royal Commission on Environmental Pollution. In addition, a number of websites, particularly those associated with tree planting, offer personal “climate change calculators” and advice on more environmentally conscious travel decisions and

Nevertheless, the discussion on the “value-action gap” (Vigar, 2002, p. 193) in Chapter 2 underlines the fact that information deficit as an underlying cause of environmentally damaging behaviours offers an “impoverished view of the complexity of human-social engagement” (Hobson, 2001, p. 193). Not only is individual travel behaviour set within the wider socio-cultural web of institutions such as the media and advertising, industry and government (Organisation for Economic Cooperation and Development, 1997b), but individual travel patterns and levels depend on a variety of situational and infrastructural factors, and a combination of habits and circumstances. For example, in spite of the expressed environmental concerns of Europeans, environmentally sound travel behaviour particularly with the use of cars, seems to be one of the most difficult pro-environmental behaviours to instil (Nilsson & Kuller, 2000). Similarly, Vigar (p. 194) concludes from other European research that the number of people likely to change their habits without some form of coercion or strong incentive is small. Further, the current incentives and advertised glamorous image of aviation act in the opposite direction. A recent advertisement declares: “Fly spacebed to Europe. The only way to do business.” (Singapore Airlines, 2003).

One way in which people’s aviation travel behaviour might be changed is through the use of a program similar to TravelSmart developed in Perth, Western Australia. This program has the explicit aim at the household level of switching individual travel behaviour from the use of cars to public transport, walking and cycling. At the organisational level, it seeks to have employers accept responsibility for how their staff travel (Transport, 1999, p. 11). Travel behaviour change programs of this kind have yielded abatement of the order of 5-18% of personal transport emissions, and a re-survey in South Perth shows that the reduction is more sustained than expected (Energy Strategies, 2003, p. 56).

It appears that the way the necessary incentives operate in this case is through the use of “individualised marketing”, with the process of change facilitated by direct contact with the individuals concerned. The ensuing discussion enables the questioning of habitual travel behaviours, and information and advice specific for people’s circumstances are
provided. In the case of a program addressing aviation, the potentially very high
collection made by aviation to a “personal greenhouse budget” (European Federation
for Transport and Environment, 1999, p. 14) provides a useful topic for discussion. In
designing and targeting a program, the implications for various socio-economic groups
need to be taken into account. For example, men with high incomes consume the most
energy on travel (as with air travel), whereas elderly women consume the least
(Carlsson-Kanyama & Linden, 1999). In addition, women appear to more generally
aligned to user needs, and to restraint, slowness and reference to nearby sites, whereas
men appear to more aligned with speed and long distances (Root, Schintler, & Button,
2000).

Another difficulty is that government policy statements can directly contradict demand
management initiatives. Following the recent drought in Australia, governments are
promoting water conservation programs in conjunction with water restrictions in the
community (S. Lucas, 2003; McLennan, 2003). As New South Wales Premier Bob
Carr put it: “We want to be smarter about [water] and the way to be smarter is to
manage demand, to reduce demand for water” (Peatling, 2003). In contrast, in relation
to the management of greenhouse emissions, the ACT Business and Tourism Minister,
Ted Quinlan, and the Australian Transport Minister, John Anderson, greeted the
announced $50 million extension to Canberra airport’s main runway with considerable
enthusiasm (Brewer, 2003; Hannaford, 2003) (see case study in Chapter 5). The
Tourism benefits for Canberra’s economy and the opening up of “regional international
gateways” to Australia were respectively emphasised in each case.

Governments do not currently apply demand management principles to transport in the
same concerted way as occurs with water reform. One might envisage, for example,
advertising akin to water conservation messages such as “Do you really need to take
that extra trip?” “Can you holiday locally this year?” and “Take the train instead”. The
contrasting approaches to water reform and the management of greenhouse emissions
have been described as a case of double standards (Griffin, 2003). When the necessary
cultural shift occurs in the way businesses and governments perceive and manage
greenhouse gas emissions, this will clearly support behavioural change programs
targeting air travel.
Poldy (2003) asserts that the main difficulty is the lack of public understanding of climate change, and suggests that focusing on a “temperature rise” of between 1.4 and 5.8°C as the headline indicator is not helpful. This is so partly because many people seek holidays in warmer latitudes. Rather, the message to individuals and policy makers should focus on the fact that is the concentration of greenhouse gases in the atmosphere that is the problem, and that it will get worse as long as emission rates exceed natural rates of removal. This follows from the important finding that the current rates of emissions are already at least twice as large as the rates at which natural processes can remove the greenhouse gases from the atmosphere (Pearman, 2003).

As part of the process of making choices in relation to lifestyle and travelling habits, one strategy for promoting reduced car use is through emphasising the benefits for the environment and personal health (Transport, 1999, p. 10, 18). For example, people who walk often are generally healthier than those relying largely on cars, and neighbourhoods are quieter and safer where shopping streets are designed to favour pedestrians. Similar approaches can be applied to the use of air travel, with for example, the ability to walk more freely in a train an advantage over the more restricted movement in aircraft, particularly in economy-class seats. The latter factor has received considerable publicity in relation to the increased risks associated with deep vein thrombosis as a result of air travel (Donne, 2002). The “save the planet” factor in relation to global warming and the reduction of emissions could also be incorporated into advertising promoting the benefits of locally based holidays in preference to holidays depending on long-haul travel (Walters, 2002).

The current chapter uses both causal layered analysis (CLA) and policy analysis to critique aviation futures in greater depth. CLA’s strength lies in its creating distance from current categories in order to question the future, as in questioning the values and scale of tourism under a redesign scenario. The latter part of the chapter deals with a more pragmatic and goal oriented policy approach, concluding with 11 broad policy measures for the restructuring and redesign of aviation.
CHAPTER 5

A CASE STUDY OF
CANBERRA INTERNATIONAL AIRPORT

*Ninety percent of aviation is on the ground. Only 10% is in the air.* Glen Curtis, aircraft designer and entrepreneur, quoted in Dempsey (2000, p. 1).

Whereas much of the critique of aviation’s growth has concentrated on such issues as its growing contribution of emissions to global climate change, another aspect is associated with the fact that airport expansion has become an ongoing, highly controversial process (Van Eeten, 2001). Thus aviation futures are increasingly contested at the local level as well.

This chapter describes and analyses a case study (Stake, 1995) of the privatisation and expansion of Canberra International Airport. My aim is to bring into sharper focus the broader global issues addressed in previous chapters, as they apply at the local level. The case study in effect covers the period 2000 to 2003, and illustrates a range of issues in community and environmental politics (Dryzek & Schlosberg, 1998).

The aims of the case study were to:

- describe and analyse community perceptions of environmental degradation, especially aircraft noise, related to the expansion of Canberra airport
- describe and map themes emerging out of various community groups’ activities
- suggest how a community group working on these issues might be more effective in implementing change to protect quality of life
- identify the relevant players, and the factors helping and retarding change towards quality of life, using Lewin’s (1935) “force-field analysis”
• develop a “thick description” (Geertz, 1973) of what is occurring with the current and further proposed expansion of Canberra airport, and its consequences for quality of life

• develop conclusions and generalisations from the “lessons learned” from the case, especially those appropriate for public policy setting (Stake, 2000).

The chapter is structured as follows. A background review of global airport development and expansion and the attendant ecological ramifications (especially aircraft noise) provides a general context for the case (Creswell, 1998). Next, the setting for the case study and the methodology are addressed. Then five themes identified with the case study are probed in greater depth. Finally, a section on synthesis of meanings and conclusions aims to integrate earlier discussion and to summarise the main findings. The implications and “lessons learned”, drawing on broader theories and models, are discussed.

**Global airport development and expansion—the ecological context**

*The growth of airports*

Earlier chapters showed that before 11 September, 2001, world air traffic was expected to grow substantially in the next ten years, with the number of passengers rising annually by 4.5%-6%, and passenger-km flown rising by around 5.5% per annum. Although international geopolitical tensions can create uncertainty around forward airline bookings (Ando, 2003), travel and tourism analysts generally conclude that long-term growth in air travel demand is likely to remain the norm (Donne, 2001).

In parallel with the projected growth rates in air traffic and travel is the growth in new airports and the expansion of existing airports. In the list of the world’s 100 busiest airports, 44 are in North America, 31 are in Europe and 18 are in the Asia-Pacific region. China is experiencing rapid growth in civil aviation, with Hong Kong likely to retain the lead as the busiest airport on the Asian mainland for many years to come (Francillon, 2000). In the ranking of world’s busiest airports Hong Kong is 23rd, Beijing is 49th, and Shanghai is 64th.
Dempsey’s (2000) *Airport Planning and Development Handbook* includes a global survey of new airports and airport expansion projects. Although not exhaustive, he has catalogued US$200 billion of projects worldwide, including US$98 billion for the fast growing Asia-Pacific region and the Middle East. To achieve this, governments across the world are devoting enormous economic resources to building new airports or expanding existing ones. This “accelerated attempt to keep pace with rapidly growing passenger and cargo demand for air transportation” (Dempsey, 2000, p. 2) is a striking illustration of the widely questioned “predict and provide” philosophy that has dominated road building and transport planning in general (Whitelegg, 1997), and stands in marked contrast to more socially and ecologically oriented demand management approaches.

In Australia, because the population is mainly distributed along the south-east coast, the traffic associated with the centres of Sydney, Melbourne, Brisbane and Adelaide accounted for more than 50% of all domestic traffic in 1998. Both Canberra-Sydney and Canberra-Melbourne are in the top Australian airline city-pair markets (Nero & Black, 2000). Passenger and air traffic movements and forecasts for Sydney Airport are indicative of the expected growth. 21.3 million passenger movements occurred at Sydney Airport in 1997-98, a rise of 4.9% over 1995-96. In the absence of significant constraints, the Department of Transport and Regional Services forecast more than a doubling of passenger movements in the coming two decades, reaching 35.1 million passenger movements by 2009-10, and 49.1 million by 2021-22. Similarly, aircraft movements are forecast to increase substantially from an actual number of 276,300 in 1997-98 to 480,000 total aircraft movements in 2021-22 (Department of the Environment and Heritage, 1999, p. 4-3). A later forecast as part of Sydney Airport’s most recent master plan predicts a near trebling of passenger numbers (to 68.3 million per year) between 2003 and 2023 and a doubling of aircraft movements over the same period (Robins & Davies, 2003).

The UK Government, from December 2000 onwards, began an extensive consultation process to help set its long-term policy framework for air travel for the next 30 years in a White Paper on air transport. The process, outlined in *The Future of Aviation* (Department of the Environment Transport and the Regions, 2000), attempted to grapple with issues associated with the growth of aviation and the fact that the UK’s
major airports are reaching capacity, in terms of both congestion and environmental constraints.

Another side of the debate in the UK is represented by the “Freedom to Fly” coalition, representing the aviation industry, business, trade unions and tourism groups. This group lobbied the UK Government for increased airport capacity in the lead up to the White Paper. The group cited an opinion poll suggesting that most people support the case for more capacity at airports “to maintain the freedom to fly and to sustain the economy” (Done, 2002).

_Environmental implications of airport growth_

As discussed in more detail in Chapter 3, accompanying the push for increased airport capacity is an increasing recognition that aviation’s environmental, energy, pollution, and noise impacts are considerable and growing (Penner et al., 1999; Vedantham & Oppenheimer, 1998). Climate change and aircraft noise are prime concerns of conservative official bodies such as the International Civil Aviation Organization (2001a), and of non-government networks of environmental organisations such as the GreenSkies Network (http://www.greenskies.org). At least 73 community organisations have been identified in the USA (National Research Council Committee on Aeronautics Research and Technology for Environmental Capability, 2002, p. 23). Many of them highlight noise as a particular issue in their naming (e.g. Quiet Skies Alliance, Citizens Fed-up with Airport Noise, and Quieter Environment Through Sound Thinking).

Pertinent to the case study undertaken here is the observation that social and environmental constraints affecting aviation at the global level tend to emphasise aircraft emissions and climate change. However, at the airport level the focus is on aviation’s impacts on the local environment especially via aircraft noise, and the resulting deterioration in quality of life for residents of local communities. Many of the world’s major airports face capacity constraints based on noise (C. Thomas & Raper, 2000).

A survey of the 50 busiest airports in the USA found that airport management most frequently cited noise as the major environmental concern (US General Accounting
Thus, out of a range of 11 environmental issues listed in the survey, the top five issues identified by airports as being of major concern were noise (33 airports), water quality (often linked to the use of de-icing chemicals) (27 airports), compatibility with nearby land uses (21 airports), air quality (19 airports), and wetlands (14 airports). On average, airport management listed three issues as major concerns, with other issues considered of lesser concern. When asked to rank their current concerns, noise was ranked first by 58% of the airports (Figure 5.1). In relation to projected future concerns, noise remains the most serious environmental issue, but air quality is expected to rise in importance.

![Figure 5.1. Relative importance of the four major areas of environmental concern, identified in a survey of the 50 busiest airports in the USA. Based on data in US General Accounting Office (2000b, p. 11).](image)

With local community groups too, noise is often considered a critical issue because of its directly experienced and invasive nature. Whereas global concerns such as climate change are important for broadly focused networks such as the GreenSkies Network and Greenpeace, the experience in the Cities for Climate Protection (CCP) campaign of the International Council of Local Environmental Initiatives suggests that climate change is not the prime motivating factor in reducing local greenhouse emissions (Betsill, 2001). Rather, climate change is framed primarily as a global issue. In most US CCP cities, local policies and programs to limit greenhouse gas emissions are motivated by actions linked more obviously to local priorities. These include, for example, local air pollution, saving money, alternative transport systems, and improving the “liveability”
of communities. A central finding of this study was therefore that “localisation requires the prior existence of a local hook on which to hang the issue of global climate change” (p. 404).

The 2001 State of the Environment Report for Australia (Newton, 2001) noted that noise from transport, industry and the community is perceived to be increasing in cities. Transport noise from road and air traffic was singled out as a particular concern. A few years earlier, the Senate Select Committee on Aircraft Noise in Sydney (1995, para. 1.30, p. 7) noted that the “effect of airports and aircraft operations on surrounding communities is a contentious and enduring issue, and aircraft noise is perhaps the most contentious and enduring aspect of that issue”.

Complicating matters further in Australia is the fact that there is no national regulatory framework for noise control. In the absence of national standards and regulations, the responsibility falls on individual States and Territories to develop standards and a regulatory framework for noise related to industrial, commercial and community activities (Tasmania. Department of Primary Industries Water and Environment, 2000). In contrast, State and Territory governments cannot directly regulate aviation noise, because aviation is subject to Commonwealth control.

Noise is contentious, partly because different people view it differently. Thus, one administrator from the US Federal Aviation Administration described noise as “the sound of commerce. If you want commerce you will have to put up with some noise” (Dempsey, 2000, p. 235). On the other hand, those concerned with the deleterious consequences of an increasingly noisy world speak of the “RIGHT for quiet and the fact that noise invades your privacy and trespasses on that right … only through massive public participation and education can the people win the Armageddon with din” (Berland, 1970, pp. 288, 294). Others argue that silence should be regarded as an endangered precious resource, and that noise in the “soundscape” is analogous to litter in the landscape. Hence, the urgent need for advocates of quiet or “ecologists of quiet” (Devall, 1990, p. 108; Forni, 2002). More pragmatically, the World Health Organization (2001) has highlighted adverse health effects associated with noise and expressed concern about the deteriorating noise environment in many countries. Such health effects encompass mental and social phenomena such as insomnia, stress and
various mental disorders as well as more direct physiological outcomes such as hypertension and cardiac diseases.

Since the introduction of commercial jet transport in 1958, Anthrop (1973, p. 83) concluded that the aircraft noise problem, although most acute around major airports, had become much more widespread. This includes the problem of aircraft noise invading previously quiet wilderness and park areas. For example, Yosemite National Park in California lies directly beneath one of the major jet routes from San Francisco to the US East Coast. Others have argued, however, that as jet aircraft have evolved over time, the noise footprints of successive generations of aircraft have shrunk (Somerville, 1996). This resulted in the number of people within the 57 Leq noise contour of London’s Heathrow Airport falling from approximately 2 million people in 1974 to 429,000 people in 1991.

The issue is complex, however. Further technological improvements are undoubtedly going to be increasingly difficult to achieve, and are being outstripped by the sheer increase in volume of aircraft movements. The National Aeronautics and Space Administration (NASA), the main body involved in pertinent research and development in the USA, aims to cut the perceived noise of subsonic aircraft in half (that is by 10 dB) between 1997 and 2007 and to cut the noise in half again by 2022 (National Research Council Committee on Aeronautics Research and Technology for Environmental Capability, 2002). Additional technological advances under NASA’s Quiet Aircraft Technology Program ultimately seek to contain objectionable noise within airport boundaries (Willshire, 2001). In contrast, the National Research Council Committee concluded that noise constraints are likely to be part of a “paralyzing collision between the growth of aviation and increasing concerns about the quality of the environment” (p. 5). This is because of: (a) the long lead times for technology development and adoption, (b) the ambitious NASA goals that contradict historical precedent, and (c) insufficient funding for research and development.

Furthermore, communities near airports are placing greater emphasis on low noise environments as part of their quality of life, and uncertainty surrounds the noise levels that will be acceptable to the general public in future. Community reaction to noise is determined not only by the intensity of noise events but also by their incidence.
(Department of Transport and Regional Services, 2000). Technological developments may therefore also be constrained by the fact that, for many people, the issue is not just the number of aircraft movements, but whether they are able to seek “respite” from such intrusive noise.

In addition, perceived risk of further noise, rather than annoyance per se, has been identified as a pertinent issue in another study (Staples, Cornelius, & Gibbs, 1999). These findings point to the importance of two factors in understanding noise disturbance: (a) the tendency for people to view noise as likely to increase and to make their communities less desirable places to live, and (b) how residents make judgments about the trade-off between the economic and environmental effects of airport development.

Even in 1973, Anthrop (p. 116) was able to say:

> If any semblance of a sane environment is to be maintained, a reduction in the growth rate of air traffic is imperative. Such a proposal seems unlikely to receive a warm reception from the airlines who can be expected to claim they are merely satisfying a public demand.

In some areas noise abatement measures such as quieter aircraft, land use policies, and landing charges have kept the size of the noise footprints in check over the past 30 years, despite the continuing growth in air traffic. However, a computer model for assessing global exposure to aircraft noise (MAGENTA) reveals that, because of the growth in air traffic, noise contours are expected to expand outwards from major airports, progressively affecting more and more people (Skogo, 2001). This reversal of the noise trend is also expected to apply to smaller, regional airports.

The overview by Whitelegg and Williams (2001) supports the latter conclusions, and questions some UK noise data that appears to show a smaller number of people affected by aircraft noise than those surveyed in other countries. They consider that this conclusion is a serious underestimate, for example by not taking into account people who live under flight paths. In contrast, they cite a noise survey in the Netherlands that found that 12% of the population were “considerably annoyed” by aircraft noise. In the UK, Whitelegg and Williams estimate that about one in eight people are presently
negatively affected by aircraft noise and that this number is rising because of the rapid growth of air traffic. One resident living 17 km from Heathrow airport described the expanding nature of the noise problem in this way: “I have lived in the same house for 35 years. For most of the time there was no problem with aircraft noise. About five years ago it started. The noise moved to me. I did not move to the noise” (Aviation Environment Federation, 2001).

The UK Government enquiry into the future of aviation (Department of the Environment Transport and the Regions, 2000) also pointed to night noise as being a major concern, given the effects of aircraft noise on sleep disturbance and people’s health. This was borne out in a well-publicised landmark ruling on night flights in 2001 by the European Court of Human Rights, in favour of residents’ rights to have a decent night’s sleep over the airline industry’s plans for expansion. Eight people living near Heathrow airport in London brought the case. Article 8 of the European Convention on Human Rights guarantees people a right to respect for home and private life. The court ruled that the UK Government had not taken into account the issue of prevention of sleep by aircraft noise and there was thus a violation of Article 8 (Buxton, 2001). However, the ruling was reversed in 2003, after an appeal by the UK Government, using countervailing economic arguments (Heathrow neighbours lose appeal at European Court of Human Rights, 2003).

Many airports are already either adopting or being forced to adopt better practices. In 2001, for example, the German and Swiss governments reached agreement on reducing noise over southern Germany by aircraft using Zurich airport. This agreement extended a weekend night-flight ban to three additional nights during the week. Pressure for curfew arrangements can be expected to continue to be applied by community groups working for such quality of life outcomes (European Federation for Transport and Environment, 2001b).

In a generic sense, the broad principles for aircraft noise management developed by the International Civil Aviation Organization (ICAO) (2001a) are typically used by government agencies and airports. The principles include:

- the reduction of noise at source
• land use planning and management
• noise abatement operational procedures
• operating restrictions on aircraft.

Even with the most optimistic technological developments, such principles ultimately appear to be inadequate for addressing the forecast growth in aviation. Further, bodies like ICAO tend to pursue the application of these principles in a conservative manner. This is shown, for example, in its recommendation to participating States to consider “alleviating the noise burden on communities around airports without imposing severe economic hardship on aircraft operators” (International Civil Aviation Organization, 2001a, p. 6). Other bodies such as the UK Royal Commission on Environmental Pollution, however, recognise the need for some form of demand management to curb the growth in air traffic. The commission thus recommended limiting “the growth in airport capacity to less than would be required to meet the forecast demand” at least in part to “deliver local environmental benefits” (Royal Commission on Environmental Pollution, 2001, para. 34).

The research study and methodology

The setting

Canberra airport has operated on its present site since 1927. It was privatised in May 1998, and in 2001 was the fourth busiest Australian airport (after Sydney, Melbourne, and Brisbane) in fixed wing aircraft movements and movements of aircraft greater than 7,000 kg (Canberra International Airport, 2002d, p. 16). The present case study of Canberra airport was bounded by time and place (Stake, 1995) in that the airport’s expansion since its privatisation has had considerable consequences for Canberra and the sub-region. More specifically, the case research was bounded by a four-year period (2000 to 2003, although more intensively in 2001 and 2002) and by a single case (Canberra airport). Whereas Canberra International Airport (CIA) and the Australian Capital Territory (ACT) Government have been promoting its economic benefits, a range of community groups within the region have been raising concerns, particularly in relation to increasing aircraft noise.
Throughout the course of this study, the perception of the key problems, causes and contextual factors, and of the layers of issues involved, has both broadened and deepened (Creswell, 1998, p. 36). For example, land use planning became a major issue in the case study in addition to the original concerns by community groups about aircraft noise. This became most evident in a highly public conflict between a land developer (The Village Building Company) and Canberra International Airport that emerged in 2002, involving full-page advertisements in *The Canberra Times* and a series of interviews on local radio. The context then became one of airports and cities invading each other’s space in increasingly problematic ways, or as one author asks: “Airports and cities: can they coexist?” (Ayres, 2001). Just as those responsible for cities need to plan beyond chronic urban dependence on car transport (Newman & Kenworthy, 1999), they also need to reflect on their growing dependence on air transport. A banner at Brisbane Airport highlights this: “Now and to the future: From a city airport to an Airport City” (Brisbane Airport, Queensland, Australia, 2002).

At Canberra airport, passenger movements more than doubled in the 15 year period 1982-83 to 1997-98, from 708,000 to 1.83 million—an average annual growth of 6.54% (Canberra International Airport, 1998, p. 15). The airport’s Master Plan for the year 2020, which was approved by the Federal Minister for Transport in August 1999, projects significant growth over the period to 2020 (p. 19). Passenger movements (primarily domestic, but with an increasing international contribution over time) are predicted to increase from 1.83 million in 1998 to 4.4 million in 2020 (at an average growth rate of 4.1% per annum), and total aircraft movements are expected to rise from 130,000 in 1998 to 201,400 in 2020 (at an average annual growth rate of 2.0%). These predicted increases are associated with a likely doubling in impacts, including aircraft noise. More recent projections by the airport to the year 2050 (Canberra International Airport, 2002d) indicate huge growth ahead, with 13.9 million passenger movements estimated by 2050, assuming a long-term average growth rate of 3.98% per annum. The annual movements for various classes of passenger aircraft in 2050, compared with the corresponding numbers in 2002, are shown in Figure 5.2:

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14 The number of passenger aircraft movements is less than the total number of aircraft movements, with the latter also including general aviation and military aviation.
Figure 5.2. Comparison of airline fleet mix for Canberra airport in 2002 and 2050
Based on data in Canberra International Airport (2002d, p. 16).

Note. The number of passenger aircraft movements is less than the total number of aircraft movements, with the latter also including general aviation and military aviation.

Wide body jets are estimated to increase from 24 in 2002 to 32,369 in 2050 (a 1,300 fold increase). Narrow body jets are estimated to increase from 21,528 in 2002 to 99,710 in 2050 (a five fold increase), and the non-jet regional aircraft to almost double from 21,008 to 37,535 in 2050.

Methodology

The research methodology used was the case study approach (Stake, 1995), from the broader tradition of qualitative research (Denzin & Lincoln, 2000b). I used Stake’s (2000) reference to a case study as both a process of inquiry about the case and the product of that inquiry. This case study has characteristics of both an intrinsic case study and an instrumental case study—intrinsic, in the sense that Canberra airport’s expansion is of particular relevance to communities in the ACT—and instrumental, in that the case sheds light on issues of broader significance. These include the growing dependence on aircraft as a form of mobility, and increasing aircraft noise at Australian airports and the attendant impacts on surrounding communities.

When Canberra International Airport began to expand its operations in 1999, the North Canberra Community Council Inc (NCCC)—an umbrella community group that
actively lobbies government for the residential interests of people living in North Canberra—formed an airport community working group to examine the environmental (especially noise) ramifications of the proposed expansion, and to suggest what might be done about it. The group continues to work on the issue and is actively lobbying government, with its policy statements available on the NCCC website (http://www.nthcanberracc.org.au).

The case study drew on the latter information plus other public documents. These include newspaper articles and letters to the editor, a periodical newsletter produced by Canberra International Airport (*The Hub*), airport policy documents, and a range of email and paper submissions and correspondence by the North Canberra Community Council airport working group and other community groups to and from airport management, politicians, and bureaucrats. This was supplemented by direct observation of five public meetings between 2000 and 2002, and 11 interviews (labelled in subsequent discussion as A to K) with members of the NCCC airport working group and other community groups in the ACT region.

The latter groups included the Gungahlin Community Council, the Jerrabomberra Residents’ Association, the Pialligo Residents’ Association and the Carwoola Aircraft Noise Abatement Group. Eight interviewees were actively involved in the community groups, and the other three were individuals who had taken a strong interest in the issue, for example by writing “letters to the editor”, or who were in some way linked to community group members. This small group of self-motivated activists was well suited to the “in-depth” approach of qualitative research. The interviews were of a specialised nature (rather than representative), given the particular knowledge and expertise that the participants had developed on airport and aviation issues in relation to community interests. However, the fact that the people interviewed came from various geographical areas in Canberra, Queanbeyan and the sub-region added to the representative nature of the data. The occupational background, age, and gender balance (five men and six women) of the interviewees were as follows:

- Academic, 39, female
- Biologist, 52, male
- Community educator, 59, female
Community lobbyist, 47, female  
Curator and dealer in visual arts, 56, female  
Horticulturalist, 49, female  
Journalist, 47, male  
Manager, 37, male  
Retired police officer, 58, female  
Retired schoolteacher, 57, male  
Retiree (ex RAAF officer), 60, male

Further, two public meetings convened by Canberra airport management on 24 and 29 May, 2001 (numbering about 100 people each) drew on a wider range of other community members additional to those listed above. The comments made to airport management at the meetings provided additional public confirmation of the positions taken by the North Canberra Community Council, such as its call for the implementation of an overnight curfew at the airport. Public meetings at later dates, for example the information briefing by Canberra International Airport to the Jerrabomberra Residents’ Association on 9 October, 2002 (Canberra International Airport, 2002f), similarly confirmed high levels of community concern about the implications of the airport expansion plans.

Each interview, which was semi-structured and took about an hour, followed the usual conventions relating to informed consent, confidentiality and anonymity. The question outline (see Appendix) used both issues-based and strategic questions (Peavey, 1994), and the conversations were tape recorded. Although the questions provided some structure, I was cognisant of the notions of creative interviewing and of the interview being seen as an “active, emergent process” between interviewer and the interviewed person (Fontana & Frey, 2000). Eight of the interviews were conducted in October 2001, and a further three interviews completed in August 2002. Each participant was interviewed only once, but the high base levels of knowledge and interview rapport ensured more in-depth responses.

As I already knew most of the interviewees, trust and rapport had already been established to a good degree. My partial role as an insider (as a member of the North Canberra Community Council) had advantages in terms of an egalitarian approach.
However, in addition, I strove to achieve both empathy and “objectivity” to the best of my ability, so that the subjectivity associated with a qualitative approach did not undermine credibility. This “objective or critical subjectivity” (Heron & Reason, 2001, p. 184) enabled me to detect and record differences of opinion and approach by different community group members.

I also endeavoured to use “triangulation” as a verification procedure. Triangulation is “generally considered a process of using multiple perceptions to clarify meaning” (Stake, 2000, p. 443), drawing on the range of data sources and literature available to provide corroborating evidence (Stake, 1995). For example, to explore the ramifications of the projected growth in aviation at Canberra airport, I used Canberra airport management’s published reports of these projections and their interpretations of these; interviewee comments from a community perspective; and published advertisements, articles and “letters to the editor” in The Canberra Times, representing a range of stakeholder interests (e.g. community, tourism business interests, and government aviation agencies).

The narrative structure that follows draws on schemes from various traditions of inquiry (Creswell, 1998, Chapter 9) and especially the schema for case studies in particular (Stake, 1995, p. 123). It uses the “realist tale” with a “scientific” or “objective” perspective, and aims to present a “thematic narrative” by using edited quotes from interviewees combined with analytical commentary, to set the issues and themes within broader socio-political and organisational frameworks. Key issues are introduced first, and then several issues are probed further. Finally, a synthesis of meanings, implications and “lessons learned” from the inquiry are presented.

**Themes and issues**

1. **How is the problem framed? Economic development vis-a-vis the community**

In a general sense, how the problem is framed sets the parameters for subsequent debate and mirrors the strong polarisation that occurs. Canberra International Airport’s (1998, p. 2) position is predictably one that regards the expansion of aviation infrastructure as a
necessity in a competitive global economy, with a particular focus on being a “major
capital city and regional hub” and a “gateway” link to economic development. The
negative effects of such growth are considered to be unavoidable, with a consequent
need to be managed, but economic and business objectives are given the strongest
priority. The airport’s Master Plan for the year 2020 declared: “Capital Airport
Group’s vision is to develop Canberra International Airport as a first-class facility to
serve the region’s evolving transportation needs and to maximise the airport’s
contribution to the region’s economy” (Canberra International Airport, 1998, p. 2). It is
claimed that such airport development will enhance Canberra’s attractiveness for
business and tourism. At an information briefing to a community meeting on
9 October, 2002, a management executive of Canberra airport described the airport as
being “crucial to the region as well as the nation’s capital” and said that “the number of
aircraft movements will increase in response to community demand for air services”
(Canberra International Airport, 2002f).

Community groups on the other hand, tend to focus on what is the best way to meet the
region’s transport and communication needs, and question the need for airport
expansion, particularly when it is heavily subsidised by public funds. The
environmental and aircraft noise impacts on quality of life of sustained airport
expansion are regarded as too high, whereas the socio-economic benefits, if real, are
considered as low and not sustainable over a longer time frame. At the very least, the
position taken considers inner city airports as being generally incompatible with high
volume operations. The lessons from Sydney (Nero & Black, 2000), the old Essendon
airport in Melbourne, and overseas airports such as Washington National are cited as
salutary reminders in this respect.

“G” encapsulated these community concerns in this way:

>You can’t just look at airport development and other developments on their own,
you have to look at an integrated strategic plan for Canberra, and there is no
strategic plan for Canberra at the moment, despite what people keep saying.
There’s too much ad hoc planning and so you need to look at the airport and its
solutions in the context of what you are going to do in relation to solutions for
Canberra more generally, such as with transport.
... I don’t personally think the airport should be where it is...the location of the site now is too much of a bandaid approach ...Too much of an ad hoc approach occurs, it was never properly looked at to see whether the site was suitable for expansion, what problems were experienced with the operations then (at the time of sale), and whether the problems would be exacerbated by the expansion planned by the purchaser of the airport. All they see is the dollars, and the residents’ concerns about safety, pollution, and noise were put aside.

Initially, and reflecting the earlier observations from the literature, the interviewees in this case study acknowledged the importance of issues such as aviation’s impact on climate change and its local air pollution impacts, but agreed that aircraft noise was the central driver of community group activities. This is linked to the fact that aircraft noise is intrusive and its effects are immediately experienced. As “D”, an interviewee living relatively close to the airport put it:

> Aircraft noise is so intrusive, in the summer you can’t have your windows open, it’s mentally draining ... it’s a threat to your sanity and your life ... the night noise really bugs me, when a plane takes off at 11-30 pm or 1 am. Also, during the evening when you are trying to relax or concentrate or do something, it’s really intrusive, you don’t feel like going for a walk, you don’t feel like going into the garden, it makes you resentful and angry.

However, as the study progressed it became clear that aircraft noise was a symptom of deeper underlying value differences. Rather the question for some became one of learning “to look differently at products and services which are profligate in their resource consumption and to reprioritise how we think about impacts and cumulative impacts” (Fawcett, 2000, p. 36). That is, the highly technical discussions around aircraft noise data militate against a framework seeking “to rethink air travel and how its unquestioned position of growth sits within a sustainability framework”.

2. Land use planning

One of the ICAO principles for the management of aircraft noise, namely land use planning, has given Canberra airport and its opponents a much greater public profile. The issue is useful in describing more specific details surrounding this case. A highly visible public relations battle took place in 2002 between the Village Building Company, a developer wishing to build a major housing estate at Tralee (near
Queanbeyan), and Canberra International Airport, which wants the land kept free from residential development as part of its proposed “high noise corridor”.

This proposed high noise corridor runs in a north-south direction between so-called noise abatement areas (discussed in more detail later in this sub-section), and is where the jet flight path tracks are most heavily concentrated (Figures 5.3 and 5.4). On the one hand, the land developers argue that the location of the proposed development is well within the Australian Standard AS2021 for land use planning, even for the airport’s projections for air traffic in the year 2050. That is, the proposed development does not lie within the 20 ANEF noise contour,\textsuperscript{15} below which all building types are acceptable under the Australian Standard (Department of Transport and Regional Services, 2000, p. 1; The Village Building Co., 2003) (see Figure 5.5). On the other hand, the airport managers cite other evidence showing that some people will consider themselves to be moderately or seriously affected by aircraft noise in areas exposed to noise below 20 ANEF (Canberra International Airport, 1998, p. 44).

The campaign included full- and half-page advertisements in \textit{The Canberra Times} and other newspapers, with captions such as "The development of Tralee will provide major benefits to Jerrabomberra and Queanbeyan" (The Village Building Co., 2002a), “Homes don’t belong under planes” (Canberra International Airport, 2002e), and “Why put our living standards at risk?” (Canberra International Airport, 2002g). Glossy newsletters were distributed in the community, such as \textit{The Tralee Newsletter} (The Village Building Co., 2002c), and a series of radio interviews and newspaper articles addressed the various stakeholders’ positions. Examples of these advertisements are shown at Figures 5.6 and 5.7, with the strong polarisation surrounding the controversy reflected in these and other news headings. Whereas Canberra International Airport (2002a) declared: “Airport condemns planning madness”, the land developers asserted the reverse position: “The real noise is coming from the airport owners” (The Village Building Co., 2002b).

\textsuperscript{15} The Australian Noise Exposure Forecast (ANEF) system was developed in the early 1980s to provide a tool for guiding land use planning around airports. ANEF noise contours are used to restrict land uses in certain zones, according to the noise sensitivity of the nominated land use. The system is similar to land use planning regimes in a number of countries (Environment Australia & Department of Transport and Regional Services, 2003, p. 57).
Figure 5.3. Jet departures from Runway 17 at Canberra International Airport for the period 15 June to 14 July 2002.
Based on data from Noise and Flight Path Monitoring System, Airservices Australia.
Figure 5.4. Noise abatement areas for Canberra and Queanbeyan in the Australian Capital Territory region (Airservices Australia, 2002c).
Figure 5.5. Tralee and Canberra airport
(The Village Building Co., 2003).
THE REAL NOISE IS COMING FROM THE AIRPORT OWNERS

On Wed July 24, airport manager Mr Byron said that 2000 homes at Tralee would be “in the noise zone”. Wrong!!

The blue line represents the boundary of acceptable residential development based on the airport’s wildly excessive flight traffic projections. It is the point at which ordinary background suburban noises are more significant than aircraft noise. Tralee is not in the noise zone even on these projections.

Noise boundaries are drawn according to the Australian Noise Exposure Forecast – a standard independently set, but based on the airport’s own traffic projections. Development of housing outside the 20 ANEF blue line is accepted by all Federal, State, Territory and Local Government agencies responsible for residential development.

A rapacious land grab by the airport should not be the basis of planning these cities.

The map produced from the airport’s own website shows the noise zone. Tralee is clearly outside it.

Source of Map: Canberra International Airport

The blue line on this map also represents the maximum ultimate capacity for the airport. As this projection equals the same volume of flights that Sydney currently has, it is wildly excessive. These noise levels will never eventuate.

So the blue line in reality will always be closer to the airport and substantially further away from Tralee and other areas. There is no need to sterilise the development of Queanbeyan.

Queanbeyan and Southern Canberra will soon have no land for new housing.

Figure 5.6. Advertisement placed in *The Canberra Times* by The Village Building Co. (2002b)
homes don’t belong under planes

CANBERRA INTERNATIONAL AIRPORT

HUME
POPLARS
JERRABOMBERRA
TRALEE
GOOGONG

Trapee lies directly under our SOUTHERN JET DEPARTURE FLIGHT PATH. It’s rural land. Yet, incredibly, Queanbeyan City Council is thinking about rezoning it residential to accommodate up to 2,000 new homes.

This is bad planning because future residents will be significantly affected by aircraft noise. We know from past experience that they will complain about aircraft noise. They will want to push it back over Jerrabomberra.

We have worked closely with the Jerrabomberra community to reduce the impact of aircraft noise. We don’t want this good work to be undone. Better land is available elsewhere, at Googong.

It’s bad planning to build homes under planes. Don’t let it happen.

Figure 5.7. Advertisement placed in The Canberra Times by Canberra International Airport (2002e)
The land use planning issue is not new. Over 30 years ago the House of Representatives Select Committee on Aircraft Noise (1970, p. 42) in Australia stated that “ideally, airports should be of sufficient size and located in such areas that a natural buffer zone of space insulates the neighbouring residential community from noise exposure” and “the Committee invariably came back to appropriate land use zoning as the key to the problem”. Similarly, the Senate Select Committee on Aircraft Noise in Sydney (1995, p. 12) acknowledged that where flight paths can be concentrated in narrow bands over non-residential areas, such minimisation of noise impacts is clearly appropriate.

The continuing issue of urban encroachment around Canberra airport as the ACT region develops, highlights the fact that the noise issue is much more than an acoustic problem, but a social and evaluative matter too (Milne, 1979). That is, Milne considers noise pollution to be a complex social issue requiring the skills of sociologists and planners as much as legislators, in order to deal with subjective differences between people, and to help decide what are tolerable and intolerable noise levels. The urban encroachment issue therefore highlights the complexity of the noise issue and the range of stakeholders involved.

For example, in the proposed housing development at Tralee discussed above, Airservices Australia, the national agency responsible for aircraft traffic management, supported Canberra International Airport’s case that the development should not proceed, but rather be zoned as part of a residential free noise corridor. This position is based on experience elsewhere in Australia, especially in Sydney, where the majority of noise complaints now received are coming from people living outside the 20 ANEF contour (Department of Transport and Regional Services, 2000; Moloney, 2002b). The agency warned that parts of Canberra and Queanbeyan would be forced to share noise to give respite to future residents of Tralee, and also urged the Australian Capital Territory (ACT) and New South Wales (NSW) governments to consider the long-term implications of approving the development (Moloney, 2002b).

In contrast, an earlier similar proposal to zone land or to “quarantine excessive aircraft noise from Canberra and Queanbeyan residential areas” in April 2001 (Canberra International Airport, 2001c) was generally opposed by community groups. This may
at first consideration seem illogical. The proposal asked the Federal, ACT and NSW governments to agree to a regional plan with three zones (p. 3): (a) a green zone equivalent to the noise abatement areas (see Figures 5.3 and 5.4), (b) an amber zone subject to greater noise and “meant to caution residents on rural estates and village communities” within regional areas of the ACT and NSW, and (c) a red zone approximating the “high noise corridor” where jet flight paths are concentrated (Figure 5.3).

Most community groups opposed this earlier airport proposal because it failed to recognise the range of aircraft noise issues already existing in the green zone (essentially the existing noise abatement areas). Airservices Australia uses a set of environmental principles and procedures for minimising the impact of aircraft noise (Airservices Australia, 2000). In the ACT region, it has also defined Noise Abatement Areas for much of Canberra and nearby Queanbeyan (Figure 5.4). Flight paths are constrained over the noise abatement areas, with jets required to be 5,000 ft (1,524 m) above ground level.

Although Canberra airport officials claim that such noise abatement procedures are “equal to or represent Australian best practice” (Canberra International Airport, 2002d, p. 2), community groups in Canberra and the ACT region expressed strong concerns about significant loopholes in the noise abatement area provisions. For example, so-called “non noise-abatable aircraft” such as light aircraft that produce considerable noise, are still allowed to fly over residential noise abatement areas at low altitudes. The same applies to jet and turbo-prop aircraft engaged in circuit training. In this sense the noise abatement area provisions are perceived by community groups as being framed in an arbitrary way in relation to protecting people from aircraft noise. Of particular significance in Canberra and the sub-region are the generally quiet background levels on to which aircraft noise intrudes.

Another reason for community groups opposing the airport zoning proposal was their regarding it as a “grab” for land without compensation to current titleholders or ratepayers who might have gained from improvements to land in the future. In short, it only added to existing community concerns about generous public subsidies to the airport and airlines (Willans, 2002).
3. Who are the stakeholders?

As with most infrastructure developments of this kind there is a wide range of interested stakeholders. They include Federal, State and Territory agencies, local councils, individual politicians, industry, media, and the general public, particularly community activists.

Although the associated question of institutional responsibilities is addressed in greater depth later, the comments of “C” who described the complexity of the situation are relevant here:

_The first thing that needs to change is that the Commonwealth needs to accept that they are ultimately responsible for the airport through their agencies … to effect change you have to deal with at least four bureaucratic agencies. That’s near impossible when you are a community group with limited resources, both financially and in terms of volunteer time._

_If there was one agency that could administer and coordinate all of that, then we’d have perhaps the opportunity to make some change … in other areas the government has tried over many years to rationalise gateways to information. Centrelink is probably the best example, with many agencies having one shopfront. There is nothing like that for the aircraft noise situation. It’s very hard to get a handle on the situation._

The main stakeholders involved in Canberra International Airport developments are shown in Figure 5.8.

_Airservices Australia_ is the Federal agency responsible under the _Air Services Act 1995_ for managing airspace and air traffic, or more specifically issues such as air traffic control and flight paths. It has responsibility for ensuring compliance with aircraft noise regulations, has established a Noise and Flight Path Monitoring System (NFPMS) for Australia’s major airports, and develops Noise Abatement Procedures.

The _Commonwealth Department of Transport and Regional Services (DOTARS)_ is responsible for civil aviation policy under the _Air Navigation Act 1920_, and also for developing the broad policy framework for aviation environmental control. The department advises the _Federal Minister for Transport_ on aviation environmental
Figure 5.8. Main stakeholders involved with the privatisation and expansion of Canberra airport
issues, including aircraft noise, aircraft engine emissions and fuel spillage from aircraft. The Minister must approve Major Development Plans under the *Airports Act 1996*, approves Master Plans as occurred with Canberra International Airport’s Master Plan, and is also responsible for putting into place legislatively backed long term operating plans for an airport as occurred with Sydney Airport. The Federal Government has also provided financial support, for example with $8.8 million to the Capital Airport Group in 2001 to upgrade the main runway so that it could accept larger jets such as B747s (Willans, 2001). The *National Capital Authority (NCA)* is the Commonwealth agency that administers the National Capital Plan, with which Canberra airport developments must comply.

The *Australian Capital Territory (ACT) and New South Wales (NSW) governments* are involved particularly in relation to land use planning. For example, as Canberra and its regional areas grow these governments have an important role in ensuring the corresponding extension of the Noise Abatement Areas. These governments, as well as *Local Government* (e.g. Queanbeyan City Council), become involved when growth and the associated proposed developments come into conflict with the airport’s land zoning proposals.

*Federal, ACT and NSW politicians* are lobbied by various stakeholders. Further, particular politicians have championed differing positions. For example, the Shadow Federal Minister for Transport backed the airport’s plan in relation to the Tralee case, whereas an ACT politician, John Hargreaves MLA, called for a moratorium on further expansion of the airport (McLennan, 2002).

*Business organisations*, such as Canberra Business Council, and *land developers*, such as The Village Building Company in the case of Tralee, have lobbied governments to achieve their goals. The Village Building Company has conducted an active public relations campaign to support its plans for a new housing estate at Tralee in the ACT region (Downie, 2002). The synergies with other stakeholders are illustrated in this case by Queanbeyan City Council’s support for the land developers. Queanbeyan City Council argues that it is “running out of land” for residential development.
Canberra International Airport management since 1998 has been headed by Terry Snow, Executive Chairman of the Capital Airport Group, which purchased the long-term lease on the airport from the Commonwealth Government for $66.5 million in 1998. From the initial press release in 1998 (Somlyay, 1998), to its Master Plan (Canberra International Airport, 1998), to newspaper articles countering criticism of the airport (Clack, 2002a), the airport group has positioned the airport as “a critical driver of the local and regional economy” (Canberra International Airport, 1998, p. 2).

Airlines such as Qantas and Virgin Blue have a strong agenda based on economic growth and increased frequencies of air services. Impulse Airlines was launched in 2000 with much fanfare about the strong economic benefits for the ACT. However, by May 2001 the airline had failed and been absorbed by Qantas, in spite of an $8 million “loan” from the ACT Government (Gentle, 2001).

The media, especially The Canberra Times and The Chronicle, produces regular articles on airport related issues. These extend from front page stories for the airport such as “Airport Launches Noise Zone Plan” (Jackson, 2001) to “letters to the editor” and opinion pieces from community groups and individuals. At peak periods of publicity, as has occurred especially with planning issues, radio interviews and local television stories with the various stakeholders have been prominent as well.

Eight community groups and residents’ associations were represented at the Canberra Airport Aircraft Noise Consultative Committee meeting in November 2002. These community groups have lobbied politicians particularly on aircraft noise issues with subsequent arguments related to planning and unnecessary subsidies to the airport and the aviation industry. For example, five groups put a joint submission to the Deputy Prime Minister and Federal Minister for Transport in April 2001. These groups were the North Canberra Community Council, Pialligo Residents’ Association, Gungahlin Community Council, Jerrabomberra Residents’ Association, and Queanbeyan City Council (the latter being the only local government representative of the five). As mentioned above, the community groups have also been active in the media.
4. Government, the market and the community

A model of particular relevance for considering the various stakeholder positions is one used by Newman and Kenworthy (1999, p. 286), as shown in Figure 5.9. It highlights three overlapping areas of importance, namely the market, government, and civil society.

![Figure 5.9. Government, market and civil society components of urban change](Adapted from Newman and Kenworthy (1999, p. 286).)

These authors suggest that markets provide the resources needed to make developments happen, whether these are helpful to sustainability or not. The government regulates and sets policy in order to ensure that the “common good” in cities is achieved. Ideally, long-term issues such as sustainability are addressed. Civil society is regarded as the guardian of culture and ethics. Here players such as the media, community organisations, and individuals in the community influence the long-term direction of society through their attention to values and visions. The market sector is often aligned with processes linked to economic globalisation. As discussed previously, the growth of air traffic, for both passengers and cargo, is often viewed as a consequence of, and a significant contributor to, the increasing globalisation of world economies (Kenneth J. Button & Taylor, 2000).

A federal government corporation previously owned most of the major airports in Australia. However, in 1997, three of the largest airports—Melbourne, Brisbane and Perth—were sold to various consortia, followed later on by the sale of a number of
smaller airports, including Adelaide and Canberra (Forsyth, 2002). Sydney airport was only privatised in 2002, for a record price of $5.4 billion. Of significance for privatisation, says Gerber (2002, p. 36), is the need for a suitable government regulatory framework, given that “with privatisation, airports change roles from being infrastructure providers to commercial entities, which have to maximise shareholder value”.

Canberra International Airport took on its new name when it was privatised in 1998. Although not yet receiving many international flights, the airport has nevertheless linked its marketing and planning to economic globalisation. In an issue of The Hub, its regular newsletter, the airport “recognises that privatised airports are emerging as significant gateways to cities and economic growth” (Canberra International Airport, 2001a, p. 1). One of the elements of the airport’s development plan is the building of a “business precinct” at the airport. The line of argument used puts airports in a similar role to seaports of past centuries, as “engines that drive new economies” (Byron, 2001, p. 2).

Not only in its newsletter name, but also in planning, Canberra airport promotes itself as a hub airport. The various hub elements include a passenger hub, a business hub, a transport freight hub, and an aviation education hub (Canberra International Airport, 2001c). Market-oriented approaches to economics suggest that drivers of growth at hub airports include (in neoliberal terms) factors such as economic vitality, deregulation, privatisation trends, airline alliances, and new airport infrastructure (Pacific Asia Travel Association Strategic Information Centre, 2000).

Tourism is an industry linked to the operation of the airport. A review of the industry, commissioned by the ACT Government in 2001, produced its final report in 2002, noting that the industry was worth more than $1 billion a year to the local economy and employed an estimated 14,000 people. However, the review found that domestic visitation to the ACT was stagnant, while the share of the Australian international visitors’ market had declined from 10.2% in 1989 to 5.1% in 1999 (“ACT Tourism Review,” 2003). 35 recommendations were made to advance the industry (e.g. improving the convention business market). The airport-tourism linkage is underlined in an agreement reached in 2002 between the airport owners, Capital Airport Group,
and Harvey Travel World, for direct charter flights to overseas destinations, bypassing Sydney for the first time (Clack, 2002b). Various venues in the Pacific region were included as part of the agreement, as were charter flights for sports enthusiasts wanting to travel to international events.

The third component of the government-market-civil society model is civil society. This sector is responding to sustainability being a major global and local issue. It recognises that “sustainability requires new approaches, most of which must be worked out by communities” (Newman & Kenworthy, 1999, p. 23).

Although my interviewees were representatives of various community groups working on aircraft noise, the issues mirror those of civil society on a wider range of issues. The consistency of comment in relation to the developments at Canberra airport was marked. The following three examples from different people are typical. “C” focused on the business precinct associated with the airport:

Today the airport is owned and operated privately by a development company that is committed to not just having an airport there, but to having a centre of commercial infrastructure … that’s demonstrated by their building Brindabella Park and by the road networks … they’re planning on having buildings all the way through there to have a business precinct linked to the airport.

As developers they’re not there for the public good, they’re there for profit. They are a private company with shareholders and they’re there to ensure their shareholders get value for money. My experience has been that they pay lip service to the noise issues, but if it’s a question of profit over public concern, profit wins, every time, without question! So the privatisation has changed the nature of the debate.

“D” raised broader environmental and futures issues considered to be neglected in market-based approaches:

The rhetoric of globalisation is pretty predictable, and pretty disturbing, because a lot of people subscribe to it and believe it. A lot of the Liberal Party, the Labor Party, and most politicians—a lot of the ones we have seen—believe it. They seem to believe that strong airports and a thriving aviation industry are good for the economy, for jobs and productivity. But to me it is pretty flawed, because it’s not a sustainable industry, it’s very short-term. There might be jobs associated with it, but for how long?
In the longer term, we are going to run out of energy, we are going to wreck the planet, we are destroying people’s environment. While they might provide some short-term economic gain, we have to look beyond that to other more sustainable forms of employment, other gateways. We have to manage air travel so that broader interests are included.

“F” questioned whether transport and mobility decisions should be based on market-based criteria:

There is the issue of the privatisation of public goods, I think transport is a public responsibility, I feel it is the responsibility of society rather than private enterprise … So basically selling an airport is a short-term decision by governments who want to have quick money. It’s not a long-term solution for ensuring that people have the facilities to travel and for goods to come in and out. I think it’s just limited.

Another interviewee “B” had a professional interest in the symbolism of big projects and what they mean in terms of their real benefits. In his view, the issues come down to the contrasting beliefs and values of the dominant social paradigm and challenging paradigms (Milbrath, 1989, p. 118). Thus, whereas the dominant social paradigm is associated with economic growth, “no limits to growth” and an emphasis on market control, the new environmental paradigms are environmentally aware, appreciate “limits to growth”, and are participation and foresight oriented. “B” asserted that the story underlying the dominant social paradigm is closely allied to Canberra airport’s expansion:

What is an airport a symbol of? You can’t convince people on any rational grounds, they just embrace this idea of an international airport as something you have to do, because it will give independence to Canberra. It’s an ideological commitment they have to it … rather than going through all the complexities of the economic arguments and the infrastructure costs as opposed to the environmental costs. It’s easier to think, yes of course all big cities have international airports, so an international airport can easily become a symbol.

… In terms of change, people are still heavily entrenched in their opinions, and I think this mirrors the local business community, which tends to mirror the dominant political attitude of the major parties, and that is—airport, international airport, good for economic growth, good for jobs, support it, don’t get into the details.
5. Institutional frameworks and influences

Who is responsible for the consequences of airport expansion, in particular aircraft noise?

Another group of issues of pivotal importance to the government-market-community model includes an apparent lack of institutional concern, the role of government, and the question of who is responsible for addressing the consequences of airport expansion, in particular aircraft noise. A book exploring the politics of Sydney Airport’s history summarised it this way in its foreword (Fitzgerald, 1998, pp. i-ii):

If the history of Kingsford Smith Airport in Sydney shows anything, it shows the tendency of the centralised two-party system to act in the private, rather than the public, interest … The 50-year history also shows that no amount of rational argument about planning, cost/benefit, the environment, the welfare of residents or even the efficiency of Australia’s airports carries any real weight in decision-making … It has demonstrated the defects of many of our institutions—representative government, the centralised two-party system, the self-serving nature of our bureaucracies and our inability to cope with the forces of deregulation, privatisation, and globalisation.

This theme of institutional paralysis was also flagged in the title of the report of the Senate Select Committee on Aircraft Noise in Sydney (1995), Falling on Deaf Ears? The report states that “it is curious that developing solutions to the problems of aircraft noise in Sydney seems to have been left to local residents rather than to those responsible for the problems” (para. 9.130, p. 244) and “it is difficult to escape the conclusion that the aviation authorities are more interested in denying problems than in pursuing solutions” (para. 9.131, p. 244).

My interview data were in accord with these conclusions. Interviewee “I” raised the issue of trust and the effective denial of a problem as follows:

In December 2000 it began—the noise and frequency of the aircraft. I found out much later that this coincided with the opening of the East-West runway, which had been rarely used in the past. It started to become unbearable, and I started writing to the airport, and assumed they would tell me the truth and be quite open about what was going on. They weren’t, they lied to me, they tried to pacify me, they were patronising. And this all spurred me on.
Another interviewee “J” suggested that the institutions involved effectively collude in the manner outlined above for the Sydney case. A lack of responsibility is emphasised in relation to the institutional responses to the lobbying efforts:

*I think the crux of the matter is this—industry, that is the airlines, Airservices Australia, the Department of Transport, and the airport, are all basically colluding in having the dollar bottom line as the most important thing. Even though they mouth all the words, they are still not factoring in that balance now of people and the environment.*

… Anything to do with the Canberra airport, every letter I have received, I guarantee when trying to answer our questions, the buck is passed on to another organisation, whether Airservices pass it on to the ACT Government, or the ACT Government passes it on to the Canberra airport, or the Canberra airport passes it on to … With this particular issue, I have never seen such an incredible example of “pass the buck”. Nobody has taken responsibility.

The theme is again borne out in comments from interviewee “F”, who considered that the institutional lack of responsibility spans political, commercial and public service agencies:

*In relation to the procedures at local and federal level … the most frustrating thing was to see a lack of willingness by institutions, both political and commercial, and by civil service agencies like Airservices Australia to find best practice procedures to have citizens’ concerns heard.*

*It was clear at the time the airport Master Plan was publicised, that all instruments in place to receive citizens’ concerns were in place to buffer institutions like Airservices Australia and commercial institutions like the airport from citizen concerns … it stonewalls anything that could question their procedures, or make them be responsible.*

At a more micro level, the same dynamics and perceptions about lack of effectiveness apply to the Canberra Airport Aircraft Noise Consultative Committee. The airport established the group in response to community feedback in 1998 (Canberra International Airport, 1999, p. 3). Such consultative committees with representatives from the airlines, relevant local government and planning bodies, federal aviation and transport agencies and community associations, have been used for some time, as a way of facilitating airports and local communities working together.

For the Australian situation generally, the House of Representatives Select Committee on Aircraft Noise (1970, p. 45) long ago supported the value of such committees. The
UK Government inquiry on the future of aviation (Department of the Environment Transport and the Regions, 2000), the precursor to a White Paper on air transport, was similarly supportive. The UK inquiry cautioned, however, that such committees should preferably be independently chaired, and should ensure a fair representation of the full range of local interests (p. 59).

In Canberra airport’s case, the consultative committee process unfortunately reinforces the earlier broad scale perceptions about lack of institutional responsiveness. Other airport consultative committees in Australia may be thought of more highly, but in this particular case, the interviewees who have been or are associated with the committee, rated it poorly. One of the perceived weaknesses is the fact that the committee is chaired and run by airport management. Community representatives commonly consider that the airport’s commercial objectives seriously compromise the objectivity of the committee process. Further, the current chairperson has pivotal development industry roles too. Some community people have likened the situation to “the fox in charge of the chicken shed”.

Although the committee does not have executive powers, it can make recommendations to those organisations with administrative and legislative responsibilities for specific issues. One interviewee “C” considered this aspect as a weakness:

*The noise consultative committee is more a venue for venting one's spleen, in many respects. They go for one to one and a half hours once every three or six months. What can you achieve in an hour every three months? If it was to be truly consultative, it should be on a more regular basis and it should be given a few teeth. It has no teeth … it’s just a reference group.*

Another interviewee “J” regarded the airport’s committee as merely another element in the web of institutional irresponsibility. This interviewee said:

*Basically what’s happened is that the Canberra Airport Aircraft Noise Consultative Committee has been set up like a blancmange, which doesn’t operate effectively. It has been set up as a fall guy for every government department—everybody can so easily just say you must go and talk to this committee, these are the people who sort this problem out, we can’t do it for you. So it’s a scam to befuddle and confuse. I think Airservices and the Department of Transport don’t want to have to handle this issue—it’s a big problem. It’s easier to keep it diffuse and to set up a cardboard replica.*
Consequently, one change needed in the way the committee operates is for it to give much greater recognition to genuine community involvement in its decision-making on noise abatement procedures. Supportive of this conclusion is a study of best environmental practices at airports in Europe and North America (Sylvan, 2000), which found that the aircraft noise problem is not only a function of technical fixes, noise measurements and noise calculations. Those airports that appeared to resolve their noise problems most effectively also gave strong priority to how communities and individuals responded to noise, and to their participation in decision-making regarding its abatement. Technical fixes alone were generally considered to be insufficient.

*The role of Airservices Australia*

One technical improvement that occurred in 2002 was the addition of Canberra airport to the Airservices Australia Noise and Flight Path Monitoring System (NFPMS) (Airservices Australia, 2002d). The system monitors aircraft operations and their environmental effects at major airports across Australia. Although this improvement resulted partly from community lobbying, community groups argue that community involvement and input need to be integrated into how the system is set up and evaluated. For example, communities need to have a say in where noise-monitoring terminals are located, and in the criteria used to evaluate the noise and flight path information obtained.

Airservices Australia also operates a national Noise Enquiry Service associated with each of the major airports in Australia including Canberra. The service deals with complaints and enquiries from the community (usually by calling a national phone number) about aircraft operations and their environmental effects. Normally, the procedure is to establish whether the operation is in compliance with regulations and procedures.

However, when asked about the effectiveness of this complaint system, the interviewees invariably described it using descriptors such as “totally ineffective”, “atrocious” and “useless”. This appears to have been most strongly linked to a lack of any meaningful feedback and a lack of perceived meaningful action taken as a result of the logged call. In some cases interviewees kept very detailed records of aircraft noise pollution events.
Usually people stopped calling when they realised that their phone call or fax achieved little else than adding to a database. Airservices Australia, as expected, defended its service. For example, “during the months of September, October and November 2002 there were 1, 7 and 4 calls, respectively, to the NES … All were responded to either immediately or with supplementary information provided within 24 hrs. All callers expressed thanks for the assistance they received” (A. Fleming, personal communication, 10 December, 2002). The counter-argument, as Berland (1970, p. 60) observes, is that complainants must have some feeling that authorities will listen to their complaints, and that their complaining will do some good. In summary, “while complaints in a community are some indication of annoying noise, they are of variable reliability”.

In many cases, it seems the aircraft noise complaints made by interviewees are a reflection of inadequate aspects of the noise abatement area provisions and procedures. That is, the complaints are about the policies in place rather than compliance with the existing regulations and procedures. However, such negative feedback does not appear to have been used by Airservices Australia as a means of improving the regulations and procedures.

Part of the problem lies in a conflict of interest that exists in the core roles of the agency. As the name Airservices Australia suggests, and as argued in Chapter 4, an alliance exists between the agency and the aviation industry. A US senator commented on a similar situation some years ago (Anthrop, 1973, p. 123):

I understand why the Federal Aviation Administration’s response has been inadequate. The FAA’s responsibility is not to reduce the environmental impact caused by aircraft noise. Its primary responsibility is to promote air commerce and to protect safety. Regulation of noise from aircraft is not consistent with that primary mission.

As Harding (1998, p. 253) notes, it is common for regulators to identify closely with the groups they regulate and to come to see the issues and solutions similarly. On the other hand, at a cost of several million dollars per annum, Airservices Australia does operate the Noise and Flight Path Monitoring System at Australia’s major airports, including Canberra. However, the conflict of roles is readily apparent in a response given by
Airservices Australia to a question about the extension of the Noise Abatement Areas in the Canberra and Queanbeyan region as the population grows. The response said (A. Fleming, personal communication, 5 November, 2002):

In developing the Noise Abatement Areas (NAA) for Canberra and Queanbeyan with all major stakeholders, including the community in 1995, Airservices Australia gave a commitment that the boundaries of the NAA would not be changed to accommodate residential development. The provision was included to allay the concerns of the aviation industry that they would be progressively penalized with more track miles as further residential development occurred around the airport in Queanbeyan and to the northwest [of Canberra]. The original boundaries were determined by consensus and Airservices Australia would require a similar consensus from among all interested parties for there to be a change.

This statement underlines that part of what is required to address the aircraft noise issue properly is an agency or role in government whose primary role is linked to noise control. For example, this could be an environmental agency whose charter is strongly linked to quality of life issues or possibly a specialised role such as an Aircraft Noise Ombudsman (Federal Aviation Administration, 1999). In addition, a way to facilitate access to the complex maze of agencies raised in earlier interviewee comments needs to be found. The issue is explored further below in the conclusions to this chapter.

Accessing the bureaucracy

Some community representatives therefore argue that a central coordinating administrative point is needed, rather than having an individual or community group attempt to track its way through various bureaucracies. The latter issue is demonstrated, for example, by the fact that adherence to noise abatement procedures is checked by Airservices Australia. As this agency is not a regulatory authority, however, an aircraft operation apparently not in compliance with regulations is referred to the appropriate regulatory body, usually the Civil Aviation Safety Authority. Airport consultative committees review aggregated reports of noise enquiry statistics and aim to deal with emerging issues. The adequacy or otherwise of environmental regulations, for example curfews, and the question of noise pollution penalties, are the preserve primarily of the Department of Transport and Regional Services (DOTARS) and the Minister for Transport (A. Fleming, personal communication, 5 November, 2002).
Informed participants do not easily traverse this level of complexity, let alone the
uninitiated. Moreover, even agencies within this maze of agencies appear to give
conflicting signals. For example, The Village Building Company framed its
development plans for Tralee, south of Canberra, based on advice from Airservices
Australia. The advice was that the proposed development was outside the Australian
Noise Exposure Forecast (ANEF) contours and compliant with the Australian Standard
AS2021 embodying land use planning principles and restrictions. The ANEF system
has generally been used for land use planning. However, later contradictory advice
from Airservices Australia expressed major concerns about the land development
proceeding, based on experience with people’s perception of aircraft noise elsewhere in
Australia.

National versus local control

Another institutional issue put to interviewees was the extent to which there should be a
national framework for the management of aircraft noise, and how much the details
should be decided locally. This question was also part of the UK enquiry on the future
of aviation (Department of the Environment Transport and the Regions, 2000, p. 46).
Most interviewees agreed that a national framework of general principles and legislation
was important, but that this needed to work hand in hand with local circumstances and
wishes. One interviewee “C” summarised it as follows:

People in Canberra have different concerns from those in Perth or Coolangatta
or Sydney or wherever. So yes you can have national policies, you can have a
national legislative framework, but there need to be vehicles built into that to
allow for local community input and for local issue address.

This position is in accord with that taken in the UK enquiry on the future of aviation.
Its initial consultation document states: “We are also keen that control of noise at
airports should be agreed locally as far as possible” (p. 41).

Illustrating this point is the fact that the ACT region is characterised by quiet
background noise levels of the order of the low 30s dB(A) and a lifestyle characterised
by peace and quiet in contrast with the larger capital cities. Many people live in the
region for reasons related to this lifestyle, with a survey of residents in Canberra’s
northern suburbs confirming the importance of “peace and quiet” as a community value (ACT Planning and Land Authority, 2003b). Therefore the general principle of avoiding flights over residential areas becomes even more significant when the difference between the noise of aircraft and the background noise levels is taken into account. Some community groups such as the North Canberra Community Council are working towards a total ban on any flights over residential areas of Canberra and Queanbeyan (other than flights required for emergency or medical reasons).

The principle of the importance of the local control and regulation of aircraft noise is part of the contested nature of the problem and what the most effective solutions are perceived to be. Canberra International Airport’s goals, as reflected in its Master Plan and in the public relations stance in its newsletter *The Hub*, demonstrate a corporate “top down” approach. This public relations model is exemplified in statements such as “the Capital Airport Group proposes to introduce a range of measures … to educate the community about the extent and impacts of aircraft noise exposure” (Canberra International Airport, 1998, p. 51). This is out of step with community-based models and changing public expectations about key community stakeholders, which consider that airport noise decisions should reflect community concerns and needs (Sylvan, 2000, p. 17).

Southgate’s (2001, p. 5) presentation on the evolution of aircraft noise descriptors in Australia over the past decade argues similarly. He suggests that the public is now seeking information that is readily understandable based on “everyday talk”, rather than assistance in understanding technical noise descriptors. This is because “decision makers and members of the public will no longer accept the advice of noise experts that a certain amount of noise is ‘acceptable’ ”.

**Corporate public relations and “greenwashing”**

Another institutional influence is the significant role of public relations and lobbying used by groups such as Canberra International Airport. Beder (2000) has analysed the influence of the public relations industry in promoting corporate agendas and programs. She notes that in the USA, environmental public relations or “greenwash”, is now a billion dollar industry in its own right. Public relations activities can be aimed at the
general public or at influential groups such as politicians, senior bureaucrats, and media executives and commentators. As well as the more benign provision of technical information and the organisation of social events, other more manipulative methods include arranging campaign contributions, staging media events, encouraging lawsuits, harassing critics, and arranging trips and gifts in order to buy corporate access to and influence over government decisions.

Two examples are considered here in relation to Canberra airport. One concerns an endangered species of lizard located within the airport’s boundaries, namely the Grassland Earless Dragon (GED). A person responsible for years of monitoring work on the species in the ACT and a member of the GED National Recovery Team subsequently raised serious concerns with the Federal government on the processes followed in relation to the protection, or lack of it, for the dragon (L. Nelson, personal communication, 8 July 2001).

She suggests that Canberra airport executives appear to “have used their connections in the Federal and ACT Governments” to push forward their plans without consideration of the conservation issues. She also raises serious concerns about the application of the Environment Protection and Biodiversity Conservation Act 1999, and asserts that approval by the Federal Ministers for Transport and for the Environment of runway and taxiway work at the northern end of the airport had important ramifications for habitat loss and survival of the species. In addition, their removal at the time suggested was contrary to the National Recovery Plan and the ACT Action Plan for the species.

In contrast, the airport’s newsletter report on the retrieval and relocation of five adult and three juvenile Earless Dragons to the ACT Tidbinbilla Nature Reserve was portrayed as being consistent with the best environmental practice and only after consultation with the relevant agencies (Canberra International Airport, 2001b). These included the Department of Transport and Regional Services, the Earless Dragon Recovery Team, Environment Australia and Environment ACT.

Corporate public relations strategies for countering environmentalists suggest the need to “find symbols around which to wrap the message … The value and power of symbols can’t be overstated” (Beder, 2000, p. 122). A subsequent issue of The Hub describes a
10 metre high artwork in the main foyer of the Brindabella Aerospace Centre at the airport. The artwork features the Earless Dragon, with the newsletter caption describing it as “Art imitates real life” (Canberra International Airport, 2002b).

The other example refers to an airport newsletter report of an event held at the airport, entitled “Chief Minister opens airport child care centre” (Canberra International Airport, 2002c). This involved the ACT Chief Minister, Jon Stanhope MLA, opening a new pre-school designed to accommodate 86 pre-school children. Although the article makes much of the progressive learning philosophy underlying the school’s approach, no mention is made of strong concerns raised by community groups about the pre-school’s location in a high noise zone that is also subject to higher local air pollution than is usual. Images of the Chief Minister and airport managers applying coloured strokes to a childlike work of art presented innocence and play as the central images.

Both examples demonstrate the power of symbols raised by Beder. The artwork incorporates the relocated and endangered Earless Dragon, whereas the event involving senior airport management and the Chief Minister uses the symbol of innocent child’s artwork as its central theme. The strong community group concerns raised in the media about the Earless Dragon (Langston, 2000) and aircraft noise and emissions, particularly within the airport’s precincts, were absent.

**Synthesis of meanings and conclusions**

This section aims to draw together many of the implicitly or explicitly discussed themes covered so far in order to develop conclusions from the “lessons learned” from the case study. The way in which the case relates to broader theories and relevant literature is explored, and strategic questions identified for further consideration by communities, politicians and bureaucrats. The three broad areas discussed are: (a) determining power and influence on policy, (b) facilitating change towards a better quality of life, and (c) developing institutional arrangements supporting quality of life and environmental objectives.
Determining power and influence on policy

A useful model for examining the hegemony of the business-political nexus draws on Vigar’s (2002) analysis of the politics of mobility, which is also discussed in Chapter 4. This “sociological institutionalist” approach is concerned with determining power and influence, and draws on three organising concepts, namely: policy discourses, policy networks (or discourse coalitions), and policy arenas (pp. 15-19).

Consider the following comments from “H”:

So having a transport hub here is not a good thing for Canberra. You can have a transport hub anywhere along a major highway, away from any residential areas. You can fly freight planes in and out and put the stuff on trucks, which is what they are proposing a freight depot here would be. So the idea that an airport in the middle of the city is going to be a port for all things, I think the community won’t like it, the reactions at Sydney Airport have shown that. But I think governments are very reluctant to put restrictions on airports, anywhere in the world, and they are going to be dragged screaming to do that. It has to be political pressure to get this changed.

… Terry Snow who is the owner of the airport is a developer. He wants to develop the airport site and sell it off at a huge profit … it’s totally unrelated to a service industry for Canberra for the population we have … it’s a business scheme. There’s not been any local government input, as far as I can see, into stating what we need in this city for an airport. They seem to be going along with the development plans of a developer. It needs to tie in with the transport needs of the city. Aviation is just one other form of transport. It’s not the city that then operates around this form of transport.

These comments are consistent with a “new realist” discourse discussed by Vigar (2002, p. 191). This discourse considers that “travel demand can be influenced by public policy” and that “policy issues increasingly extend beyond transport policy itself”. In addition, it extends to the “broader economic, social and environmental evaluation of transport policies and schemes”.

In contrast, Vigar’s (2002, pp. 16-18) analysis of the policy discourse and discourse coalition associated with a “predict and provide” approach to transport is one characterising that taken by Canberra International Airport and most politicians backing the case for further growth. Changes in travel demand are viewed as “an expression of underlying social and market dynamics” (p. 191). The most recent example—more
than a year on from the interviews conducted for this case study—relates to a bid by Canberra airport to become a solution for Sydney Airport as the latter reaches its capacity constraints over time. This involves a $50 million plan by Canberra airport to strengthen and extend its main runway south, to allow the airport to accept Boeing 767 and 747 aircraft on a commercial basis. Marketing associated with the plan promotes the airport as a domestic and regional hub in southern Australia, as well as taking an increasing number of international flights.

An obvious “policy arena” in this case involved advertisements in major newspapers, including *The Canberra Times, The Sydney Morning Herald* and the *Financial Review*, asking “Is the solution to Sydney’s second airport 20 years away?” together with the reply “Less than three hours, actually” (Cooke, 2003a). In addition, a series of front page articles appeared in *The Canberra Times* (Brewer, 2003; Cooke, 2003a; Hannaford, 2003). This coverage also underlines the nature of the discourse coalitions involved. For example, the ACT Government and Canberra Business Council welcomed the proposal because of its business and tourism implications (“Concrete plans for jumbo suitors,” 2003), whereas the mayor of Queanbeyan City Council expressed concerns that Canberra airport’s curfew-free status might be abused at times when Sydney Airport’s curfew is in operation (Hannaford, 2003). Further, the developer associated with the proposed housing development at Tralee (discussed earlier) reaffirmed a commitment to his objectives, describing the runway extension as a “stunt” (Cassidy, 2003b).

The earlier discussed theme of land use conflicts between Canberra airport and residential land developers underlines the strategic planning issue that became increasingly apparent over the course of the case study. It raises the issue of the extent to which airports can dominate planning processes to serve their ends. For example, the ACT Government’s policy and planning agenda has sought to support aviation-driven assumptions such as the linking of airport expansion with regional economic development. The latter position, discussed in Chapter 4, is one often used by airports to bolster their privileged position in society and to influence policy-making. The ACT Minister for Planning expressed the ACT Government’s stance as follows (S. Corbell, personal communication, 6 February, 2003):
The Government is generally pleased with the development of the airport. It recognises the significant role that Canberra International Airport plays in providing business opportunities and essential transport services to the ACT community. It also recognises the efforts the airport is making to influence long term planning in Canberra and the surrounding region to protect both the viability of the airport and residential amenity in Canberra, Queanbeyan and many of the rural residential estates in the surrounding shires. The Government is supportive of appropriate employment growth at the airport, particularly where the airport attracts activity that would otherwise not be located in Canberra.

This statement is in accord with Upham’s (2001, p. 247) observations in the United Kingdom and the European Union (EU), where he notes that airport practice and government policy aim to mitigate the impacts of aviation, but not at the expense of aviation growth. Therefore sustainability “should not be taken to mean a realised commitment to environmental impact reduction” but more “a consideration of environmental and social impacts alongside environmental and financial performance”. For the major EU airports reviewed in his study, he finds no evidence of a reduction in environmental impact or a commitment to consumption or waste limits.

Further, in late 2003, The Draft Canberra Spatial Plan was released by the ACT Government to guide its planning for Canberra over a 30 year period (ACT Planning and Land Authority, 2003a; Grech, 2003a). The plan identifies the airport as “critical infrastructure for the Canberra region”, with planning to ensure the development of the airport “as a regional hub, bringing new jobs to the region, [being] of fundamental importance” (ACT Planning and Land Authority, 2003a, p. 55). At the time of writing, the plan had invoked strong criticism from a number of sources including some Members of the ACT Legislative Assembly, the Queanbeyan City Council and environmental groups (Hannaford & Brewer, 2003). Members of the North Canberra Community Council expressed particular concern about statements in the draft plan, which effectively align the ACT Government and Canberra International Airport positions (G. Willans, personal communication, 16 November, 2003). Thus the draft plan states that to protect the airport “its operations need to be unconstrained by the limiting effects of residential development where airport noise would impact on residents” as with the planned development at Tralee in New South Wales (ACT Planning and Land Authority, 2003a, p. 55). Of concern also is another statement in the plan expressing reservations about pressures to introduce a curfew at the airport.
therefore “constraining [the airport’s] opportunity to function as a major regional hub and a possible second airport for Sydney” (p. 55).

An additional planning issue of concern to some is that of increasing office development at the airport, including calls from a local politician to restrict further expansion on the grounds that the airport and associated business park had become a “de facto town centre” (McLennan, 2002). Predictably, the airport owners countered with the assertion that any moratorium on office development and further growth at the airport would in effect be “a moratorium on jobs” (Clack, 2002a). More generally, Graham and Guyer (2000, p. 253) note that the aviation functions of airports are increasingly linked to on-site developments such as business parks and quote one executive’s description of an airport as “a runway with a shopping mall inside it”. In the case of Canberra airport, the situation has been criticised further on the grounds that the ACT Government does not have planning authority over the airport. Critics argue that the relevant planning control comes under the National Capital Authority, which is much less stringent than under the local ACT Government requirements, with only limited demands for community consultation (Cassidy, 2003a).

In relation to these concerns, an editorial in The Canberra Times suggests that the airport’s framing of its arguments in terms of its expansion plans vis-à-vis the planned housing development at Tralee (discussed earlier) is a distraction from much wider planning considerations that need to be debated (“Airport pitch a smart move,” 2003). The editorial asserts that Canberra airport’s ambitions for commercial development areas at the airport “take place in a vacuum, and without reference to ACT planning about shopping centres, office development and land use”. Interestingly, a more recent development in the debate involved resistance from a powerful group of builders and developers who are unhappy with the planning concessions that enable unfettered office developments at the airport. This has disadvantaged the group’s interests in other parts of Canberra, thus creating additional enmity towards the airport from competing commercial interests (Cassidy, 2004a, 2004b). An editorial cartoon from The Canberra Times captures the situation succinctly, referring to the airport owner (as of February 2004) in the “Snow dome” caption (Figure 5.10).
A similar situation has also arisen at Brisbane Airport, with the Brisbane Airport Corporation accused by the Shopping Centre Council of Australia of effectively sidestepping planning laws (Fraser, 2003). The Shopping Centre Council contends that the *Airports Act 1996* is deficient, given that its primary focus is on aviation-related development such as runways and terminals. Thus, inadequate attention is paid to the planning and assessment of non-aviation developments on airport land. In addition to accentuating the negative environmental externalities of airports, Graham and Guyer (2000, p. 261) agree that airport business parks “can be a zero-sum game if the airport-related jobs are diverted from other locations within the region”.

A policy position that has a city airport as a necessary node in the global economy needs to be contrasted with other positions that question the benefits of further aviation growth, or that perhaps more pragmatically search for sustainable solutions to the demand for mobility (Van Eeten, 2001). Whereas Canberra International Airport uses economic arguments by referring to the airport as an important “gateway” to a global economy, community groups generally subscribe much more to positions that question the need for airport expansion. This is based on doubts about the economic benefits, especially when public subsidies to the airport are taken into account; concerns over environmental degradation, in particular the threats to quality of life from aircraft noise;
and the desirability of substituting other modes of transport such as fast trains to meet mobility needs, especially for short-haul routes such as Canberra-Sydney. The latter issue is discussed in Chapter 4, with Laird (2002) arguing for the use of fast tilt trains on upgraded and straightened track.

The need to reduce the need for air transport—in effect a questioning of the “predict and provide” approach to aviation planning—has also been generally confirmed by the interviewees in this study. This is in accord with the sustainable transport literature, especially in relation to aviation, which increasingly emphasises that the rapidly growing demand for mobility cannot be met in a sustainable way. As Graham and Guyer (1999, p. 179) have summarised the matter, air transport policy generally fails to address the integrated nature of transport itself or the broader concerns of society. This is reflected in the way the interviewees’ comments support Graham and Guyer’s observation that “society is moving towards an aggregate acceptance that infinite mobility cannot be sustained” (p. 179).

Some community groups in the ACT region are also acting to put forward broader frameworks for considering aviation and airports than mere demand driven ones, and are lobbying for a broad-based evaluative research study of Canberra airport taking into account economic, social, environmental and planning factors (May, 2002). This is in contrast to the narrowly defined economic impact studies of the airport undertaken by ACIL Consulting (Canberra International Airport, 2001c, p. 10; 2003a). In addition, community groups, both in submissions to politicians and in newspaper articles (Willans, 2001, 2002) have questioned the range of subsidies that Canberra International Airport has received. As interviewee “K” stated:

*The aviation industry is a mature industry, it’s been going on now since the second world war, it’s had considerable strength in the country; and there has to be the question: why does it have to be subsidised? It’s not a new and starting industry, if it can’t stand on its own two feet now, then we should get out of the business.*

Using similar questions to those used by Newman and Kenworthy (1999, p. xiv) for car dependence in cities, governments and community stakeholders could address a range of strategic questions for framing policy such as:
• What are the myths of the inevitability of the “Airport City” as part of a global economy?
• How dependent on aviation services should Canberra and the surrounding region be?
• What limits should be placed on the development of Canberra airport? Should Canberra airport be relocated?
• In what ways might the further growth of Canberra International Airport contribute to the economy, taking into account the range of social and environmental “externalities”?
• How might the ACT region best plan to meet its future transport and communication requirements rather than becoming strongly integrated with an unsustainable transport mode?
• What kinds of scenarios face “Airport Cities” in an era of oil depletion?

Facilitating change towards a better quality of life

Lewin’s (1935) “force-field analysis” is a model that can be used to identify the forces helping to move towards a better quality of life and those forces hindering such changes. Lewin argued that change be facilitated by strengthening and adding to the driving forces and removing and weakening the restraining forces (barriers) (Figure 5.10):

![Diagram of force-field analysis]

Figure 5.11. Lewin’s (1935) force-field analysis applied to quality of life

An outline of some of the driving forces and restraining forces (barriers) in relation to the expansion of Canberra airport, particularly as raised by interviewees in the case study, is listed in Table 5.1.
Table 5.1. Driving forces and restraining forces in relation to the expansion of Canberra airport and the city’s quality of life, as identified in case study interviews

<table>
<thead>
<tr>
<th>Driving forces</th>
<th>Restraining forces</th>
</tr>
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<tbody>
<tr>
<td>• Community energy and community group participation</td>
<td>• Private business institutions, privatisation of airport emphasises profit motive</td>
</tr>
<tr>
<td>• Value shifts favouring quality of life, health, and environment (“green consciousness”)</td>
<td>• Short term politics and profit</td>
</tr>
<tr>
<td>• Long-term ecological vision</td>
<td>• Lack of long-term planning and commitment to environment and quality of life issues</td>
</tr>
<tr>
<td>• Quality of life an important reason for people being drawn to Canberra</td>
<td>• Political climate favouring development</td>
</tr>
<tr>
<td>• Alternative conceptions of the role of an airport as part of a city</td>
<td>• Lack of trust by community in business and government</td>
</tr>
<tr>
<td>• Possible relocation of airport</td>
<td>• Difficulty for politicians in challenging business agenda</td>
</tr>
<tr>
<td>• Broad-based research evaluation study of airport, taking into account economic, social, environmental and personal factors</td>
<td>• Lack of alternative conceptions of economy</td>
</tr>
<tr>
<td>• Local politician and community synergies</td>
<td>• Fragmentation of government responsibility, complexity of access to bureaucracies</td>
</tr>
<tr>
<td>• Media support e.g. letters to the editor, opinion pieces</td>
<td>• Lack of transparency</td>
</tr>
<tr>
<td></td>
<td>• Consumer attitudes related to the “right to fly”</td>
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</tbody>
</table>

Dryzek (1998, p. 596) confronts the issues of “green values” and “green structures” characteristic of the driving forces column in Table 5.1, “given the seeming global hegemony of profoundly anti-environmental liberal democratic and capitalist ideas”. He notes that markets are “not exactly an ecological success story” and that they are not “much good at coordinating the activities of political authorities”. Further, governments operating in the context of a capitalist market system are reluctant to pursue policies that damage business profitability. Such constraints on governments are apparently
magnified by the increasing global mobility of capital. Dryzek goes on to outline a case as to why the structure of liberal democracy itself is ultimately incapable of responding effectively to ecological problems. His hopes lie more with civil society and the public sphere, and with “the possibility of democratisation apart from and against established authority” (p. 595).

“A” described it this way for Canberra airport:

“It’s complex. What hinders change are the players with the money and the control by businessmen. And the community doesn’t have the same resources. I wouldn’t trust whatever they were doing. I would want to know the background to all of that and I am going to go and find that out.

On the side of forces working for quality of life, is the community energy. But who pushes the community? We’ve all got to do it for each other. And so it comes down to value systems and your own lifestyle choices … Once you get public opinion on side, you get different sorts of influence.

But again it’s still very complex. Because the businessmen at the airport, their objective isn’t to make quality of life worse, that’s just an outcome of their business objectives, there are so many different influences and things that are hidden.

“E” underlined the importance of communities working for values centred on “healthy cities” and “healthy environments”:

I believe communities of people working on aircraft noise are very important and that they should have a stronger voice and representation. I believe the democratic process should take on board their feelings about healthy cities and healthy environments … The population is going to increase in any urban suburban area, and there is an opportune time in Canberra now to reroute aircraft, and to prevent situations such as in Sydney where noise is an ongoing problem. It will be hard to push commercial groups and politicians who are backing that up, but I think the voice is getting stronger from community groups wanting a healthier way of life.

Investments in more diversified local economic development of regions may be one way of reducing the growing demands of air traffic. This issue was raised by interviewees in the case study in the suggestions for the need for alternative conceptions of the economy, and the need for a broad-based study of Canberra airport, taking into account social, economic, environmental factors. Of relevance here is Newman and
Kenworthy’s (1999, p. 111) questioning of an assumption often made by transport planners and engineers that there is a close link between mobility and wealth. Their examination of the data on car use per capita in 37 global cities suggests that cities with high wealth (mostly European and wealthy Asian) are associated with lower mobility than those in the mid-wealth range (US and Australian). Where mobility needs must be met, modal change especially to high-speed rail, is regarded as a sensible option for short-range traffic, for both economic and environmental reasons (Price & Probert, 1995).

The issue of the lack of a futures focus, or more specifically, the adoption of a short-term development oriented focus, was addressed by “K”:

\[ \text{We lack enough electoral muscle to make the politicians really sit up and take notice and heed the advice we are providing. Until there is enough complaint to make our policies and suggestions stand, we will always be a splinter group I guess. But eventually as the air traffic increases, there will be more and more converts coming across who will remember when the lifestyle used to be quieter and will yearn for those days and be prepared to stand up and be counted. So it will come, it’s just a matter of waiting. Trouble is, in waiting, the position will get worse before it gets better. The situation could get to a doubling of aircraft noise and over.} \]

Another significant theme is the critical importance of community group participation for improving quality of life, as emphasised in the column listing driving forces in Table 5.1. Community participation and involvement is an essential part of a sustainability agenda. Further, communities have power because of their ethics and vision, with “the real visions for change rarely com[ing] from government or from the marketplace, but from civil society” (Newman & Kenworthy, 1999, p. 329). As discussed earlier, even within “business as usual” growth scenarios, there is evidence from the study of best practice outcomes at European and North American airports, that meaningful community participation is critical for more effective noise abatement management (Sylvan, 2000).

Underlying the notion of community is the idea that people are social rather than economic beings, which leads to the conclusion that the makers of current political agendas overemphasise markets at the expense of the personal and social aspects of reality (Cox, 1995). Therefore citizens must take some responsibility for changing what
they do not like. Here, raising social capital—the cooperative networks and processes of social trust between people—is of critical importance in building “a truly civil society”. Cox nevertheless notes that it is hard to find policies that encourage the practice of social capital formation in the public sphere. And where community consultation processes have been instituted by governments, citizens often describe the process as a “token involvement” with community suggestions and desires being ignored, as was the case with community consultations on planning issues in Canberra (Grech, 2003b; "Residents say public discussion a farce," 2003).

During the course of the case study, the effort sustained by community groups varied over time, with some people moving to other locations for a period and others constrained by competing commitments. As one study in the USA shows, a number of factors can severely constrain the amount of time, attention, and effort people can devote to citizenship roles (Tonn & Petrich, 1998). Such factors include, for example, work and family commitments, and social networks that are not “tight” enough to foster ongoing involvement in community issues. A factor that assisted ongoing effort in the case of the North Canberra Community Council was the presence of members with scientific and aviation expertise who were thus able to provide detailed insights on airport proposals and documents. One person in particular is an ex-aviator with specialist knowledge of aviation, in addition to a long-term interest in protecting the community’s quality of life.

In spite of the various constraints linked to the operation of community groups, the fact that well coordinated community interests can overcome a combination of government and commercial interests was shown in the abandonment of a planned charcoal plant on the New South Wales south coast in 2002. Australian Silicon, which had ongoing support for the proposal from the State Government, was forced to withdraw as a result of strong community opposition on environmental grounds and concerns about damage to the local tourism industry (Messenger, 2002).

The list of driving forces in Table 5.1 indicates that there is a strong argument for bolstering and supporting community groups in order to promote quality of life outcomes for communities. In addition, the range of factors outlined suggests that decisions on technology and infrastructure (e.g. airports) should no longer be considered
as one-dimensional market-based ones. Rather, such decisions should be regarded as challenges to choose pathways that will create better economies, better communities and better local and global environments (Newman & Kenworthy, 1999). Moreover, restraining forces such as the fragmentation of government responsibilities, and the complexity of access to bureaucracies, need to be addressed, as discussed in the following sub-section.

Developing institutional arrangements supporting quality of life and environmental objectives

With respect to the institutional arrangements in place, Dryzek’s (1998) insights into liberal democracies being ultimately incapable of responding to ecological problems are pertinent. Because such problems often feature high degrees of complexity and uncertainty, Dryzek considers that any adequate political mechanism for dealing with them must incorporate negative feedback, and coordination across the various problems and actors involved.

The case study findings here and observations in the literature reveal that the reverse situation applies. In the USA, Falzone (1999, p. 800) concludes:

>Aircraft noise is a serious yet often unappreciated and neglected form of pollution. The current method of regulating airport noise pollution is an unnecessarily complicated web of federal, state, and local legislative and judicial decisions. Lack of accountability among these various entities has produced an inefficient means of controlling airport noise.

Not only is a central coordinating point needed to address the confusion of roles and agencies, but one is required that is responsive to community approaches to decision-making. However, Airservices Australia, the central Australian agency in the area of aircraft noise, has many characteristics in common with the US Federal Aviation Administration (FAA). Falzone (1999, pp. 802, 803) notes that “the FAA is highly influenced by the interests of the air carrier lobby” and “the FAA’s direct responsibility for and investment in air traffic control equipment and personnel … causes the FAA to dedicate more resources to airspace management and safety over airport problems”.

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Similarly, because of conflicting roles, Airservices Australia is unable to address negative feedback from the community constructively, as it is committed to and constrained by the growth paradigm subscribed to by various spheres of government and the airline industry. Addressing the aircraft noise issue properly requires an agency whose primary role is linked to environmental and quality of life concerns, and which is able to investigate and act on the ramifications for quality of life, of the continuing growth in the aviation industry. An AirportWatch network associated with community groups in the UK, for example, is calling for an “Independent Regulatory Authority for airports with the responsibility to impose all pollution control regimes” (Aviation Environment Federation, 2002, p. 12).

Nevertheless, the difficulties of introducing “green structures” that are responsive to the approaches of community groups, and which have an overriding concern with sustainability and quality of life issues, are clearly apparent in the context of capitalist market systems. For example, in the Australian Capital Territory, efforts by the Office of the Commissioner for the Environment to protect remnant woodlands, drawing on both the scientific assessment of biodiversity, and constructive community consultation, were effectively ignored. Kerrie Tucker, a Greens Member of the Legislative Assembly commented (Beeby, 2003a):

> The ACT is very fortunate to have such an informed and independent voice to protect our environment, but it is very disturbing to see that advice being disregarded by Government … I am also aware that the role of the Commissioner for the Environment is under review. It would be a very bad thing for the ACT if the Government decided this independent voice was politically problematic and so reviewed the Office out of existence.

In one particular case, a group of leading Australian ecologists also backed up the Commissioner’s position, describing the ACT Government’s sale of an endangered woodlands ecosystem for prestige residential development as “ecologically irresponsible” (Beeby, 2003b). Given that the advice of both the Commissioner for the Environment and of the ecologists was ignored, it is no surprise in the case of aircraft noise, that community groups’ concerns have had much difficulty in influencing the dominant government and business agendas.
A broad “lesson learned” from this case study is the therefore the strong need for independent institutions such as policy bodies and “think tanks” to develop and promote policy discourses that challenge the prevailing hegemony of the business-political nexus. For example, The Australia Institute (http://www.tai.org.au) is one such body. It is engaged in research on a range of issues linked to quality of life, and the importance of community; the development of alternative indicators for measuring progress; and questioning the values and practices of consumer society (Hamilton, 2003; Hamilton & Mail, 2003). In addition, it has made effective use of print and television media in presenting these alternative policy discourses e.g. Burke (2003).

Working in conjunction with community groups and other groups, such institutions can then form a broader discourse coalition to challenge the dominant social and economic paradigm. In addition, the policy focus of the “think tank” has the potential to further increase the effectiveness of an individual community group’s actions. The more widespread dissemination of an alternative policy discourse, and the associated actions of the network, appear to offer the best hope for facilitating change “apart from and against established authority” (Dryzek, 1998, p. 595). In relation to the negative ramifications of aviation growth, a relevant discourse coalition could consist of, for example, The Australia Institute, various community groups working on airport related issues, Queanbeyan City Council and The Village Building Company.

Of course, the elements of the opposition to the airport’s expansion plans may well differ at times between the “members” of such a coalition and would need to be carefully managed, particularly in media statements. Thus, The Australia Institute and some community groups oppose the airport’s expansion on a “no growth” consumption reduction agenda. On the other hand, Queanbeyan City Council and The Village Building Company are much more concerned with opposing the airport’s plans on the grounds that the planning and development of residential areas are likely to be restricted. For example, although vigorously rejecting Canberra airport’s opposition to the planned housing development at Tralee, The Village Building Company (2003, p. 6) states that it “fully supports the vision of the Capital Airport Group for the development of their asset”.
Although the case study reinforces the negative ramifications of the aircraft noise issue for communities as shown in the earlier literature review, it also demonstrates that other contentious issues such as land use planning in relation to airports, have the potential to increase community groups’ effectiveness by increasing synergies with what may at first appear to be unlikely associates. In addition, the increased publicity associated with land use issues in this case has further increased public awareness and consideration of quality of life issues linked to the expansion of Canberra airport. On the other hand, various powerful players have sought to manipulate public perception of the issues involved to serve their own ends.
CHAPTER 6
SYNTHESIS AND CONCLUSIONS

The transition to a post-growth society will be just as far-reaching as the transition from feudalism to industrial capitalism or from industrial capitalism to global consumer capitalism. It will fundamentally transform power relationships, social institutions, our relationships with others, our ethical rules, our attitudes to the natural environment and, ultimately, our consciousness (Hamilton, 2003, p. 205).

The aviation industry is fundamentally and unsurprisingly committed to the year-on-year growth of its output, with growth rates large enough to cancel out gains in the noise performance of engines and in the fuel efficiency of aircraft … Given this, one has to ask whether sustainable aviation can really exist (Whitelegg, 2003. p. 236).

In this final chapter, I revisit the research aims and central themes of my study, followed by a section summarising the research undertaken and the main findings. Subsequently, I present an integration of the findings, drawing on some broad conceptual schemes to facilitate this synthesis. The next section examines strengths and limitations of the study and suggests future avenues of research. In concluding, an epilogue envisions a world committed to sustainability principles 25 years on.

Overview of research aims and central themes

In this inquiry, my primary research aim has been to identify and articulate visions and policies for aviation futures in keeping with an ecological framework. As part of this process I have examined how the projected growth and consumption of aviation travel are unsustainable. A number of more specific sub-questions were also addressed, namely:

- What are some visions for sustainable aviation 20 to 30 years on?
• How do the aviation and tourism industries need to be redesigned in order to be more sustainable?
• What policies need to be put in place to curb the growth of air travel and how can these be encouraged and implemented?
• How can people’s individual travel behaviour be encouraged to move in sustainable directions, particularly for air travel?
• How are “sustainable ways of living” relevant to the future of air travel?
• How do sustainable aviation visions and policies demonstrate sustainable consumption practices and patterns?

An inquiry of this nature is particularly apposite at this time, as the year 2003 marked the centenary of the Wright Brothers’ first flight on 17 December 1903, with celebrations occurring across the globe. In part these celebrations acknowledged the vast significance of the way in which aircraft have revolutionised the world (Kightly, 2003). Pertinent examples from my inquiry include, for example, the globalisation of tourism and the dramatic increase in air freight linked to e-commerce and “just-in-time” delivery systems.

It is significant too, that on 16 December 2003, one day before the centenary of aviation, the UK Government published a White Paper, *The Future of Air Transport*, following an extensive national consultation process begun in December 2000. The paper sets out a strategic framework for the development of airport capacity in the UK over the next 30 years. The tenor of the document is captured by excerpts from Alistair Darling’s statement (Secretary of State for Transport) to Parliament (Department for Transport, 2003, paras 3, 7):

3. And it is significant too to look ahead over a 30-year timescale. It’s essential that we plan ahead to meet the pressures we know we’ll face as a result of a growing economy, and in a world where people can and will want to travel more for both business and leisure. And only the Government can provide such a framework to enable everyone to plan ahead….

7. The growth of passengers travelling in the low cost—no frills—sector has been dramatic. 5 years ago just 7 million people flew on low cost airlines; this year we expect the number to reach 47 million. A third of the goods we export by value go by air, and that figure is increasing. Indeed the amount of airfreight at United Kingdom airports has doubled since 1990.
In contradistinction to this growth-oriented vision of the future of aviation is a critique contesting it on ecological, resource, security and health grounds. A significant part of this critique forms part of a larger debate surrounding the issue of sustainability, which is asking fundamental ethical, philosophical and political questions such as “How shall we live?” (Singer, 1993) and “How shall we arrange our systems of production and consumption to ensure the sustainability of the Earth?” (J. Davidson, 2000). As examined in Chapter 2, “strong” approaches to sustainability accept that the present trajectory of planetary human civilisation is unsustainable and that the organising principle of industrial societies needs to shift from one of economic growth to living within ecological limits (Australia 21, Nature and Society Forum, & Sustainable Population Australia, 2003). Such a stance questions the values and consumption patterns underlying economic growth and calls for the development of “post-growth economies” that redefine the nature of “progress” (Eckersley, 1998; Hamilton, 2003). This position also challenges the narrow, egoistic view of human well-being based on a market ethic. In contrast, it suggests that a shift in human consciousness is both needed and already underway, towards a spiritual worldview encompassing empathy and concern for human beings and nature (Hamilton & Mail, 2003; Hubbard, 1998; Laszlo, 1997).

One of the significant challenges to a growth-oriented future for aviation focuses on the ecological ramifications of unhindered growth at a global level. Such critiques are a subset of those on ecologically sustainable transport, which are questioning the sustainability of current and emerging transport patterns (particularly by road and air) and reframing the way in which transport questions are considered (Organisation for Economic Cooperation and Development, 1997d, 2001). For example, in earlier chapters I have often referred to the work of the UK Royal Commission on Environmental Pollution in this respect. The commission concluded from its 2002 special report, *The Environmental Effects of Civil Aircraft in Flight*, that “emissions from aircraft are likely to be a major contributor to global warming if the present increase in air traffic continues unabated”. Further, it flagged the issue of “denial” on the government’s part, noting: “the government shows little sign of having recognised that action to reduce the impacts of air transport is just as important as action in other sectors contributing to climate change” (Royal Commission on Environmental Pollution, 2002a). In its earlier report, *Transport and the Environment*, the commission
similarly cautioned that “an unquestioning attitude towards future growth in air travel … [is] incompatible with the aim of sustainable development” (Royal Commission on Environmental Pollution, 1994, para 5.39, p. 75).

A pivotal distinction between growth and ecological futures scenarios is the notion of limits. Growth-based scenarios depend on the “no limits” metaphor of economism, which allows the extrapolation of single variable trends into the future. Ecological scenarios, on the other hand, recognise that ecological integrity is not infinitely negotiable and that “the primacy of this dynamic needs to be more squarely brought to the fore” (Fawcett, 2000, p. 33). With respect to climate change, for example, an important finding is that the current rates of emissions are already at least twice as large as the rates at which natural processes can remove the greenhouse gases from the atmosphere (Pearman, 2003). Another way of describing the issue in relation to decisions on climate change policy is that the problem cannot be resolved by weighing up readily measurable costs and benefits. As Poldy (2003, p. 3) says: “It is a physical problem that requires the best possible understanding of the risk, nature and timing of possible disruptions to the climate system”. Furthermore, only the obvious costs tend to be measured, and many are presently unmeasurable.

Accordingly, on the basis of current scientific knowledge about human impact on climate (particularly from the Intergovernmental Panel on Climate Change), the Royal Commission on Environmental Pollution (2000a, p. 2) recommends that atmospheric concentrations of carbon dioxide should not exceed a limit of 550 parts per million by volume (ppmv), this being a level approximately double the pre-industrial level of 280 ppmv, and above which dangerous and destructive climate change would be likely. An Australian Government senate committee report on Australia’s greenhouse future also strongly advocated the 550 ppmv limit (Senate Environment Communications Information Technology and the Arts References Committee, 2000, para. 2.93, p. 36). Others have suggested much lower precautionary threshold limits such as 350 ppmv (Sutton, 2001), which is lower than the actual 2002 concentration of 373 ppmv (Keeling & Whorf, 2003). However, assuming 550 ppmv is selected as the acceptable upper limit, the Royal Commission (2000b, p. 57) concludes that to meet this, UK carbon dioxide emissions would have to be reduced from their current level by almost 60% by 2050, and by almost 80% by 2100.
In Chapter 4 I considered in detail the commission’s concern about the ecological impacts of a growing aviation industry. In summary, if the 60% reduction in “radiative forcing” by 2050 (from 2000) in the Royal Commission’s 22nd report and also the UK Government’s Energy White Paper (Royal Commission on Environmental Pollution, 2003b, p. 8) is assumed, and if air travel expansion goes unchecked, the commission’s calculations suggest that about a quarter of the UK’s climate change budget by 2020 would come from aviation. (The calculations also assume that the rest of the economy progressively reduces its carbon dioxide emissions by 60% from current levels.) The same calculations suggest that by 2050 up to three quarters of the UK’s climate change budget could come from aviation (Royal Commission on Environmental Pollution, 2003a).

The assumptions and values underpinning growth and ecologically oriented visions of aviation futures are thus inherently at loggerheads. Graham and Guyer (1999, p. 165) capture this contradiction by asserting that policies directed at air transport liberalisation on the one hand, and at environmental sustainability on the other, are “irreconcilable goals”. Thus, “the current laissez-faire attitudes of airlines and their regulators are unlikely to prevail as ‘polluter pays’ principles are more firmly implemented” (p. 165) and “society is moving towards an aggregate acceptance that infinite mobility cannot be sustained, even if individual people and companies are not yet prepared to modify their behaviour accordingly” (p. 179).

Of course governments are not attracted to a deeper consideration of the concept of sustainable consumption, because of the potential threat to competitiveness and profitability, as discussed in Chapter 2. Substantive changes in consumption patterns would directly challenge many of the tenets of a growth-based economy. Instead, governments generally subscribe to an ethically “weak” position aligned with a modernist view of progress (J. Davidson, 2000). This discourse, typically linked to sustainable development scenarios, rests on the notion that “we can have it all” and on the “rhetoric of reassurance”. That is, “environmentally benign growth” is possible through the judicious juggling of economic growth, environmental conservation, and social justice concerns, without the need for any painful changes (Dryzek, 1997, p. 132).
Thus in introducing the White Paper *The Future of Air Transport* discussed above, the UK Secretary of State for Transport, Alistair Darling, states that “a balanced approach is required which recognises the importance of air travel to prosperity”, but that also “need[s] to have regard to the environmental consequences of air travel”. On the one hand he asserts: “simply building more and more capacity to meet demand is not sustainable”; on the other, he argues: “some of our major airports are close to capacity, so failure to allow for increased capacity could have serious economic consequences” (Department for Transport, 2003, paras 13, 14). An environmental non-government organisation response described the “Neo-Labour” celebration of 100 years of flying as “giving the green light to an unprecedented programme of aviation expansion” with 20 airports being given the opportunity to expand (London Earth First!, 2003). This includes, for example, a proposed third runway at Heathrow and new runways for London Stansted, Birmingham and Edinburgh airports (Department for Transport, 2003).

Norgaard’s (1994) framework for understanding development as a coevolutionary process between social and environmental systems, as discussed in Chapter 2, is instructive here. Social systems, encompassing knowledge, values, organisation and technology, coevolve with each other and with environmental systems. The model underlines the current overemphasis on institutional structures such as global economics and the use of technologies, thus compromising a consideration of values and denying the interconnections between people and nature. In addition, the framework facilitates a critique of modernity by acknowledging that industrial social systems have coevolved with the use of fossil hydrocarbons. The effect of this strong emphasis on fossil hydrocarbons has been to transfer the environmental impacts to other people, and “expanded the temporal and spatial dimensions of our interactions and coevolution with nature” (Norgaard, 1997, p. 165).

My examination of tourism in Chapter 3 is illustrative. I demonstrated that governments generally, as well as bodies such as the World Tourism Organization and the World Travel and Tourism Council, are committed to the ongoing expansion of tourism, with aviation travel considered an essential instrument for the globalisation of tourism. In contrast, I also explored how the environmental ramifications of tourist travel, especially air travel, have been relatively neglected in tourism studies and also by
the environmental movement. On the other hand, there is an increasing realisation that
tourism related travel is a significant source of transport energy use and carbon dioxide
emissions, with the projected growth in such travel—especially long-distance air
travel—being expected to significantly increase the environmental impacts from this
sector over the next 20 years (Organisation for Economic Cooperation and
Development, 2002a, pp. 23, 50). As a consequence, the tourism industry is likely to
face constraints as the externalities of greenhouse issues are internalised in the cost
structure of every industry, and also as a result of rising oil prices (Benghezal et al.,
2000).

As discussed above, however, governments generally are strongly biased towards
economic growth and increasing consumption, and tend to deny the need to account for
greenhouse emissions from tourism related travel (including air travel and “fly/drive”
packages). In 2003, for example, the Australian Government released a *Tourism White
Paper*, with a commitment to funding of $235 million over four and a half years,
including $120 million for international marketing (Australian Government, 2003), to
be spent on expanding tourism. The paper discusses “new foundations” for the tourism
industry aimed at (p. ix):

> motivating long-haul travel in the face of fears of terrorism and events like the
> outbreak of SARS. For Australia to maintain and grow market share as an
> attractive long-haul destination in the years to come, it is crucial to revitalise our
> marketing and promotion strategy to ensure that we continue to grow both
> visitor numbers and yield….

*Tourism Australia* will vigorously market a revitalised *Brand Australia* in key
global markets.

As outlined in Chapter 3, the range of ecologically contentious issues linked to the
growth of aviation is considerable and includes in addition to global climate change,
aircraft noise affecting people near airports and under flight paths, local air pollution
near airports, water and soil pollution near airports, and “land take” and habitat loss
through airport construction. Further, although a full life-cycle assessment is beyond
the scope of this thesis, studies cited in Chapter 3 indicate that the indirect energy
consumption and greenhouse gases associated with the operation of transport are about
a third of the total, and in the case of Australian domestic aviation exceed the direct fuel component.

I chose to primarily focus on climate change and aircraft noise as consumption indicators for my analysis. Climate change is a dominant factor identified in studies of the externality costs of aviation (Banfi et al., 2000, p. S-4), and aircraft noise is widely accepted as the most significant local environmental impact associated with the operation of airports (Callum Thomas & Lever, 2003). The latter issue is addressed in the case study of the privatisation and expansion of Canberra International Airport in Chapter 5, being one aspect of the fact that airport expansion has become an ongoing, highly controversial process (Van Eeten, 2001).

Other likely constraints on aviation futures, such as the decline in reserves of conventional oil, and the impact of the rapid spread of an infectious disease across the globe, as occurred with SARS in 2003, were also raised in Chapters 3 and 4. Using a critical futures approach, and attending to chaos theory and the issue of complexity in research, underlines the limitations of linear, mechanistic frameworks. Rather, non-linearity, spontaneity and surprise are evident. As Faulkner put it: “the only certainty about the future is that the unexpected will happen” (Faulkner & Valerio, 2003, p. 173). Thus it has been argued that “commercial aviation is most vulnerable to the coming decline of conventional oil, the transport mode least able to adapt” (Fleay, 1999, p. 33).

**Overview of research undertaken and summary of findings**

In Chapter 1, I referred to Graham’s (2003, p. 211) observation that recent academic studies of air transport have been dominated by a shared focus on the effects of liberalisation and competition, and the impacts of globalisation, reflecting the prevailing dominant paradigm discussed above. Although the broader debate on transport and social change is increasingly concerned with issues of sustainability, Graham considers that “these broader sustainability issues have had relatively little impact on the academic study of air transport, either in European or North American contexts”. This underlines the need for further work on aviation within an ecological context—the position taken in this thesis.
Likewise, in contrast with the prevailing short-term timeframes characteristic of Western cultures, my primary methodological approach drew on critical futures studies. The particular research method I used is Causal Layered Analysis (CLA) (Inayatullah, 1998a), which is well situated within critical futures research. This approach and methodology (Inayatullah, 2002, p. 5):

- favours questioning the future, and is concerned with making basic assumptions problematic
- is long-range in its theoretical and action orientation
- examines a range of futures
- is vision oriented
- has an emancipatory interest
- attends to socio-political questions in preference to technical and instrumental ones.

Nevertheless, my research philosophy and methods are akin to Inayatullah’s approach of encompassing empirical, interpretive and critical paradigms where possible. The range of research methods used includes literature reviews and synthesis (all chapters), trend analysis (Chapter 3), critique (Chapters 2 to 5), causal layered analysis and scenarios (Chapter 4), policy analysis (Chapter 4), and a case study including interviews (Chapter 5).

In addressing the research aim of identifying and articulating visions for aviation futures in keeping with an ecological framework, the causal layered analysis method was used to identify a range of possible futures scenarios as alternatives to the prevailing “growth forever” scenario. The alternatives analysed included: “sustainable development”, “redesign (ecological/spiritual)”, “inner travel”, “cyber-revolution”, and “crash” (see Table 4.1). Given that the CLA method focuses on vertical levels of analysis, the issues are framed in varying ways at each level of the model.

At the social science analysis level of the model, the “redesign” scenario, for example, pictures transport in 2030 as characterised by a massive shift from less sustainable to more sustainable modes such as rail transport, accompanied by a relative decrease in
transport activity (Organisation for Economic Cooperation and Development, 1999). Typically 60% or more of this change is envisaged as being met by demand-side management measures, with 40% or less of the task being met by improvements in technology. Other features (in contrast to business as usual scenarios) include the following:

- Long-distance air passenger travel is substantially reduced. Aircraft in use are more efficient conventional types, and rigid airships may be used for specific purposes.
- Long distance freight movements are substantially decreased.
- There is much greater use of non-motorised means for short distance trips together with necessary supporting infrastructure.
- There is a significant decrease in car ownership and use, with many cars running on hybrid-electric engines.
- Changes in the form of settlements are implemented in order to reduce the need for movement of people and freight.
- Greater use of telecommunications is made to avoid passenger travel and the movement of goods (especially by air).
- Regional production is favoured in order to avoid long-distance freight movement.

Underlying these changes, as discussed in Chapters 2 and 3, is the need for a fundamental shift in the way consumption is viewed. I discussed the difficulty of any easy “technical fix” for air travel, and noted that the future growth in air traffic is expected to far outstrip any efficiency gains. Further, even if effective substitution strategies such as hydrogen-powered aircraft could be produced on a broad scale, such an approach could leave existing tourism and consumption patterns in place. Such an ideological change is in keeping with the deep ecology approach of Arne Naess (1995b, p. 68), which favours appreciating quality of life and questioning current consumerist practices. For example, Naess (1995a, p. 260) supports “attempts to live in nature rather than just visiting beautiful places, and avoidance of tourism (but occasionally making use of tourist facilities)”.

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At the metaphor level of the CLA model, the “growth forever” scenario of aviation futures, for example, is encapsulated in terms such as “the sky is the limit”, “faster”, “further away”, “bigger”, “more”, and the “freedom to fly”. The consumerist priorities underpinning this scenario are reflected in a newspaper advertisement placed by Qantas (2003), offering return economy airfares to overseas destinations. Boldly headed “global sale”, the ad conjoins the ideas of economic globalisation and consumption that are central to this scenario.

In contrast, an “inner travel” scenario offers metaphors to counter the restless and ephemeral nature of the modern, runaway world. Thus, a Taoist philosophical approach that respects the rhythms of nature suggests journeys of a mystical rather than materialistic kind. As Lao Tzu put it (Bahm, 1958/1979, p. 46): “Without going out-of-doors, one can know all he needs to know”. Thus, in redesigning tourism industries to make them significantly more sustainable, this level of analysis includes within the meaning of tourism a consideration of the personal as something greater than “fragmented selves in search of wholeness or defeated selves desiring to forget” (Inayatullah, 1993, p. 5).

Causal layered analysis was applied in order to analyse contrasting visions of aviation futures. Such a process opens the possibility of reframing and rethinking people’s need to travel and of rethinking tourism, especially international tourism. It also raises the potential for redesign at every level, as with the inclusion of the “personal” in policy considerations.

In questioning the future, the CLA method raises implications for both theory and practice (discussed more fully in Chapter 4), which vary with the audience. For example:

- Politicians and policy makers involved in the rapid expansion of airports and airport developments around the world might look again at whether economies and airport developments must become increasingly integrated. Such developments are predicated on the continuing expansion of aviation, and many of the infrastructure developments may turn out to be unwise investments (Centre for Sustainable Transportation, 2000). What if world oil production
peaks around 2010, as many experts think? What if another infectious disease such as SARS spreads globally, aided by modern air travel?

- Is the corporate sector indulging in obsolete work practices, which from an environmental perspective can readily be redesigned? In an age where videoconferencing and other rapid communications are available, how much business travel is really needed? How might the aviation industry itself contribute to ecologically sustainable transport futures? For example, investment in fast train services rather than aircraft is more greenhouse friendly, particularly for short haul travel.

In Chapter 4, I also addressed the research question: What policies need to be in place to curb the growth of air travel? I acknowledged that progressive and pragmatic policy measures are often aligned with a policy reform agenda, rather than with the fundamental changes inherent in “strong” sustainability arguments. In addition, policy analysis is often considered to be more short-range in orientation than the long-range orientation of futures visioning (Inayatullah, 2002, p. 5). Nevertheless, foresight and a longer-term orientation is characteristic of the work of bodies such as the UK Royal Commission on Environmental Pollution. In its detailed examination of climate change in its 22nd report, a full chapter is devoted to the process of adopting a long-term strategy (Royal Commission on Environmental Pollution, 2000b, chap. 10, p. 181). The commission acknowledges that cutting carbon dioxide emissions by 60% by 2050 requires changes that are far-reaching and that will take many years to achieve.

With respect to aviation and transport policy, Whitelegg (1997, p. 88) describes aviation as an “outstanding example” of the “predict and provide” model of transport planning. Further, the commitment to growth by the airlines and airport operators is “fundamentally at odds with policy commitments to sustainable development”. Particularly in relation to road building, Vigar (2002, p. 190, 193) argues that the “predict and provide” paradigm has been increasingly discredited during the 1990s. Thus, a gradual perceptual shift is occurring from “roads as solution” to “roads as a problem”, with a reframing of policy towards a “new realism” becoming apparent.
Those critiquing the never-ending growth paradigm of the aviation industry similarly argue for a “new realist” approach to be applied to it (Aviation Environment Federation, 2002; Royal Commission on Environmental Pollution, 2002b; Whitelegg, 2003). Where a “predict and provide” model constructs “changes in travel demand as an expression of underlying social and market dynamics” and as being inevitable without serious consequences (particularly economic), a “new realist” approach argues that “travel demand can be influenced by public policy” and that travel demand management is an appropriate policy response. Further, the “new realist” approach moves beyond a narrowly defined transport policy approach to encompass a much wider set of health, social, and environmental concerns (Vigar, 2002, p. 191).

Subsequently in Chapter 4, I presented a range of policy measures for restructuring and redesigning aviation and air travel, with the discussion biased towards practical considerations. Some of these measures are broad, challenging fundamental tenets of industrial societies as organised at present, whereas others are specific to aviation such as an environmental charge based on carbon emissions. The measures include:

(a) the decoupling of transport and economic growth
(b) approaches that critique the social and environmental costs of the transport components of globalisation, and instead favour local production and consumption
(c) reframing tourism, a significant area related to (a) above
(d) challenging aviation’s privileged position in society
(e) economic incentives applied to aviation in keeping with building an “eco-economy”
(f) modal shifts from air transport to less energy-intensive modes such as rail
(g) the optimisation of aircraft technology and of aircraft operations using air traffic management systems and procedures
(h) regulatory approaches such as the setting of environmental and noise limits at airports, including the use of curfews
(i) the need for governments to consider airport developments and extensions much more critically than at present
(j) substitution of air travel by telecommunications and information technology, in order to reduce the need for physical travel
(k) behaviour change by individuals (the population) in order to reduce aviation’s emissions and impacts.

The case study (Stake, 1995) of the privatisation and expansion of Canberra airport described in Chapter 5 underlined the global-local link, and showed that, at the local level, concerns about aviation’s impacts centre on issues related to the quality of life of local communities, especially the effects of aircraft noise. At present, climate change issues are framed primarily as a global issue, and are not the prime driver of community groups’ actions in relation to Canberra airport’s expansion. This conclusion is supported by experience from the Cities for Climate Protection (CCP) campaign of the International Council of Local Environmental Initiatives. In most US CCP cities, local policies and programs to limit greenhouse gas emissions are motivated by actions linked more obviously to local priorities, such as reducing local air pollution or improving the “liveability” of communities (Betsill, 2001).

The conflict between a land developer and Canberra airport management described as part of the case study, highlights the issue of airports and cities invading each other’s space in increasingly problematic ways. As one commentator put it: “Airports and cities: Can they coexist?” (Ayres, 2001). However, the commitment shown by governments across the world to building new airports and to expanding existing ones, emphasises the strength of the government-business nexus and its commitment to economic growth models (Canberra International Airport, 1998; Department for Transport, 2003). Although a banner at Brisbane Airport declares: “Now and to the future: From a city airport to an Airport City” (Brisbane Airport, Queensland, Australia, 2002), the fact that the “effect of airports and aircraft operations on surrounding communities is a contentious and enduring issue” (Senate Select Committee on Aircraft Noise in Sydney, 1995, para. 1.30, p. 7) has been confirmed again in this study.

**Integration of findings**

Schauer (2003, p. 73) asserts that a comprehensive model for sustainability requires a combination of a “consciousness approach” and a “frameworks approach” (Figure 6.1). A consciousness strategy, generally preferred by those with strong altruistic tendencies, argues that the transition to a sustainable society requires a change of awareness leading
to changed lifestyles among people. A frameworks strategy, on the other hand, argues that global frameworks currently support consumerist behaviours at the expense of social and ecological factors, and that these frameworks must be changed in a way to reward ecologically friendly behaviour. This can be accomplished, for example, through new laws and taxes consistent with an “eco-economy” (L. R. Brown, 2001). People with a strong realistic bent are biased towards this approach.

**Figure 6.1.** Consciousness and frameworks strategies for the transition to sustainability (Schauer, 2003, p. 64).

Schauer’s model, although simpler than Wilber’s quadrant model discussed in Chapter 2 (Figure 2.3), is in accord with it in noting the need for constructive synergies between the “interior” and “exterior” quadrants in moving towards sustainability. It is also useful for integrating the disadvantages of each of the consciousness and frameworks strategies (Figure 6.2). Thus a consciousness strategy is inhibited when negative environmental behaviours are rewarded. As discussed in Chapter 2, it is retarded by the gap between environmental awareness and actual behaviour, not only of individuals, but as also evidenced in the practices of corporate bodies. A significant obstacle for the frameworks approach arises from its coercive nature. Thus, measures that aim to reduce energy and material consumption, particularly if they are ambitious, can by opposed by voters, and therefore can be potentially risky for politicians. However, changes to frameworks are possible if accompanied and supported by a consciousness change in most of the population. Similarly, frameworks strategies can help to reduce the discrepancies between values, awareness and the associated actions.
With respect to air travel, evidence cited in Chapters 3 and 4 suggests that many people are poorly informed about the environmental ramifications of aviation, and that the same conclusion applies to many businesses and policymakers. Moreover, current incentives such as the low cost of flying and the advertised glamorous image of aviation act in the opposite direction. Programs similar to the TravelSmart, as developed in Western Australia, are needed to advance consciousness about aviation’s impacts (Transport, 1999). As part of the process of questioning habitual travel behaviours, people could consider the potentially very high contribution made by air travel to a “personal greenhouse budget” (European Federation for Transport and Environment, 1999, p. 14; Lenzen & Smith, 1999/2000). This could be further reinforced by frameworks approaches such as an emissions tax on air tickets, but identified on the ticket as a “climate protection charge”, to heighten public awareness of the environmental damage caused by air transport (Royal Commission on Environmental Pollution, 2002b, para. 5.13, pp. 32-33).

Theoretically, a broad range of policy measures implemented at various political levels, with demand management integral to the overall framework, is most likely to be successful in moving towards aviation futures compatible with ecological sustainability (Pastowski, 2003, p. 190). Such a package of measures was discussed in Chapter 4 and is summarised in the section above in the list of items (a) to (k). However, a major impediment to the implementation of such a range of measures is that many of them directly challenge the prevailing tenets of economic growth and consumption.
underpinning government policies and decisions. That is, the required frameworks approaches—particularly those involving a substantial element of redesign—are not supported, except in theory, by governments.

For example, the Australian Government plan to expand tourism and long-haul travel, as discussed earlier in this chapter, runs directly counter to the typical recommendation from a parliamentary committee set up to inquire into Australia’s greenhouse future, for example (Senate Environment Communications Information Technology and the Arts References Committee, 2000, recommendation 13, p. 127):

The Committee recommends that the Commonwealth Government incorporate the reduction of greenhouse emissions as a central objective across the whole-of-government and in all policy formulation. All relevant areas of Government, including transport and treasury, should be required to include greenhouse abatement in policy development and report on progress in their annual reports.

In relation to aviation futures, application of an ecologically oriented frameworks approach is therefore inhibited by the policy discourse associated with economic growth and the “predict and provide” approach to transport planning that is still strongly evident. The above analysis of the UK Government’s position on the future of air transport, and the Federal and Australian Capital Territory government positions in the case of the expansion of Canberra airport (Chapter 5) are further testimony to this. The hegemony of the business-government nexus is also demonstrated in the politics of Sydney Airport’s history. As the commentary in the foreword to a book on this issue states: “If the history of Kingsford Smith Airport in Sydney shows anything, it shows the tendency of the centralised two-party system to act in the private, rather than the public, interest” (Fitzgerald, 1998, p. i). In addition, the analysis in Chapters 4 and 5 showed how Airservices Australia—the body responsible for monitoring aircraft operations and their environmental and noise effects across Australia—is similarly committed to and constrained by the growth paradigm subscribed to by governments and the airline industry.

An important conclusion from the case study in Chapter 5 is the strong need for independent institutions such as policy bodies and “think tanks” to develop and promote policy discourses and futures visions that challenge the prevailing hegemony of the
business-political nexus. This draws on a “sociological institutionalist” approach concerned with determining power and influence, which uses three organising concepts, namely: policy discourses, policy networks (or discourse coalitions), and policy arenas (Vigar, 2002, pp. 15-19). Working in conjunction with community groups and other groups such as local governments and schools, such institutions can form part of a discourse coalition to challenge the dominant social and economic paradigm, and to promote the elements of the frameworks approach for redesigning aviation and air travel presented in Chapter 4. In addition, the policy focus of the “think tank” has the potential to further increase the effectiveness of an individual community group’s actions. The more widespread dissemination of an alternative policy discourse, and the associated actions of the network, appear to offer the best hope for facilitating change “apart from and against established authority” (Dryzek, 1998, p. 595).

The Australia Institute (http://www.tai.org.au) is one example of an independent policy body working towards “a just, sustainable and peaceful future”. It is engaged in research on a range of issues linked to quality of life and the importance of community; the development of alternative indicators for measuring progress; and questioning the values and practices of consumer society (Hamilton, 2003; Hamilton & Mail, 2003). In addition, it has made effective use of print and television media in presenting these alternative policy discourses (e.g. K. Burke, 2003), and produces ongoing discussion papers on a variety of issues.

Generally speaking, environmental non-government organisations (NGOs) are likely to form a significant part of an alternative discourse coalition. As Brown (1999, p. 20) observes: “The formation of environmental NGOs is a response of civil society to the immobility of existing institutions and specifically to their lack of timely response to spreading environmental destruction”. In the case of aviation, organisations such as the GreenSkies Network (http://www.greenskies.org) and the Aviation Environment Federation (http://www.aef.org.uk) are good examples of broad-based networks. In addition, groups working on aviation issues at the local community level, such as the North Canberra Community Council referred to in the case study in Chapter 5, constitute critical “grass roots” components of an alternative discourse coalition as well.
In Chapter 4, and earlier in the current chapter, I also examined in detail the case of the UK Royal Commission on Environmental Pollution, to show how an official body with strong scientific credentials can influence policy reform. It too effectively forms part of a discourse coalition questioning growth-oriented aviation futures. The commission was instrumental in having a Radiative Forcing Index of 2.7 for aviation accepted by the UK Department for Transport and also Treasury (Royal Commission on Environmental Pollution, 2003a). This means that aircraft emissions have an effect about 2.7 times greater than from carbon dioxide alone, and therefore an enhanced climate changing impact when this factor is used in calculations. Moreover, the commission emphasises that there remains considerable uncertainty in scientific understanding and that the true value could be much larger (Royal Commission on Environmental Pollution, 2002b, pp. 14-18). As discussed in Chapter 3, the Australian Bureau of Transport and Regional Economics reports do not take this enhanced radiative forcing effect into account either, meaning that the effects of the greenhouse gas emissions from Australian aviation are considerably understated.

In the broader paradigmatic sense, a model of value here is one based on Kondratiev cycles. It is used to understand long-term economic changes in history, and suggests that each successive “long wave” of economic activity have been associated with substantial shifts in the use of resources, the nature of technology, and the organisation of society (Freeman & Perez, 1988). Five waves are used, spanning the “industrial revolution”, the early and later stages of industrialisation, and an emerging fifth wave linked to information technology. The changes in technology, especially for transport, and the underlying social values associated with the fourth and fifth waves of the model are shown in Table 6.1.

The fourth cycle based on mass production and the era of cheap oil is currently declining. The fifth cycle is now very much part of futures thinking, with information technology, a commitment to sustainability, and networking systems being key elements. In contrast with the growth orientation of the fourth cycle, decisions on technology and infrastructure such as airports are no longer considered as one-dimensional market-based ones (P. G. Laird et al., 2001). Rather, they are increasingly regarded as challenges to create better economies and communities, and better local and global environments (Newman & Kenworthy, 1999).
Table 6.1. The fourth and fifth “long waves” of economic activity based on Kondratiev cycles

<table>
<thead>
<tr>
<th>Wave</th>
<th>Time Description and main industries</th>
<th>Key factor</th>
<th>Business Paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1930s/1940s to 1980s/90s Golden age of growth and Keynesian full employment</td>
<td>Fordist mass production era Cars, trucks, tractors, aircraft, petrochemicals, fertilisers</td>
<td>Oil</td>
</tr>
<tr>
<td>5</td>
<td>Late twentieth century “global recession”—next wave of economic activity</td>
<td>Information technology (communication and control systems), environmental technology</td>
<td>IT and sustainability</td>
</tr>
</tbody>
</table>

In relation to the issue of how sustainable aviation visions and policies can demonstrate sustainable consumption practices, I argued in previous chapters that growth-oriented visions for aviation are integrally linked with economic growth and consumer capitalism. This is apparent in the globalisation of tourism, where airlines, travel agents, tour operators, international hotels, and leisure-based businesses form part of a web of complementary interests (Knowles et al., 2001). Thus airline passengers are encouraged to join frequent flyer programs with rewards related to distance travelled (Hanlon, 1999), and “fly-buy” schemes linked to credit cards underline the link between the consumption of both travel and non-travel items. Further I noted that consumer oriented developments at airports are substantial, with the presence of hotels, offices, shopping centres and leisure facilities. Shopping malls attached to airports have helped to embed shopping as a core ritual of tourism (Jansen-Verbeke, 1998), and non-aeronautical sources of income for airports worldwide are estimated to be about 46% of total airport revenues (Citrinot, 1999, p. 4).

Addressing these unsustainable consumption patterns and putting in place ecologically more benign infrastructures and lifestyles was discussed most specifically in considering futures visions and policy (Chapter 4). For example, delivery systems and logistics can be redesigned to minimise the distance travelled by goods and to promote
regional and local production instead. Similarly, tourism can be reframed to promote domestic tourism in place of international tourism, along with the improvement of the local environment and leisure facilities. Electronic networks can be increasingly used to build the links between people at community, national and international scales, while attention to quality of life factors and the autonomy of local “communities of place” can enhance the health of people and the biocommunities in which they live. In essence, a transition from laissez-faire, market led globalisation to an increasingly decentralised world based on smaller politico-economic entities and true participatory democracy is envisaged (Korten, 1999). This is indicated too in the underlying assumptions of the “fifth wave” of economic activity shown in Table 6.1.

I conclude this section with a summary of three broad central themes emerging from this inquiry, as shown in Figure 6.3. These themes are consistent with “the goal of social ecology … to remove hierarchy and domination from society, including the domination of people over nature” (Merchant, 1994, p. 9). In addition, they underline social ecology’s recognition “that it is our institutions of domination and hierarchy, especially embodied in the state and government, that block the possible liberation of nature and humanity” (Marshall, 1992, p. 423).

**Strengths and limitations of this study and future avenues of research**

My inquiry was a broad-based holistic one, drawing on literature from sociology, ecological economics, energy policy, tourism studies, transport geography, futures studies, environmental philosophy, and psychological and behavioural studies. Thus the conclusions are necessarily broad-based as well. However, the futures visions and specific policies outlined fit within a critical paradigm, and therefore challenge and question prevailing ideologies and structures. As I pointed out in Chapter 1, there is a dearth of work in this area in relation to aviation futures. My inquiry was geared towards critical debate and emancipatory knowledge, and especially in this sense adds to the body of knowledge about consumption and aviation futures, for example in a chapter included in a forthcoming book on causal layered analysis (May & Hill, in press).
1. My research challenges the dominant thinking that growth in the aviation industry is indisputable and good. The latter is reflected in “business as usual” assumptions linked to economic growth and global consumer capitalism. Alternative scenarios for aviation futures are presented in this thesis that recognise major ecological and resource constraints limiting such growth. Furthermore, the difficulty of any easy “technical fix” for air travel is acknowledged. Substantially reduced airport development, air passenger travel and air freight are assumed in ecological scenarios. A consideration of underlying values and metaphors also challenges consumer identities immersed in “hypermobile” and unsustainable lifestyles.

2. Theoretically, a broad range of policy measures implemented at various political levels, with demand management integral to the overall framework, is most likely to be successful in moving towards aviation futures compatible with ecological sustainability. However, the application of ecological frameworks is prevented by the dominant policy discourse of economic growth and the “predict and provide” approach to transport planning. There is a strong need for independent institutions such as policy bodies and “think tanks”—working in conjunction with community groups—to develop and promote policy discourses and futures visions that challenge the prevailing hegemony of the business-political nexus. In addition, pragmatic considerations such as a near to medium term decline in the supply of conventional oil, are likely to challenge the future viability of the aviation and tourism industries. Another likely important limiting issue is increasingly stringent climate change policy, which recognises the significant impacts of unchecked aviation growth.

3. My research supports the contention that there is a low public awareness of the ecological impacts of flying. This extends to businesses and policymakers as well. Further, even where environmental consciousness is high, other literature asserts that a variety of situational and infrastructural factors can influence behaviour in ways that overrule environmental concerns. In addition, as noted above, the difficulty of promoting pro-environmental behaviour in individuals is further compounded by the reluctance of liberal democracies to seriously challenge current consumption patterns. Effectively addressing this issue suggests the need for strategies that will really question habitual travel behaviours combined with the promotion of alternative policy discourses and futures visions as discussed above.

**Figure 6.3.** Three central themes emerging from this inquiry
Some may contend that my bias is too much towards an ecological framework and that the work does not sufficiently recognise the benefits that aviation has brought, such as facilitating international liaison and physical links between people across the world. I maintain, however, that the predominant trend favouring studies that are economically based, and which assumes that the ongoing expansion of aviation is inevitably desirable, suggests otherwise. It is true that the case study might have also included interviews with politicians, airport operators and airline representatives. I did pay attention to the perspectives of other players, however, by taking into account public statements and documents from them, as well as drawing on emails, letters and meetings linked to community based activity. The case study was useful in that it confirmed the contradictions apparent in the more theoretically based futures and policy related work. It served to ground in a concrete way the earlier insights obtained through trend analysis and futures critique, and demonstrated the difficulty of communities challenging the predominant business and government nexus.

As argued in Chapter 1, there is a need for much more work on this issue from a futures and policy perspective. How to boost the power of communities in challenging the dominant growth paradigm is a critical issue, particularly in terms of the competing demands on people often filling voluntary community-based roles. In addition, the question of how to build discourse coalitions questioning the current growth-oriented vision of aviation deserves further attention. This could be considered at local, national, and international levels. My inquiry also confirmed to me, both from personal experience talking to others over a four-year period, and from the research literature reviewed, the generally low public awareness of the ecological impacts of flying. Moreover, even where such awareness exists, competing priorities more often than not favour behavioural decisions that meet other needs.

More research on the best way for individuals to implement a “personal greenhouse budget”, especially in the context of aviation travel vis-à-vis other behaviours, would be useful. For example, it could be included as an addition to the TravelSmart program. Similarly, if politicians in key areas were better informed about these issues, could this significantly affect policy-making in relation to tourism, in a way analogous to the management of water following the recent severe drought conditions in Australia? Given the generally high priority given to environmental education programs in schools,
research on how to best incorporate greater awareness of issues linked to sustainable transport (and aviation in particular) would be another useful avenue of research. Ultimately, the question for debate (whether for politicians or school students) becomes one such as: What can individuals do to ensure that transport becomes more sustainable within their communities?

**Epilogue—visioning 25 years on**

The following story is based on the premise that anything that is created has to be imagined first, and uses an exercise for travelling through time (Adair, 2002, part II). It also draws on the work of Korten (1999, chaps 6, 14) and Spretnak (1997, chap. 5).

Today is a special day in the year 2029, when a group of us have gathered to share stories about what we especially appreciate and what inspires our spirits. It’s also a useful time to reflect back on the last 25 years—especially for helping with the task of making the local community and hence the whole society work better. Creativity is highly valued now, with people encouraged to solve their own problems, as well as contributing to the group’s creative thinking on personal, social and ecological issues.

Steve began. His interests are strong in community-based economics. He can recall how this approach gradually became part of the process of guiding community affairs as a replacement for the former globalised, industrial model. Things deteriorated significantly around the year 2015 when ecological feedback from the planet sent a clear and alarming message to everyone. Even back in the early part of the 21st century, people, not to mention insurance companies, were becoming more aware of the changing climate, with more intense storms and bushfires, and significant heat waves leading to an increasing number of deaths.

At that time the issue of ecological sustainability was still struggling for a place with governments and businesses, although their rhetoric at times sounded plausible. However, the fact is that societies in the rich world were still locked into an economic growth and globalisation model, with consumption a central feature. The domination of local communities by corporate bodies was profound, leaving communities feeling vulnerable. More often than not, corporations gave priority to shareholder interests over
the public good. For example, obesity became a significant problem in societies at that
time, with very significant impacts on people’s health. One reason was that food
companies used the political system, marketing strategies, and nutrition experts to
courage people to constantly “eat more” of their products. Likewise, the airlines and
tourism companies were encouraging more and more people to travel the world,
oblivious of the ecological consequences. Again, clever marketing promoted air travel
as a smooth, seamless part of everyday life, and meeting the demand for growth was
perceived as a “good” for economies by both business and governments.

As time moved on, however, the patently obvious ecological crisis and the fact that
people got sick of the corporate domination and the “tinkering” efforts by government
to address the big issues led to a grassroots demand for a better way of doing things.
“What’s different now and what I really appreciate”, said Steve, “is the focus on
ecologically responsible production processes with lots more local ownership and profit
sharing. The strong focus on local and regional community-supported organic
agriculture has not only meant a good supply of fresh fruit and vegetables to keep
people healthy. It means that the wasteful and energy-intensive way that food used to
be transported long distances from grower to our plates has been replaced by a much
more sensible way of doing things”.

Kerry chimed in to support Steve’s passion for the quality of life in the local region, but
also said how much she loved her voluntary exchange visits to other countries in order
to share friendships and the wonderful diversity of other cultures. One aspect she
commented on was the variety of music each culture produced. However, she felt OK
about the travel involved, as most long-distance travel is now by energy-efficient public
water and rail transport. This reduces its frequency but makes it more relaxed and
meaningful. “As people became more attuned to our impacts on the planet”, she said,
“it became obvious that ecologically damaging and frenetic long-distance air travel to
brief business meetings and the next international tourism resort could not go on.
Aircraft still run on jet fuel from oil, even if they do so much more efficiently than they
used to. However, with oil depletion now in full swing, it means that the costs of air
travel as well as its greenhouse gas impacts, dictate that it is infrequent, and reserved for
emergencies and high-level diplomatic exchange”. She went on. “To the extent one
sees advertising on travel, it emphasises the socially aware and ecological ways to do it,
just as they did with water conservation earlier in the century. Walking and cycling in town centres gets much higher priority than the use of powered vehicles, although light rail is obviously well patronised. And to make sure the embodied energy in fuel cell cars is used well, these are mostly hired out through the local collective”.

Of particular interest to David is the use of electronic networks to facilitate communications between people. “The use of videoconferencing and teleimmersion has really made communication across the globe wonderfully easy”, he said, “with collaboration on design between different groups being possible without the need for actual physical travel”. One of his strong goals is building global networks using information technology to link organisations, social movements, and individuals. “I love the region where we live”, he said, “but meaningful people-to-people communication and international cooperation on a whole range of civil society projects is really important too”.

Others commented on additional aspects important to them. Jane stated that for her, at the heart of the new culture was love of quiet reflection, care for the body, and creativity in and with nature. What had been a really pivotal shift in her view was the valuing of people as spiritual beings, with consumption being conscious, and an emphasis on “being” rather than “having” as central to the notion of society. Cedar emphasised her links with groups and the community. She puts in much of her time at the local food cooperative, an outlet for organic food where all the members put in some time towards its running and maintenance. A weekly community schedule there underlines how learning and empathy for other human beings and nature are now paramount. The various meetings and activities encompass a diverse range of areas such as ecological restoration projects, community business networks, choral and instrumental music groups, adopt-a-grandparent groups, and so on. With individual creativity flourishing, and environmental balance being given a central priority by society, it is not surprising that peaceful living was at last becoming a reality.

Everyone agreed that community-based economics, communities of place, spirituality, ecological sustainability, and sustainable approaches to areas such as transport and health were now strong defining characteristics. Thankfully, the old unsustainable ways
tied to economic growth, profligate consumption, corporate domination and money were no more.
(Reprinted with permission of the artist Martyn Jolly)
APPENDIX

Case study of Canberra airport—questions for interview

(stimulus questions as a basis for interactive dialogue)

Would you please describe how the airport group got off the ground, and what attracted you to it?

How important would you rank aircraft noise as an issue compared with other issues like safety, local air pollution and the greenhouse implications of expanding aviation?

(Prompts – personal experience of noise; noise, sleep and health; a curfew)

What are your views on the parts played by the Commonwealth and ACT Governments in the expansion of the airport and the management of aircraft noise?

Would you identify and elaborate on the three most important ways the airport group has effected change so far? Are there any others that were important? What has been achieved so far?

(Prompts – lobbying politicians; communication with the community; Noise Reference Group any value?)

In the March 2001 issue of “The Hub” the airport sets its activities within a globalisation framework, describing privatised airports as the gateways to cities. What is your view on this in comparison with community concerns about quality of life?

How effective, in your experience, is the noise complaint system for the airport and aircraft noise monitoring generally?

(Prompt - community perceptions of noise compared with ANEF?)

To what extent should there be a national framework for management of aircraft noise and to what extent should the details be decided locally?

(Prompts – institutional arrangements; legislation; environmental impact studies; who are the players?)

What would need to change at Canberra airport to have it as you would like it?

What have been the three most important lessons learned so far? Are there any others worth mentioning?
What issues are hindering change towards a better quality of life, in relation to the airport and its impacts, and what issues are helping such change?

Any other comments? (Prompt – land use issues around airports)

Age and occupation?
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