

Parliament of the Commonwealth of Australia

House of Representatives Standing Committee on
Environment, Recreation and the Arts

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HOUSE OF REPRESENTATIVES

**WORKING WITH THE ENVIRONMENT:
OPPORTUNITIES FOR JOB GROWTH**

November 1994

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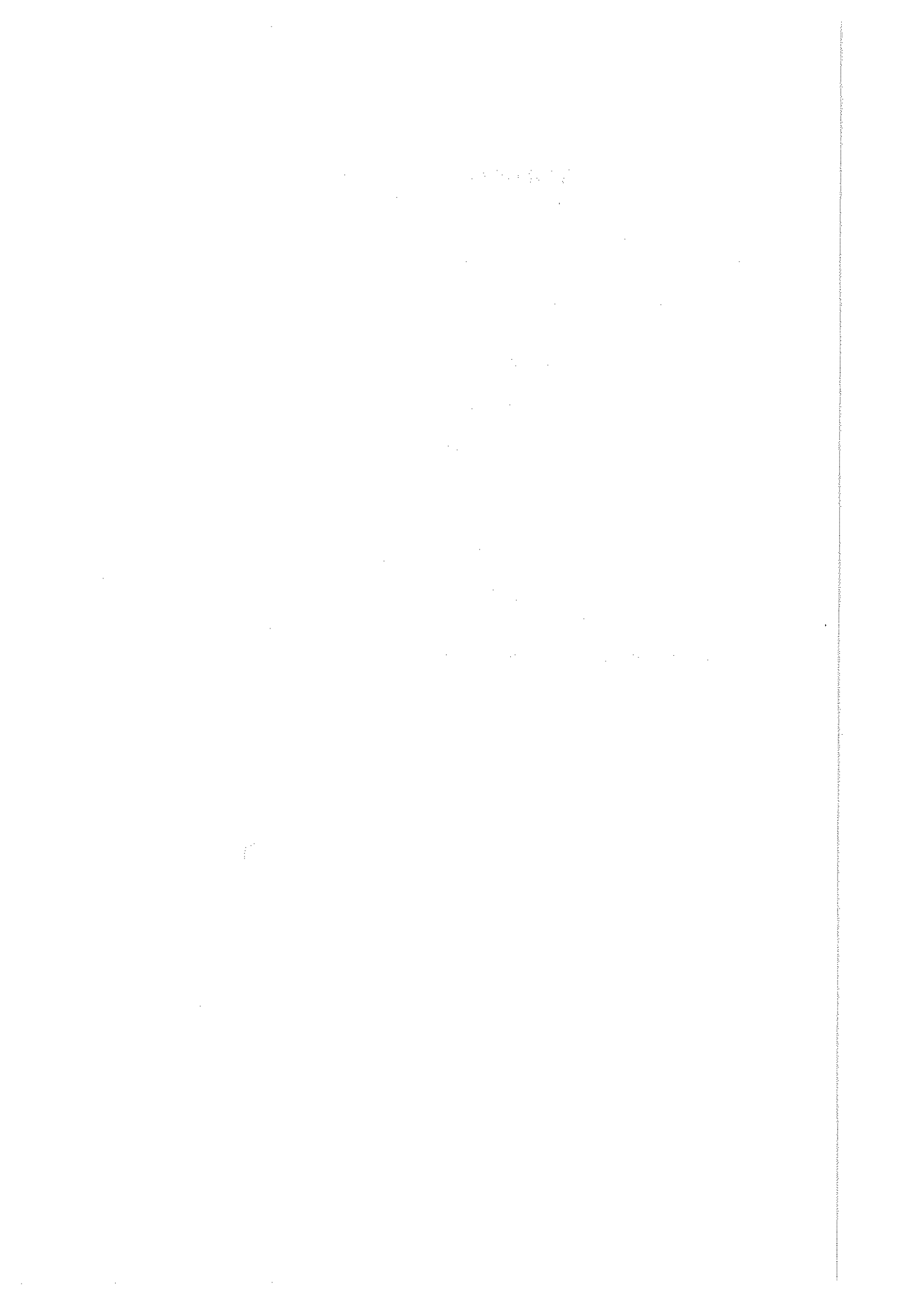
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TERMS OF REFERENCE

That, given the national commitment to environmentally sustainable development, the Committee inquire into and report on environmental and other policies which would contribute to increasing productive employment opportunities through environmentally sound technologies, processes and practices, including policies for:

- . avoiding and controlling pollution;
- . recycling, reprocessing and use of recovered materials;
- . increasing use of energy sources other than those causing carbon and other harmful emissions;
- . rehabilitating and restoring disturbed and contaminated sites;
- . environmental management including management of protected areas;
- . eco-tourism; and
- . sustainable industrial development strategies for industries such as agriculture, marine industries, forestry and manufacturing.

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PREFACE

This report arises from the growing recognition by governments, industry and the community that ecologically sustainable development offers many opportunities for profitable investment and therefore for employment growth, as well as being essential for ecological survival. The community is also faced with the pressing task of finding opportunities to create more jobs and the environment industry is an obvious place to look.

The inquiry was proposed to the then Minister for the Environment, Sport and Territories by the Committee and the Minister then formally referred the matter for inquiry to the Committee on 26 May 1993. It soon became apparent to the Committee from early discussions with industry and submissions received that the scope of the inquiry was very wide-ranging. The Committee also was aware of a number of recent and concurrent inquiries by other Parliamentary committees and the Industry Commission which covered some of the areas outlined in the terms of reference for this inquiry. The Committee also found the work of the ACF-ACTU Green Jobs in Industry Project of particular significance.

The Committee concentrated its resources on those components of its terms of reference which appeared to offer the best potential for sustainable employment. In particular, the Committee looked at what the Commonwealth Government could do to stimulate the growth of employment in the environment industry. As a consequence, the Committee did not consider the rehabilitation and restoration of disturbed and contaminated sites, nor did it inquire into sustainable industrial development strategies for the separate agriculture, marine, forestry and manufacturing sectors. Instead it considered policies which would stimulate cleaner production and waste minimisation in industry in general.

The inquiry generated a high degree of interest and the Committee was particularly impressed with the number and quality of the submissions received from industry associations and several State governments. The Committee also appreciated the opportunities to inspect a range of facilities in both metropolitan and rural areas ranging from wastewater treatment plants and manufacturing facilities to land regeneration and reforestation projects.

John Langmore
Committee Chair

ABBREVIATIONS

In the report, references to a 'State' or 'States' may be taken to include the Northern Territory and the Australian Capital Territory except where otherwise indicated.

ACCI	Australian Chemical Industry Council
ACEEO	Advisory Council on Environmental Employment Opportunities
ACF	Australian Conservation Foundation
ACIC	Australian Chemical Industry Council
ACTU	Australian Council of Trade Unions
AIDAB	Australian International Development Assistance Bureau
ANCA	The Australian Nature Conservation Agency
ANZECC	The Australian and New Zealand Environment and Conservation Council
ANZMEC	Australian and New Zealand Minerals and Energy Council
ATIA	Australian Tourism Industry Association
AUSTEMEX	Australian Environment Management Export Corporation
BPEM	Best Practice Environmental Management
CEDA	Committee for Economic Development of Australia
CFCs	chlorofluorocarbons
CSIRO	Commonwealth Scientific and Industrial Research Organisation
EMIAA	Environment Management Industry Association of Australia
EPA	Environment Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
ERDC	Energy Research and Development Corporation
DEET	Department of Employment, Education and Training
DEST	Department of the Environment, Sport and Territories
DIFF	Development Import Finance Facility
DITARD	Department of Industry, Technology and Regional Development
DPIE	Department of Primary Industries and Energy
HDPE	high density polyethylene
ILO	International Labour Office
IGAE	Intergovernmental Agreement on the Environment
LEAP	Landcare and Environment Action Program
EWMESS	Environmental Waste Management, Equipment Systems and Services

MSDS	Material Safety Data Sheets
NEMP	National Energy Management Program
NEPC	National Environment Protection Council
NPI	National Pollution Inventory
PVC	polyvinyl chloride
TRI	Toxic Release Inventory
RAPS	Remote Area Power Scheme
REEP	Regional Environmental Employment Program
UNEP	United Nations Environment Program
UNIDO	United Nations Industrial Development Organisation
WRAP	Waste Reduction Always Pays

SUMMARY

The Committee's report on the potential of environment policies to stimulate employment growth addresses two of the most important national issues facing Australia as we approach the year 2000. Unemployment is traumatic for those individuals and families affected, results in severe social dislocation and is a huge waste of the nation's skills and human resources. Australia's environmental problems, while nowhere near as severe as in many other countries, are a cause of increasing public concern. There is an urgent need for better coordinated and more effective action to deal simultaneously with environmental and employment problems.

National coordination of economic and environment policies

Until recently, measures aimed at protecting the environment were regarded in many sectors of industry and commerce as a threat to economic growth and employment. There is now, however, a growing consensus that only development strategies which take full account of environmental objectives are sustainable in the longer term. It is increasingly recognised amongst business, government and conservation groups that good environmental management can lead to increased business activity and creates productive jobs.

The environment industry is one of the fastest growing sectors of the global economy. Worldwide, the market for environmental goods and services is already larger than the aerospace market. While the world market for the pollution control and waste management sectors of the industry is expected to grow by at least five per cent per year, a much higher growth rate is forecast for South-east Asia which will provide substantial opportunities for Australian industry. Potential markets do not necessarily translate into business and jobs and it will be necessary for all levels of government in Australia to encourage the development of the environment industry by adopting economic and environmental policies aimed at increasing the industry's competitiveness.

Environmental degradation is a national problem, as is unemployment, and needs to be addressed on a national scale. Environmental policies should be pursued in an atmosphere of Commonwealth/State cooperation rather than confrontation, but there are signs that this cooperation may not always be readily achievable. The Committee is concerned, for example, that although the establishment of the National Environment Protection Council was agreed to by Heads of Government in 1992, legislation was only introduced into the Commonwealth Parliament in June 1994 and so far Western Australia has decided against participation.

Although the Commonwealth Department of Environment, Sport and Territories has the main responsibility for environmental matters, other Commonwealth government departments and agencies have responsibilities affecting the environment itself and the environment industry. The Committee identified a need for a high-level group to coordinate the environmental activities of departments and agencies with potential for employment creation.

Employment opportunities in the environment industry

The Committee found that there was potential employment growth within the Australian pollution control industry of at least 20 000 jobs by the year 2000 on the basis of OECD estimates. Taking a more expansive view, if Australia could capture only two per cent of the world market by 2000, some \$8 billion of business could generate 150 000 jobs.

There could also be job gains arising from the increased use of cleaner production techniques by industry but the extent cannot be quantified. The adoption of cleaner production technology will, however, assist in resolving the potential conflict between industrial growth and protection of the environment. The Commonwealth Government should increase its support and demonstrate the use of cleaner production technology in its own facilities.

The need for efficient and effective environmental regulation and its consistent enforcement was identified as a major factor if the potential of the environment industry is to be realised. Specific problems included excessive complexity, fragmentation, non-uniformity, ineffective monitoring and inconsistent enforcement of regulations. The Committee considers that a national approach to environmental regulation and the implementation of national or nationally harmonised standards should proceed without further delay. Environmental standards should also be more outcome oriented rather than process oriented. Innovative approaches using economic instruments rather than the traditional 'command and control' model of environmental regulation should be examined.

Environmental regulation would be greatly enhanced and the environment industry stimulated if community right to know legislation, one of the most effective ways of reducing pollution, is introduced in Australia. The Commonwealth Government should, in cooperation with the States and Territories, implement without delay the proposed National Pollution Inventory as a community right to know mechanism.

Several thousand jobs could be created through an increase in recycling, particularly from households. The major problem, however, is establishing sustainable markets for the recycled materials. The Commonwealth and State governments should examine the option of imposing mandatory contents of recycled material in specific products to establish stable markets. The pricing of landfill disposal to reflect its real costs, early resolution of matters relating to sales tax exemptions and purchasing preferences for recycled paper products, are measures which would encourage recycling as well as waste minimisation.

Measures to encourage the more efficient use of energy and the use of less polluting energy resources would create employment which would more than offset job losses resulting from the decreased use of fossil fuels. The technologies for achieving increased energy efficiency and utilising renewable energy sources are generally well known, but the challenge is to get them into the market place. It is necessary for the Commonwealth to take a leadership role by increasing its funding support, examining the scope for introducing innovative financing mechanisms and setting an example in its own facilities. A Commonwealth Government commitment to solar water heating in its housing stocks would provide a significant boost to the industry.

The use of ethanol produced from woody agricultural residues as an alternative transport fuel could provide significant new employment in rural areas, besides reducing greenhouse gas emissions. The development and demonstration of commercial technologies should proceed without delay. Development of a fuel ethanol industry to provide 10 per cent of road transport fuel needs would create well in excess of 10 000 jobs.

A tax on emissions of greenhouse gases or an energy tax in the form of a carbon tax could be introduced as a substitute for other taxes such as payroll tax which are a disincentive to employment. The substitution of a carbon tax for payroll tax could have net economic benefits for Australia but the evidence is not conclusive. The Committee therefore considers that this issue should be investigated in detail by the Commonwealth Government with a particular emphasis on the implications for employment.

The Landcare movement is considered to be one of the most significant and successful developments in natural resource conservation, but much remains to be done and its funding should be at least doubled over the next three years. The Committee is concerned that Landcare funding should not be used as a substitute for soil conservation funding by State governments. Additional funding should also be made available for the structured training of Landcare facilitators, coordinators and group leaders.

The Landcare and Environment Action Program, the Jobskills Program and the recently established Regional Environmental Employment Program are training and work experience programs administered by the Department of Employment, Education and Training. They all involve a substantial amount of conservation and restoration work. The Committee has concerns, however, about the availability of permanent positions for trainees, the possible displacement of permanent workers by trainees and the risk of Commonwealth program funds being used by local authorities to substitute for their own funds. The Committee considers that the environmental benefits of these programs should be regularly and closely monitored and that the issue of the possible displacement of permanent workers be investigated as a matter of urgency. The Committee also considers that should the Regional Environmental Employment Program prove to be successful, priority be given to it in allocating funding and resources. Consideration should also be given to extending the six month traineeships in those cases where the environmental benefits would be enhanced.

The establishment and maintenance of parks and reserves can be a significant contributor to local employment in rural and remote areas. This is another area where much work remains to be done and it is essential that additional funding and staffing resources be provided to adequately manage national parks and areas designated as World Heritage areas. Control of feral animals and weeds is labour intensive and the Committee suggests that funding for the Feral Pests Program be increased with priority for labour intensive projects. The Committee also supports continued Commonwealth Government cooperation with traditional Aboriginal and Torres Strait owners in the restoration and maintenance of their lands.

Ecotourism is a new and rapidly developing sector of the tourism industry. The problems emerging with the expansion of the industry are being addressed by a range of measures including the National Ecotourism Strategy. There is an urgent need for the Commonwealth, states and the industry to jointly develop an industry accreditation scheme. The pressure on national parks and World Heritage areas is increasing and it is imperative that sufficient funds be provided for their effective management. This will contribute substantially to employment growth in remote areas.

Need for a national strategy

The Committee concluded that a window of opportunity exists for Australia to develop and implement a range of environmental policies that will create sustainable employment and at the same time protect and restore our environment. The Committee considers that there is a need for the Commonwealth Government to assume a leadership role by developing a national strategy for the Australian environment industry which would identify opportunities to be pursued and constraints to be overcome.

The crucial issue is the mechanism through which this national strategy can be developed and implemented. There is a need for some kind of high level industry/government consultative and advisory body to formulate a broad national strategy for the development of all sectors of the Australian environment industry. The Committee suggests that the newly established Advisory Council on Environmental Employment Opportunities could be a suitable vehicle, but the charter of the Council and its membership would need to be expanded and sufficient resources provided for its effective operation.

RECOMMENDATIONS

- (1) that relevant Commonwealth Government policies and program initiatives aimed at promoting economic development, including industry and employment measures, should include a statement assessing their contribution towards sustainable development and protection of the environment. (*paragraph 2.24*)
- (2) that the Commonwealth urges the Government of Western Australia to accept the importance of comprehensive national environmental standards and, in the national interest, reconsider its position towards the establishment of the National Environment Protection Council. (*paragraph 3.24*)
- (3) that the Commonwealth Government establish a high level inter-agency coordinating group, chaired by the Secretary of the Department of the Environment, Sport and Territories, to raise the level of interdepartmental cooperation and consultation on environmental policies and programs with potential for employment creation. (*paragraph 3.33*)
- (4) that the Commonwealth Government establishes a high level group including representatives from the Department of the Environment, Sport and Territories, the Department of Industry, Science and Technology, the Department of Primary Industries and Energy and the Treasury to develop options for using fiscal measures to stimulate both cleaner production in industry in general and the development of the Australian environment industry. (*paragraph 3.46*)
- (5) that the National Procurement Board proposed by the Standing Committee on Industry, Science and Technology be established as a matter of urgency and that it then develops purchasing policies which require the inclusion of relevant environmental criteria in specifications and purchasing guidelines. (*paragraph 3.55*)
- (6) that the proposed National Procurement Board liaises with the States and local government authorities to develop and harmonise environmental criteria to be used in government purchasing. (*paragraph 3.55*)
- (7) that the Commonwealth Government through the Department of Industry, Science and Technology, Austrade and the Australian International Development Assistance Bureau significantly increases funding and staff resources to support the Australian environment industry in overseas markets, particularly those in the Asia-Pacific Region. (*paragraph 3.67*)
- (8) that the Commonwealth encourage the productive use of liquid wastes by continuing to provide assistance for trial projects. (*paragraph 4.27*)

- (9) that the Commonwealth Government through the Commonwealth EPA and the Department of Industry, Science and Technology in consultation with industry associations increases funding for the demonstration of the benefits to be obtained by industry from Cleaner Production to a minimum of \$5 million per year. *(paragraph 4.44)*
- (10) that the Commonwealth Government extends the use of Cleaner Production technology and practices in all its facilities and those operated by Commonwealth government business enterprises, including a requirement for annual reporting of progress on reducing discharges to the environment. *(paragraph 4.44)*
- (11) that national environmental standards should be outcome oriented (rather than process oriented), stringent and rigorously based on scientific grounds. *(paragraph 4.67)*
- (12) that where feasible the Commonwealth Environment Protection Agency develops and incorporates economic instruments within environmental regulatory regimes to provide clear positive incentives for compliance. *(paragraph 4.73)*
- (13) that within three years the Commonwealth Government implement a requirement that companies whose operations impact on the environment, and which receive significant government grant assistance or obtain major government contracts, obtain certification of their environmental management systems. *(paragraph 4.80)*
- (14) that Commonwealth and State Ministers responsible for the environment direct their environment agencies to collect and publish information on the effectiveness of monitoring and enforcement programs as part of the process of producing State of the Environment Reports. *(paragraph 4.84)*
- (15) that the Commonwealth move, in cooperation with the State and Territory governments, move as quickly as possible to develop and implement the National Pollution Inventory as a community right to know measure. *(paragraph 4.107)*
- (16) that the legislation establishing the National Pollution Inventory provide that compliance with mandatory public reporting requirements be made compulsory (except for commercial-in-confidence considerations) within three years of the enactment of the legislation. *(paragraph 4.109)*
- (17) that the legislation establishing the National Pollution Inventory require the provision of sufficient information for the public to be able to assess the environmental performance of particular sources of pollution. *(paragraph 4.109)*
- (18) that the proposed National Pollution Inventory apply to all Commonwealth government instrumentalities. *(paragraph 4.110)*

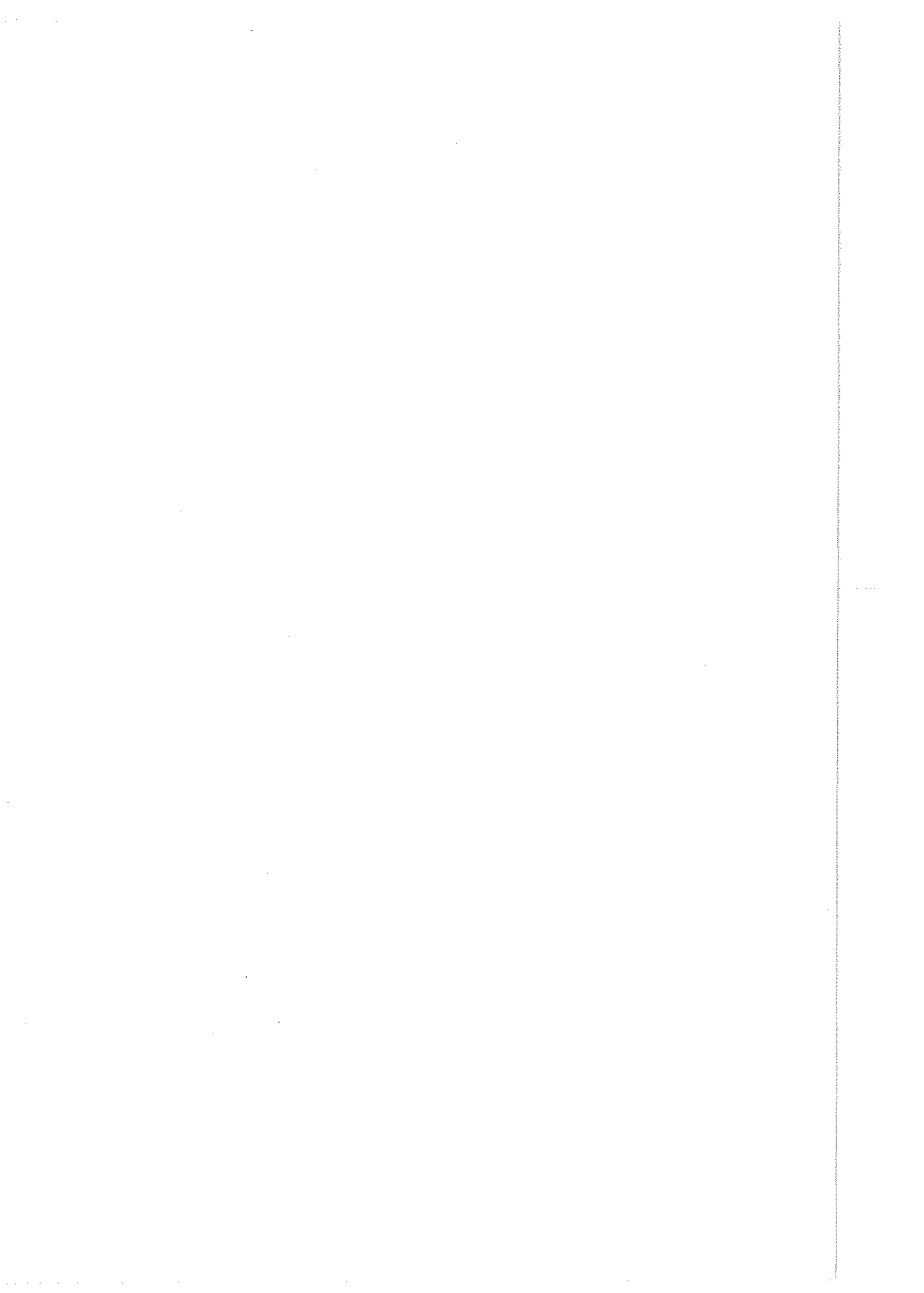
- (19) that the Commonwealth Government encourages State and Territory governments and local government authorities to implement the recommendations of the Industry Commission relating to the introduction of charging structures for landfill that are based on the user pays principle together with full cost recovery. *(paragraph 5.15)*
- (20) that to stimulate the market for recycled materials, the Commonwealth Government investigate the environmental, employment and economic costs and benefits of imposing a mandatory requirement for a minimum content of recycled material in specified products, and that it develop standards for the use of recycled materials. *(paragraph 5.37)*
- (21) that to stimulate the market for recycled products, the Commonwealth Government, in full consultation with industry and the community, investigate the environmental, employment and economic benefits and costs of exempting or reducing wholesale sales tax on specified products with a minimum content of recycled material. *(paragraph 5.42)*
- (22) that the Commonwealth Government rationalises existing programs aimed at the promotion of increased energy efficiency and the demonstration of renewable energy technologies. *(paragraph 6.27)*
- (23) that Commonwealth support for energy efficiency and renewable energy initiatives be coordinated through a high-level group to include the Department of Primary Industries and Energy, the Department of Industry, Science and Technology, the Department of the Environment, Sport and Territories and the Department of Transport. *(paragraph 6.27)*
- (24) that the Commonwealth Government in cooperation with the states;
- . develop a jointly funded scheme for modifying existing housing of low income earners, to increase energy efficiency and create employment; and
 - . encourage energy efficient design of new housing. *(paragraph 6.30)*
- (25) that the Commonwealth Government increase funding for the National Energy Management Program to at least \$10 million per year for the next three years with an increased focus on the industry sector and with job creation potential as one of the key factors in the allocation of funding. *(paragraph 6.32)*
- (26) that the Commonwealth Government, through the Department of Primary Industries and Energy, target reductions in energy usage in Commonwealth buildings and facilities of at least 25 per cent by 2000 based on 1992-93 usage, and report annually to Parliament on progress in energy saved, reductions in greenhouse gas emissions and savings in energy costs. *(paragraph 6.37)*

- (27) that the Commonwealth Government, through the Department of Primary Industries and Energy, implement a program to increase the application of renewable or less-polluting energy resources within its own agencies and business enterprises. *(paragraph 6.37)*
- (28) that the Commonwealth Government install solar water heaters in all new Commonwealth housing, such as Defence housing, and replace current gas and electricity units with solar systems wherever possible. *(paragraph 6.43)*
- (29) that the Commonwealth Government review the Commonwealth State Housing Agreement with a view to encouraging the states to install solar water heating in public housing wherever possible. *(paragraph 6.43)*
- (30) that the Commonwealth Government strongly support, promote and extend the development of third party financing schemes for solar water heaters such as the 'EnergyCard' scheme, including arrangements for consumers to meet repayments as part of their energy bills. *(paragraph 6.45)*
- (31) that the Commonwealth Government in cooperation with the states develop a jointly funded scheme to subsidise remote area power supplies using renewable energy technologies through the introduction of schemes similar to the New South Wales Government's Remote Area Power Supply Assistance Scheme as it applies to renewable energy sources. *(paragraph 6.49)*
- (32) that the Commonwealth Government provide financial assistance to State governments to support the construction of demonstration grid-connected wind farms on at least three sites within Australia. *(paragraph 6.52)*
- (33) that the Commonwealth Government, through the Department of Primary Industries and Energy, commit the available funding for the development and demonstration of technologies for the production of ethanol from woody and agricultural residues without further delay. *(paragraph 6.66)*
- (34) that the Commonwealth Government urgently develop an Australian Design Rule for motor vehicles, allowing ethanol compatibility in all new vehicles. *(paragraph 6.66)*
- (35) that the Commonwealth Government seek the cooperation of the Western Australian Government in undertaking a joint assessment of the feasibility of constructing a pilot tidal power plant in the Kimberley region to provide a basis for evaluating the prospects for the long term development of the resource. *(paragraph 6.70)*
- (36) that the Australian and New Zealand Minerals and Energy Council and the Australian and New Zealand Environment and Conservation Council without further delay implement the decision to investigate the pricing structures of the energy sector including environmental costs. *(paragraph 6.80)*

- (37) that the Department of the Environment, Sport and Territories, the Department of Primary Industries and Energy, the Department of Industry, Science and Technology and the Treasury jointly undertake a detailed examination of the issues associated with the introduction of greenhouse gas emissions or carbon taxation in Australia. The implications for industrial activity and employment of using the revenue from a carbon tax to reduce direct taxation on labour inputs should also be addressed in this examination. (*paragraph 6.91*)
- (38) that, as part of its undertaking to reduce greenhouse gas emissions, the Commonwealth Government through the Department of Primary Industries and Energy develop a National Renewable Energy Strategy, including the establishment of a Renewable Energy Commission to coordinate Commonwealth and State government action to implement the strategy. (*paragraph 6.96*)
- (39) that the Commonwealth Government incorporate the Renewable Energy Sources and Systems Research Strategy developed by the Energy Research and Development Corporation into the National Renewable Energy Strategy, and examines means by which its implementation could be hastened. (*paragraph 6.99*)
- (40) that in view of the scale of land and water degradation problems in Australia and the success and wide community acceptance of the National Landcare Program, the Commonwealth Government at the very least double its financial commitment to the Program over the next three years to a total of some \$200 million per year and that it allocates the main part of this increased funding to the community landcare component of the Program. (*paragraph 7.19*)
- (41) that Commonwealth funding under the National Landcare Program should only be directed to state government agencies subject to an unequivocal commitment by the agencies to use the funding to employ additional staff resources and be subject to regular reporting of the numbers of persons employed under the program. (*paragraph 7.23*)
- (42) that to help ensure the long term survival and growth of the landcare movement, additional funding be made available under the National Landcare Program for structured training of Landcare facilitators, coordinators and group leaders. (*paragraph 7.26*)
- (43) that Landcare Groups in drought affected regions currently eligible for Commonwealth assistance under exceptional circumstances provisions receive priority in funding allocation under the National Landcare Program. (*paragraph 7.29*)
- (44) that the environmental benefits of the Landcare and Environment Action Program, the Regional Environmental Employment Program and the Jobskills program be regularly and closely monitored and evaluated, and that environmental benefits and employment benefits of the Landcare and Environment Action Program and the Regional Environmental Employment Program be given equal priority. (*paragraph 7.40*)

- (45) that at least 25 per cent of the funding available under the Landcare and Environment Action Program, the Regional Environmental Employment Program and the Jobskills program be allocated for expenditure in those rural areas with unemployment significantly above the national average. (*paragraph 7.40*)
- (46) that should the Regional Environmental Employment Program prove to be successful in delivering significant employment and environmental benefits, priority be given to allocating resources to it from labour market environmental programs. (*paragraph 7.41*)
- (47) that the Department of Employment, Education and Training as a matter of urgency investigates whether trainees under the Landcare and Environment Action Program and the Jobskills program are displacing other workers in the environmental protection and regeneration industry and, if so, the extent of such substitution. (*paragraph 7.47*)
- (48) that the length of employment offered to Landcare and Environment Action Program, Regional Environmental Employment Program and Jobskills trainees on environmental projects should be extended beyond six months where their continued employment will significantly enhance the environmental benefits of the project by, for example, ensuring that projects are adequately maintained. (*paragraph 7.49*)
- (49) that the Commonwealth Government investigates the scope for it to support local government environmental projects either by coordinating Commonwealth programs, such as the Landcare and Environment Action Program, with local government environmental programs or by providing finance to supplement funds raised through environmental levies. (*paragraph 7.56*)
- (50) that in consideration of the employment and conservation implications of several of the major recommendations in the second report of the Committee's previous inquiry into biodiversity in Australia, the Commonwealth Government urgently respond to the recommendations of that inquiry. (*paragraph 8.12*)
- (51) that funding for the Feral Pests Program be increased to at least \$10 million per year and that priority be given to labour intensive projects. (*paragraph 8.20*)
- (52) that the Commonwealth Government continue to cooperate with traditional Aboriginal and Torres Strait owners in the restoration and maintenance of their lands by agreeing to continue the Contract Employment Program for Aboriginals in Natural and Cultural Resource Management, or another program with similar objectives, beyond 1994-95. (*paragraph 8.25*)
- (53) that the Commonwealth Government work jointly with the States and Territory governments, and with the ecotourism industry, to establish quickly a national ecotourism accreditation scheme. (*paragraph 8.52*)

- (54) that the scope of the Advisory Council on Environmental Employment Opportunities be extended to formulate a broad national strategy for the development of all sectors of the Australian environment industry, including education and training needs, and that additional and sufficient resources should be made available to the Council to undertake this task. Following the development of an industry strategy, the Council should consider the means by which the strategy can be implemented quickly.
(paragraph 9.25)



CHAPTER 1: INTRODUCTION

1.1 Two of the most urgent national priorities facing Australia are restoration of full employment and ongoing protection of our environment. Unemployment causes terrible personal suffering and severe social disintegration. It also involves a huge waste of resources for the nation. As the Prime Minister's Committee on Employment Opportunities stated in 1993:

Today the nation's number one priority is to find jobs for unemployed Australians ... The loss of production through unemployment is the greatest source of inefficiency in our economy. Unemployment is also the most important cause of inequality and alienation for families and communities. Full employment is the ultimate goal.¹

1.2 The huge personal, social and economic costs of unemployment and its cost to the nation were summarised by Langmore and Quiggin as follows:

Unemployment is the most destructive economic and social problem affecting Australia. In its various forms including overt unemployment, underemployment, hidden unemployment and long term dependence on social welfare it directly affects millions of Australian families. In its broader social consequences including family breakdown, crime, and the loss of social cohesion, unemployment damages everyone. Even in narrow monetary terms, the loss associated with unemployment is staggering, amounting to tens of billions of dollars every year. The huge costs of unemployment are one of the biggest obstacles to positive government action to address our social needs.²

1.3 The problems of unemployment are particularly severe in rural and remote Australia due to a large extent to the changing nature of the farming industry and its impact on rural employment. The main problems were outlined by the Anglican Social Responsibilities Commission of Western Australia:

Rural poverty is often overlooked, the poor in the bush are the hidden poor ... The traditional role of male farm labourer has largely disappeared and has not been replaced, this creates a range of pressures in families and communities ... The picture for young people growing up in rural Australia is bleak ... Young rural people who leave school to seek work are faced with an ever diminishing labour market. This is accentuated further if he/she does not want to leave their home town.³

¹ Committee on Employment Opportunities, Discussion Paper, *Restoring Full Employment*, December 1993, p 1.

² Langmore J and Quiggin J, *Work for All: Full Employment in the Nineties*, Melbourne University Press, 1994, p. 36.

³ Anglican Social Responsibilities Commission (WA), *Submission No. 25*, pp 3-5.

1.4 The Commonwealth Government's May 1994 White Paper on Employment and Growth recognised that economic growth is the best way of generating new jobs to meet the needs of an expanding workforce and to make inroads into unemployment. The Government is aiming at reducing the unemployment rate to around 5 per cent towards the turn of the century. The Government appears to recognise however, that relying on economic growth alone will not be enough and that other action will be necessary:

While economic growth is the key, waiting for growth alone will not suffice. To bring unemployment down more rapidly the Government will intervene directly to assist long term unemployed people, and those at risk of becoming long term unemployed. This, in turn, will increase the rate of economic growth that can be sustained.⁴

1.5 The pursuit of economic growth is not without problems, particularly in relation to protection of the environment. Economic development must be ecologically sustainable in order to ensure that the employment created is also sustainable in the longer term. In recent years investigations into ecologically sustainable development have shown that environment protection and economic development can be integrated. As the Prime Minister said in his Statement on the Environment in 1992:

Australia's natural environment is our greatest asset. It is the air we breathe, the water we drink, the soil in which we grow food. The environment provides us with nothing more or less than the basics of life.⁵

1.6 In December 1992, the Council of Australian Governments endorsed the National Strategy for Ecologically Sustainable Development. This strategy sets the scene for the broad changes in direction and approach that governments will need to take to ensure that Australia's future development is ecologically sustainable. The Committee saw an opportunity, through its inquiry, to look more closely at the issues involved, and to identify specific policy proposals which would create jobs and at the same time safeguard the environment.

Extent of environmental problems in Australia

1.7 The Committee examined the extent of the problems faced by Australia in controlling and alleviating environmental degradation, with the objective of identifying major problems whose remediation would provide opportunities for employment creation. An important development noted by the Committee is the increasing level of public concern expressed in recent years on environmental issues, particularly those involving air and water quality. These concerns have been stimulated by strong media coverage of incidents such as the toxic blue-green algae (cyanobacteria) bloom over some 1000 km of the Darling River in 1991 which resulted in the declaration of a state of emergency. Other areas of considerable public concern are the pollution of our beaches and inland waterways, and atmospheric pollution in our major cities.

⁴ *Working Nation*, White Paper on Employment and Growth, May 1994.

⁵ Prime Minister's Statement on the Environment, December 1992.

1.8 Following Australia's signing of the Global Convention on Climate Change in 1992, the need for Australia to take action to reduce emission of greenhouse gases has emerged as a major national issue which has led the Committee to consider the employment implications of strategies to reduce emissions, particularly measures to increase energy efficiency and the development of alternative energy sources.

1.9 The stabilisation and subsequent reduction of greenhouse gas emissions is possibly the most critical environmental issue on a long term basis. In December 1992, the Council of Australian Governments endorsed the National Greenhouse Response Strategy.⁶ A key element of the Strategy was agreement on the adoption of an interim planning target to stabilise greenhouse gas emissions, based on 1988 levels, by the year 2000 and to reduce these emissions by 20 per cent by the year 2005. While not a legally binding commitment, the interim planning target acts as a yardstick against which the implementation of greenhouse response measures can be assessed.

1.10 The Committee notes, however, that at the release of the Australian National Greenhouse Gas Inventory in September 1994, the Minister for the Environment, Sport and Territories admitted that Australia's greenhouse gas reduction commitment under the International Framework Convention on Climate Change would not be met. The Inventory stated that, by the year 2000, Australia's emission levels will rise to 610 million tonnes of carbon dioxide which will exceed its commitment to stabilise emissions at 1990 levels by 6.6 per cent, or 38 million tonnes. The main contributors to carbon dioxide emissions are the energy sector (67.19 per cent) and land use change and forestry (31.2 per cent).

1.11 The increasing public concern about the environment has been confirmed through surveys. A poll of households in Victoria in 1990 reported that some ninety per cent were concerned about water pollution and pollution caused by waste disposal. Over seventy per cent were concerned about the greenhouse effect and damage to the ozone layer.⁷ More recently a survey conducted in April 1994 by AGB McNair concluded that the environment as an issue of real concern to Australians has leapt 33 percentage points since 1986, from 25 per cent to 58 per cent of respondents. It was cited by ten per cent of respondents as a main concern. It is ranked fifth, ahead of poverty, wage levels/work conditions and inflation.⁸

1.12 The disposal of solid wastes in metropolitan areas as the availability of suitable landfill sites declines is another growing environmental problem. The Australian Bureau of Statistics estimated that, in 1989, local municipal councils collected nearly 13 million tonnes of solid waste, of which 96 per cent was disposed to landfill.⁹ In the Sydney region alone, the amount of solid waste was 3.75 million tonnes.¹⁰

⁶ Commonwealth of Australia, *National Greenhouse Response Strategy*, Canberra, 1992.

⁷ Australian Bureau of Statistics, *Australia's Environment: Issues and Facts*. Catalogue No. 4140.0, Canberra, 1992, p 324.

⁸ 'Crime's a major concern', *The Bulletin*, 10 May 1994, p 18.

⁹ Australian Bureau of Statistics, *Australia's Environment: Issues and Facts*. Catalogue No. 4140.0, Canberra, 1992, P 309.

¹⁰ Waste Recycling and Processing Service of NSW, *What do we do with it all?*, Sydney, 1992.

1.13 Rural Australia has as many, if not more, severe environmental problems as metropolitan areas. Apart from water quality problems, such as the well publicised blue-green algae occurrences, there are serious problems of land degradation, including salinity and erosion, and damage to the native environment from feral animals and plants. In the future more intensive animal husbandry and further processing of agricultural commodities will give rise to substantial quantities of additional wastes. Dr John Cole, Executive Director of the Environment Management Industries Association of Australia (EMIAA) summed up the position as follows:

More pertinent to the Australian debate remains the non-urban problems of land degradation, salinity and the deterioration of the inland river system. These problems are unseen by 90 per cent of the population, but they are crucial to our economic survival. ... With 17 million people and six cities, our biggest problems are in the Murray-Darling and places like that.¹¹

1.14 While Australia's environmental problems may well be less severe than those in most other industrialised countries (because population density is lower), the Committee is of the strong view that there is no room for complacency or any relaxation in our efforts to protect and preserve our unique environment. On the contrary, at our present stage of development, the opportunity exists to ensure that the principles of ecologically sustainable development are recognised and implemented in all major policy initiatives relating to economic development and employment.

Recent reviews, inquiries and initiatives

1.15 A number of other reviews and inquiries which were relevant to the scope of the inquiry were either underway at the same time the Committee was conducting the inquiry or had recently been completed. An initiative which was particularly timely and relevant to the inquiry was the Green Jobs in Industry Research Project which was launched in early 1993. This project is a joint effort of the Australian Conservation Foundation (ACF) and the Australian Council of Trade Unions (ACTU) with financial support from the Office of Labour Market Adjustment which is an agency of the Commonwealth Department of Employment, Education and Training (DEET). The project conducted a survey of five targeted environment industries. The results of the survey were published in the 'Green Jobs in Industry Research Report' of May 1994 and a summary of the findings was published in the report 'Green Jobs in Industry' released in October 1994. To some extent this project paralleled the Committee's work and many of its findings are similar to those reached by the Committee. The Committee acknowledges the significance and usefulness to the work of the inquiry of the ACF-ACTU project and other initiatives which included:

- . Inquiry into Waste Disposal by the Senate Standing Committee on Environment, Recreation and the Arts which reported in September 1994;
- . Inquiry into Water Resources - Toxic Algae by the Senate Standing Committee on Environment, Recreation and the Arts which reported in December 1993;

¹¹ Evidence, Dr John Cole (EMIAA), Canberra, 15 November 1993, pp 311, 313.

- . A review, 'Jobs and the Environment' by the Fibre Processing and Sustainable Development Jobs Council of Victoria which reported in August 1992; and
- . Inquiry into Environmental Waste Management Equipment, Systems and Services by the Industry Commission which reported in September 1993.

1.16 In July 1994, the Commonwealth Government established the Advisory Council on Environmental Employment Opportunities (ACEEO) in recognition of the opportunities for the creation of green jobs. The Council has an industry focus and its membership was selected on the basis of personal expertise and a strong commitment to employment, environment and regional development. At its inception Mr Simon Crean, the Commonwealth Minister for Employment, Education and Training stated that:

The Government wants the Advisory Council to specifically identify long term prospects for employment growth in the environmental industries, encourage the take up of environmental traineeships and provide an industry oriented mechanism for consultation and cooperation between the various stakeholders on potential projects.¹²

1.17 The Committee sees the establishment of ACEEO as timely. However, as the Committee soon became aware during the course of the inquiry, the environment industry is wide-ranging and extremely diverse. As a consequence the Committee considers that the Advisory Council will need to focus on the main opportunities which can be developed quickly. It is hopeful that the findings of this inquiry will prove to be of considerable assistance to the Advisory Council.

¹² Joint Statement by Commonwealth Ministers for Employment, Education and Training and Environment, Sports and Territories, 'Promoting Green Job Opportunities', 21 July 1994.

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CHAPTER 2: ENVIRONMENTAL POLICIES AND EMPLOYMENT

Employment and the environment - a new paradigm

2.1 There is an urgent need for a paradigm shift in society's attitude towards employment and the environment. Until recently, the debate about environment and employment has tended to focus on perceived conflicts. Sectors of industry exhibited a siege mentality, emphasising negatives such as possible job losses and plant closures. They feared that industry's competitive position would be eroded by extra costs incurred for environmental reasons or if ready access to low-cost resources was restricted in any way. However, it has been increasingly recognised that only development in harmony with the environment can contribute to sustainable economic growth and thus to permanent long term employment creation. It has also been found that attention to environmental concerns provides opportunities for industry to become more efficient and promotes growth in those sectors involved in providing environmental goods and services.

2.2 The nexus between environmental policies and economic growth and employment is a critical factor in considering changes to environmental policies to stimulate employment. There is also a growing consensus that the high rates of growth in the industrialised countries during the past few decades were to a significant extent at the expense of the environment through the depletion of natural resources and increased environmental degradation. As Professor Adrienne Clarke, Chairman of CSIRO, has stated:

For most of this century, many nations behaved as if the environment had an unbounded capacity to absorb industrial pollution, and as if environmental damage was the unavoidable price to be paid for economic development, one that could be ignored indefinitely. We now know differently - witness the acidification of lakes in Scandinavia and North America, the destruction of Europe's conifer forests and the corrosion of historic buildings by acid rain, the catastrophic loss of stratospheric ozone caused by CFCs and the enormous cost involved in changing over to refrigerants and solvents that reduce ozone damage.¹

2.3 There is no doubt that economic growth based on environmental degradation can no longer be sustained without endangering our very survival. The only alternative paradigm is for development strategies to fully integrate environmental protection strategies so as to be sustainable in the long term. The new paradigm may best be summed up by the Canadian Committee on Future Directions of the Union:

In the long run, the real choice is not jobs or the environment. It's both or neither. What kind of jobs will be possible in a world of depleted resources, poisoned water and

¹ Clarke A E, *Application of Technology for Clean Production, paper presented to conference, 'Economic Growth with Clean Production', CSIRO, Melbourne, February 1994.*

foul air, a world where ozone depletion and greenhouse warming make it difficult even to survive?²

2.4 Ecological harmony is now a global imperative. Rapid adoption of environmentally responsible forms of economic activity and social organisation are essential, and recognition of the importance of this requirement is spreading widely through communities and their representatives in government. The essential issue is how the imperatives of environmental responsibility and sustainable productive employment can be combined. Both imperatives should be kept at the centre of national aspirations, and policies and practices at all levels of government, industry and commerce should be formulated to achieve these aims.

2.5 A critical issue which the Committee examined is whether, on balance, environmental policies are likely to result in a net increase in employment. Considerations include whether additional care for the environment is likely to lead to additional work, the extent to which environmentally sound technologies are more labour-intensive than conventional technologies and the opportunities for the Australian environment industry to develop export markets.

2.6 The timing of the introduction and implementation of environmental policies in the business cycle is an important factor. At the present stage of Australia's economic recovery there are clear indications that business investment has started to grow. This provides an opportunity for governments to ensure that economic growth proceeds in an ecologically sustainable manner. As the Department of the Environment, Sport and Territories (DEST) suggests:

It is at the bottom of the business cycle, where new directions for investment can best be set. As the economy begins to grow, many firms make major investments in new capital. If governments signal markets about new environmental requirements before investment decisions are made, businesses and consumers can incorporate the appropriate environmental standards in their normal investment decisions. This will greatly reduce the cost of environmental management. Environmental standards imposed in the middle of the business cycle can impose additional costs to update existing capital and works.³

2.7 The Committee considers therefore that it is critical that the objectives of employment growth and sustainable development be pursued in an integrated manner consistent with the achievement of both objectives. A significant opportunity exists at this stage of Australia's economic recovery to pursue policies to achieve this.⁴

2.8 Success in attaining the two ideals of employment growth and environmentally sustainable development in Australia will only result from a concerted effort by Commonwealth, State and local governments in providing encouragement to the private sector to develop and exploit markets. This involves the establishment of a legislative climate conducive to investment in environmentally sustainable processes and products.

² Report of the Canadian Committee on Future Directions of the Union.

³ DEST, *Employment and ecologically sustainable development*, submission to the White Paper on Employment, Canberra, March 1994. p. 10

⁴ *ibid*, p 2.

Overseas experience

2.9 The issue of whether policies aimed at protection of the environment create or destroy jobs and whether there is a trade-off between the environment and jobs has been a vexed and controversial issue, particularly in relation to jobs in manufacturing industry. There is no conclusive evidence either way but there is a strong indication that the costs of meeting environmental regulations may not be as great as sometimes stated and that the benefits for employment are greater than has generally been recognised. Environmental compliance costs of OECD based companies are reported as rarely exceeding two per cent of sales income.⁵ A study conducted by the International Labour Office (ILO) in 1992 found that empirical evidence on the employment impact of environmental measures is very scarce even in the developed countries. The macro-economic, sectoral and micro-economic studies that have been carried out have been based on weak methodology and questionable assumptions. The ILO nevertheless concluded that:

At the national level, as a result of environmental policies and measures, employment may be affected in several ways. First, additional jobs may be created in the new industries which manufacture pollution control equipment and devices (eg filters, recycling equipment, precipitators, cooling towers, water treatment components). Jobs may also be created through software associated with licensing and consulting services and the dissemination of pollution control technology. ... But such gains in employment are likely to represent only a small fraction of total employment.

Secondly, positive employment effects are also likely to accrue from the growth of economic activities which are environment-compatible i.e. renewable energy and recycling, which tend to be labour intensive. ... But this gain has to be set against the loss in industries being phased out.

Thirdly, there are negative employment implications through the closure of polluting plants and industries, through the ban on polluting products such as certain packaging materials, and through a rise in product prices leading to a decline in demand, output and employment. However, these negative employment effects in the short term may be more than offset by positive growth in the long term.⁶

2.10 A recent review of the impact of environmental policies and legislation on the US economy and job market has reached similar conclusions to those of the ILO. The review concluded that anecdotal examples could be quoted to prove almost anything and that econometric simulations were inconclusive. Empirical studies indicated a positive relationship between environmental protection and economic growth:

Empirical studies comparing the stringency of environmental legislation with measures of economic growth and job creation for the US States unanimously reject the hypothesis that there is a negative relationship between environmental protection and economic growth. In fact, when statistically significant relationships are found, they are invariably

⁵ Lash W H, *Environment and global trade*, Social Science and Modern Society, Vol. 31, No. 4, May/June 1994.

⁶ Bhalla A S, *Environment, Employment and Development*, International Labour Office, Geneva, 1992, pp 161-2.

positive in that the US States with more stringent environmental regulations show the best economic performance.⁷

2.11 The spectre of massive plant closures and layoffs as a result of increasingly stringent environmental regulatory regimes is at times raised in the jobs versus environment debate. Evidence on this linkage is limited but the ILO has stated that environmental pressures have speeded up the ongoing structural adjustment process:

... evidence in industrialised market-economy countries suggests that adverse employment effects of plant closures have been very limited. Plants that allegedly closed for environmental reasons were mostly small, old and marginal, and probably would have closed anyway. In many instances, environmental regulations simply accelerated the timing.⁸

2.12 The ILO went on to recognise, however, that plant closures are only part of the environment/employment linkage:

The adverse effects on employment may have been greater in cases where plants did not expand or could not be built at all because of environmental regulations. Unfortunately, almost no data are available to measure such effects in the past, nor to help predict potential repercussions in the future.

2.13 Recent research on the links between economic growth and the environment has suggested that economic growth does not necessarily continually damage the environment. US economists Gene Grossman and Alan Krueger examined the relationship between income per head and four types of environmental indicators, namely concentrations of urban air pollution, measures of the oxygen in river basins, concentrations of faecal coliform in river basins and concentrations of heavy metals in river basins. They found no evidence that the environmental quality of any of these measures deteriorates steadily with economic growth. Rather, for most of these indicators, economic growth brings an initial phase of deterioration followed by a period of improvement. The most likely explanation for this conclusion is political: as nations experience greater prosperity, their citizens demand more stringent environmental standards and as these are achieved, environmental damage is reduced. However, this still leaves a legacy of existing deterioration.⁹

2.14 The Committee notes that it is apparent that several of the developing countries in the Asia-Pacific region are nearing the end of the environmental deterioration phase of economic growth. These countries are now aware of the environmental degradation which has occurred during the period of rapid economic growth and industrialisation, and their economies are strong enough to undertake substantial remedial measures.

⁷ Bezdek R H, *Environment and Economy, What's the Bottom Line*, Environment, Vol 35, No 7, September 1993, pp 7-32.

⁸ *Environment and the World of Work*, Report of the Director-General to the International Labour Conference, 77th Session, 1990, International Labour Office, Geneva, pp 40-41.

⁹ 'Beating pollution with plump purses', Age, August 1994.

Australian experience

2.15 In Australia there is a similar range of views on whether more stringent environmental protection creates or reduces employment, particularly in the manufacturing sector whose conventional view in past years was that more stringent environment regulations inevitably resulted in increased costs, loss of competitiveness and job losses. This view would still be true for inappropriate or inefficient regulations. The Australian Chamber of Manufactures has expressed concern over the wider implications of environmental regulation on manufacturing costs:

Manufacturers bear significant costs in complying with environment regulations, including discharges to air, water and land, for noise control, solid and liquid waste management and so on. Before introducing new policies, account needs to be taken of these compliance costs which are borne by manufacturers and the need to balance environmental goals with technical, economic and social objectives (such as employment).¹⁰

2.16 On the other hand inadequate and inefficient environmental management can also add to industry's costs. The Chamber of Manufactures of NSW addressed this issue:

It generally follows that pollution, of all forms, results in product lost or wasted and occurs in consequence of inefficient manufacturing processes. ... There is, necessarily, considerable financial incentive to implement pollution abatement programmes. These programmes can range from the basic housekeeping type of improvement to the introduction of more sophisticated measures that result not only in reduced pollution, but reduced use of resources and generation of waste, together, significantly reducing total operating costs.¹¹

2.17 There is a growing view amongst business, government and conservation groups that good environmental management can lead to increased business activity and sustainable employment. This will in many cases result in a win-win outcome as suggested by the South Australian Government:

Australian manufacturing industry is faced with the dual challenges of international competitiveness and community demands for a cleaner environment. Cleaner production involves the introduction of technologies, processes, practices, and product design that can minimise waste, improve efficiency and provide environmental benefits to the community and substantial financial reward to the company.¹²

2.18 This positive outlook was supported by DEST which highlighted the financial benefits which could occur from cleaner production:

... while it may be true that firms initially must pay more for technologies which meet stringent environmental standards, investment in environmentally preferred technologies can yield cost-savings, often in the very short term. Many cleaner production techniques can be very cost-effective, with pay back periods often less than one year.¹³

¹⁰ Australian Chamber of Manufactures, *Submission No. 91*, pp 7-8.

¹¹ Chamber of Manufactures of NSW, *Submission No. 90*, p 4.

¹² South Australian Government, *Submission No. 97*.

¹³ DEST, *Submission No. 85*, p 4.

Need for the Commonwealth to recognise employment/environment linkages

2.19 There is a clear need for Commonwealth policies, particularly those aimed at stimulating economic growth and employment, to recognise and adjust to the new paradigm that sustainable development creates jobs. The Committee notes that the Commonwealth Government's White Paper on Employment and Growth of May 1994 did not address, in any depth, the issues of sustainable development or the linkages between employment and the environment. The White Paper however, recognised that environmental sustainability was one of the characteristics of those firms which the industry development policies aimed to assist to become innovative and internationally competitive. Specific initiatives on the environment announced in the White Paper included the Environmental Policy and Research Program, aimed at ensuring that environmental objectives are met at minimum cost to industry, and programs to improve water supply and drainage in rural areas.

2.20 An example of a successful Commonwealth Government activity which clearly links the environment, economic growth and employment is the 'Clean and Green' image being promoted overseas for Australia's agri-food industries. Consumer demand for clean fresh food has forced new approaches to environmental management as well as the development of new technologies. Australia's annual food sales total about \$30 billion of which more than a quarter is exported. Australia's clean image could, however, easily be discredited, with serious effects on the economy of rural Australia, if environmental standards are not maintained. As the then Commonwealth Minister responsible for the environment stated in February 1994:

Clean food cannot be nurtured by dirty water, polluting chemicals or nuclear accidents - as many overseas suppliers have found out.¹⁴

2.21 On the basis of the above views and reports of overseas experience, the Committee concurred with the view of DEST that:

Meeting environmental objectives need not limit the potential for job creation: indeed, in many situations these goals can be achieved in a cooperative and complementary way.¹⁵

2.22 It is important to recognise that there can be losers as well as winners from environmental policies. Although there can be net job gains on a national scale, the disruption to individuals and local communities from plant closures can be traumatic. From a social justice viewpoint, suitable retraining and adjustment assistance should be readily available to those affected.

¹⁴ Hon. Ros Kelly MP, Opening Address, Conference on Economic Growth with Clean Production, CSIRO, Melbourne, February 1994.

¹⁵ DEST, *Submission* No. 85, p 2.

2.23 It is clear that there is a strengthening linkage between jobs and protection of the environment. The new paradigm is that sustainable development can deliver economic development with the creation of long term productive employment. Employment initiatives should therefore take account of their environmental impact and, correspondingly, environmental policy initiatives should include consideration of their employment creation potential.

2.24 The Committee recommends:

- (1) that relevant Commonwealth Government policies and program initiatives aimed at promoting economic development, including industry and employment measures, should include a statement assessing their contribution towards sustainable development and protection of the environment.

The Environment Industry

2.25 The environment industry is very diversified. It spans a variety of industries and services which traverse a number of standard industry classifications in a manner similar to the tourism industry. Before considering the employment potential of the industry it is first necessary to determine what is meant by the term 'environment industry'. At present there is no precise definition of the industry or statistical classification of its products and occupations. For the purpose of this inquiry, however, the Committee followed an approach similar to that adopted by the Victorian Fibre Processing and Sustainable Jobs Council in a study on employment possibilities in the environmental sector.¹⁶ The Committee considered the environment industry to comprise those activities which make a positive contribution to ecologically sustainable development. These activities should enhance the quality of natural resources available to future generations and should also aim to provide solutions to the adverse affects on the environment brought about by human activity.

2.26 There is a wide range of views on the scope of the environment industry. The OECD has taken a relatively narrow view, confining the environment industry to basically pollution control and waste management and comprising companies producing pollution abatement equipment and a range of services for environmental protection and management.¹⁷

¹⁶ *Jobs and the Environment*, Report of the Victorian Government's Fibre Processing and Sustainable Jobs Council, August 1992.

¹⁷ *The OECD Environment Industry: Situation, Prospects and Government Policies*, OECD, Paris, 1992, p 5.

2.27 Several submissions to the inquiry adopted a broader perspective. For example Senator Dee Margetts proposed a wider view, submitting:

... in considering the issue of environmental policies and employment, that the terms of reference should be considered in their broadest aspect... environmental considerations must enter into the assessment of all employment. Virtually all jobs must become green jobs.¹⁸

2.28 The New South Wales Coal Association expressed a similar view in a different way:

In the context of sustainable development, virtually all jobs are 'green' jobs. Every industry and area of employment will endeavour to change in a way which improves compliance with sustainable development concepts, even though change may be slow and irregular in some cases. We should therefore not try to single out certain jobs as 'green' or 'environmentally friendly' as this risks a misallocation of resources. Rather, we should seek policies which 'green' all employment.¹⁹

2.29 The EMIAA has a similar view, recognising that in many cases environment management is increasingly part of just about every other industry:

While environment management is a value that should be part of every endeavour it has only recently emerged as a major issue. This concern has come about through a quadrupling of economic output and virtual doubling of population since 1945 which has impacted so adversely on the planet that environmental pressures can be ignored no longer by governments, industry, communities and individuals. Concomitantly technical advances in measurement, in global perspective (satellite imagery) and in communications had meant an ever growing awareness at all levels, from individuals to world bodies, of our planet, its fragility and its degradation.²⁰

2.30 The South Australian Government pointed out that environment industries cover a diverse range of activities extending far beyond the pollution and waste management areas to include the sustainable economic use of and development of Australian native fauna and flora and the development of environmentally friendly products such as phosphate free detergents and non-chlorinated solvents.²¹

2.31 The Committee did not attempt to resolve this definitional issue and considered that there was little to be gained by involvement in a protracted academic debate on which particular industries may or may not be classified as environment industries. The EMIAA has taken a similar view, a submission to the Industry Commission inquiry into Environmental Waste Management, Equipment Systems and Services (EWMESS) stating that:

¹⁸ Senator Dee Margetts, Greens (WA), *Submission No. 73*, p 1.

¹⁹ New South Wales Coal Association, *Submission No. 92*, p 5.

²⁰ Submission of EMIAA to Industry Commission Report No. 33, *Environmental Waste Management Equipment, Systems and Services*, 1993, p 9.

²¹ South Australian Government, *Submission No. 97*, p 8.

... definition of the industry in itself is not an outcome of real moment ... Definition and understanding of the 'drivers' (and consequences) of demand for environment management goods and services is far more relevant, because the drivers are the engines of growth for the EWMESS sector.²²

2.32 Environmental management is a crucial part of all employment and business activity. For the purpose of this inquiry the Committee decided to adopt a flexible approach focussing on those particular activities within each of the components of its terms of reference where environmental policies were perceived to have the potential to create employment.

2.33 During the course of the inquiry it soon became obvious to the Committee that environmental policy issues could not be separated from economic policy considerations. This is particularly applicable to Australia's environmental goods and services industry whose further growth into export markets will depend to a large extent on economic factors both overseas and in Australia. The Committee therefore considered economic factors affecting employment in the environment industry as well as environmental policies. Evidence to the Committee suggested, however, that stringent environmental regulatory regimes in countries such as Japan, Germany and Denmark had stimulated the development of those countries successful environment industries.

2.34 An assessment of the number of jobs in the Australian environment industry depends on the definition of the industry and on data which is not specifically collected. The ACF-ACTU Green Jobs Unit has estimated that core environment industry employment could be between 200 000 and 400 000.²³ The Committee considers that assessing the number of existing jobs in the industry, in whatever way the environment industry is defined, is less important than examining ways and means of stimulating future growth.

2.35 A number of studies have examined the job-creation potential of business expansion in general. Studies undertaken by the National Institute of Economic and Industry Research suggest that each \$100 million in export expansion or import replacement will generate a total of 2000 additional jobs in Australia.²⁴ A recent study prepared for the Industrial Supplies Office of Queensland indicates direct and indirect employment of 3120 person-years per \$100 million of successful new or retained business in Queensland.²⁵

2.36 The Australian Chamber of Manufactures also quoted similar levels of potential job creation:

Research has shown that each \$1 million of new or retained Australian manufacturing can be expected to produce an average of 30 jobs for one year through its direct and

²² EMIAA, Supplementary Submission to Industry Commission EWMESS Inquiry.

²³ ACF-ACTU Green Jobs Unit, Green Jobs in Industry, Research Report, May 1994, p 9.

²⁴ Submission of EMIAA to Industry Commission Report No. 33, *Environmental Waste Management Equipment, Systems and Services*, 1993.

²⁵ Jensen R C, *A Study of the Economic Indicators used by the Industrial Supplies Office of Queensland*, University of Queensland, 1992.

indirect effects.²⁶

2.37 The growth of an industry as diverse as the environment industry could be expected to create similar levels of new employment opportunities. On the basis of the above studies, it would be reasonable to conclude that in the environment industry at least 2000 new jobs for one year would be created for every \$100 million of additional business. Estimates of future growth of the environment industry are highly speculative and depend again on how the industry is defined and future environmental policies and regulations. Strong growth is nevertheless forecast. Australian National Industries has reported that a study conducted by Bain and Co in 1992 estimated that Australia's environmental services industry would grow to \$6 billion by the year 2000. The OECD forecast in 1992 that the Australian environment industry will grow by 4.4 per cent from \$2.7 billion in 1990 to \$3.8 billion by the year 2000. The Committee notes that, even considering the lower OECD estimates of growth for the environment industry based on its narrow definition of the industry, some 22 000 new jobs would be created.

²⁶

Australian Chamber of Manufactures, *Submission No. 91*, p 2.

CHAPTER 3: THE ROLE OF THE COMMONWEALTH

3.1 As with other sectors of industry, a major role for government in relation to the environment industry should be to encourage and facilitate the private sector to take full advantage of emerging opportunities. An essential pre-requisite is a commitment from the Commonwealth Government to recognise the potential of the environment industry and to develop policies which provide the regulatory framework within which the private sector can confidently pursue business opportunities and undertake the necessary capital investment and staff training.

3.2 To meet this challenge and realise this potential it is necessary for all levels of government to encourage the sustainable growth of the industry by adopting economic and environmental policies aimed at increasing its competitiveness and removing impediments. Although it would not be realistic to expect the industry to generate large numbers of jobs in the short term, the Committee considers that its steady sustained growth will, without doubt, provide significant employment opportunities in the longer term.

Need for government intervention

3.3 A number of measures which could either assist the development of the environment industry or remove impediments to its growth were proposed to the Committee. Several of these measures relate to economic policies rather than environmental policies but in view of the increasing inter-relationship between economic and environmental policies they were considered by the Committee as being within the scope of the inquiry. A number of measures apply right across the environment industry while others are applicable only to particular sectors of the industry. Many of the problems identified fall outside the direct responsibility of the Commonwealth Government but were, nevertheless, considered by the Committee if they had implications for job creation.

3.4 What the industry wants from governments is essentially a business climate with stability, an opportunity to compete on equal terms with imports in the Australian market, and government support and backing for the development of overseas markets. As the Australian Chamber of Manufactures submitted:

It is a responsibility of government to develop the framework which encourages growth in accordance with the economic and environmental objectives of sustainable development. ... more should be done to encourage research and development, exports and to get our existing practices into better shape. Measures such as cost effective recycling, re-processing, re-use of materials, energy management and energy efficiency improvements also play an important part to achieve an efficient economy and provide employment.¹

¹ Australian Chamber of Manufactures, *Submission No. 91*, p 1.

3.5 DEST suggested that governments should support industry but also make it clear that they are serious in their commitment to the achievement of agreed environmental targets:

... governments must evaluate both 'carrots' and 'sticks'. Assistance to industries to facilitate the achievement of better environmental standards will need to be considered. Governments may provide new infrastructure or fund research and development of new technologies. This type of approach has been used in both Japan and Germany - standards have been set and industries given incentives over the short term to develop and meet these targets.²

3.6 DEST also raised the issue of 'market failure' resulting from environmental costs such as pollution and resource depletion which are not paid for either by the resource user or the resource owner.³ Failure to account for these costs, or 'externalities', distorts and generally undervalues the prices of resource inputs, raising the cost of labour compared with other inputs and encourages the over exploitation of the environment. While there are considerable difficulties in measurement and valuation of these externalities, this should not preclude the government intervening to ensure a realistic costing structure.

3.7 The Commonwealth has a dominant role to play in economic policy. Although it may not be possible to identify and assess all the environmental externalities that result from the Commonwealth's policies, it is clear that both economic and environmental policies impact significantly on Australia's environmental industries. The Commonwealth should use its powers to maximise opportunities to develop environmental industries and to correct the failure of the market to reflect all the environmental consequences of productive activity.

Commonwealth powers relating to the environment

3.8 Prior to considering specific environmental policies which could create jobs, it is important to examine the extent of the Commonwealth's responsibilities for environmental matters. Until recently, the conventional view was that the main carriage of responsibility for environmental matters in Australia lay with the States and local governments and that this situation represented the constitutional distribution of powers. According to this view, the Commonwealth Government has little direct constitutional power to exercise control in matters which relate to the environment but achieves its environmental aims through such things as its power to grant export licences and foreign investment approval and through its obligations as a signatory to international agreements.⁴

² DEST, *Submission No. 85*, p 6.

³ DEST, *Submission to White Paper on Employment*, March 1994, pp 14-16.

⁴ Hawkins B, *Environment Approval Processes for Major Industrial Processes*, National Law Association Conference, July 1993.

3.9 Other more expansive views of the Commonwealth's powers have been expressed. Associate Professor Robert Fowler of the University of Adelaide observes that constitutional interpretations by the High Court over the past twenty years, particularly in relation to the corporations power and the trade and commerce power, have changed the capacity of the Commonwealth Government to legislate on environmental matters. Professor Fowler concludes that:

It may be seen that the overall effect of recent interpretation of the Constitution is to rebut the traditional view that the States have the primary responsibility for environment protection. The scope of the corporations, trade and commerce, financial and external affairs powers is very broad, so that the Federal government now has substantial powers in this field... It may be said that the Federal government now has the capacity to meet its own responsibilities with respect to environment protection, in whatever manner these may be defined. The failure to do so must be explained by political rather than constitutional or legal considerations.⁵

3.10 A similar view is put by Professor Fisher of the Queensland University of Technology who acknowledges that the Constitution contains no reference whatsoever to the environment as such but points out that:

Areas of Commonwealth legislative competence however may impinge indirectly upon environmental management; the Commonwealth may also exercise considerable influence politically, financially and otherwise over matters of environmental concern. The Constitution of the Commonwealth is as much a political instrument as a legal document. It has shown remarkable flexibility and adaptability - not least in response to the growing philosophy of environmentalism that has emerged over the last two or three decades.⁶

3.11 The Committee recognises that as a result of High Court decisions over the past few years the scope for the Commonwealth to legislate directly in respect to the environment appears to have increased significantly. Particular powers of significance which could be used for environmental objectives are the corporations power and the trade and commerce power. Cooperation is, however, preferred to confrontation and it is essential and in the national interest for both Commonwealth and State governments to work towards maintaining constructive cooperative arrangements for environmental protection and regulation rather than engaging in a debilitating conflict about powers.

3.12 The Committee considers that the employment opportunities opening up in the environment industry could be better pursued in an atmosphere of Commonwealth/State cooperation rather than of confrontation, which could result if the Commonwealth were to exercise this power unilaterally. The national interest would not be served by protracted litigation between the Commonwealth and the States. The essential issue has been summarised as follows by Dr Gerry Bates, visiting Lecturer in Law at the University of Tasmania:

The recognition flowing from recent decisions of the High Court that Commonwealth powers in respect of the environment may well be more extensive than previously realised has led the Federal Government to suggest, and the States to acknowledge, that a

⁵ Fowler R J, *A brief review of Federal legislative powers with respect to environment protection*, Australian Environmental Law News, No.1, March/April 1993, pp 51-64.

⁶ Fisher D E, *Environmental Law*, 1st Edition, The Law Book Company, 1993, p 45.

cooperative approach to environmental issues might be more politically acceptable to all parties. On the one hand the Commonwealth wants to pursue urgent national strategies for environment protection, for example, with respect to land degradation, pollution standards and forest protection, but would rather not come into direct conflict with the States; while on the other, States which have traditionally had control over land use and environmental matters realise that if they do not respond to the Commonwealth's concerns they risk being bypassed by expanding federal power if conflict ensues... It is in the interests of both State and Federal Governments therefore to try to work out cooperative arrangements to environmental regulation wherever possible.⁷

Commonwealth/State cooperation

3.13 DEST emphasises that although some States have entrenched views on some environmental issues, officials of the Commonwealth and State governments are maintaining a constructive dialogue with the purpose of addressing and resolving some of these issues. Confrontation is generally avoided as Ms Joanne DiSano, of DEST, said in evidence:

The present Commonwealth policy is certainly not to get into a confrontationist situation with the states over a range of issues that, quite clearly, are their areas of responsibility. National interest, national good and what have you are certainly debated, discussed and negotiated with the states whenever possible.⁸

3.14 The Australian and New Zealand Environment and Conservation Council (ANZECC) which consists of the Commonwealth, State, Territory and New Zealand Ministers responsible for the environment, provides a forum for governments to exchange information and experience, and to develop coordinated policies on national and international environment and conservation issues. The position of the Commonwealth, the States and local government has also been formalised in the Intergovernmental Agreement on the Environment.

Intergovernmental Agreement on the Environment

3.15 In October 1990, at a Special Premiers' Conference, Heads of Government of the Commonwealth, States and Territories of Australia agreed to develop and conclude an Intergovernmental Agreement on the Environment (IGAE), to facilitate:

- . a cooperative national approach to the environment;
- . a better definition of the roles of the respective governments;
- . a reduction in the number of disputes between the Commonwealth and the States and Territories on environmental issues;

⁷ Bates G M, *Environmental Law in Australia*, 3rd Edition, Butterworths, 1992, p 66.
⁸ Evidence, Ms Joanne DiSano (DEST), Canberra, 23 September 1993, p 124.

- greater certainty of government and business decision making; and
- better environment protection.

3.16 The Commonwealth and State governments signed the Intergovernmental Agreement on the Environment in May 1992. The Agreement acknowledged the necessity to clearly define and clarify the roles and responsibilities of the different levels of government and the extent to which duplication could be avoided. The role of local government was recognised by the inclusion of the Australian Local Government Association as a party to the Agreement. An important part of the Agreement was the decision to form the National Environment Protection Authority with the general purpose of establishing national environment protection standards, guidelines, goals and associated protocols.

National Environment Protection Council

3.17 The proposed National Environment Protection Authority has subsequently been renamed the National Environment Protection Council (NEPC). Its structure will be that of a Ministerial Council with representation from each State and the Commonwealth. The NEPC will develop national standards and guidelines to work towards common legislative standards. Decisions will be taken by a two thirds majority vote.

3.18 The Intergovernmental Agreement on the Environment required draft legislation for the establishment of the Council to be presented for the consideration of Ministers within twelve months of the signing of the Agreement. Subsequent progress in establishing the Council has, however, been slow, with legislation establishing the Council only introduced into the Commonwealth Parliament in June 1994. The enactment of complementary State legislation will be required before the Council can begin operation. The need for national standards and a more effective environmental regulatory regime was brought to the Committee's attention by several sectors of the environmental industry and is discussed further in the next chapter. In light of this need, the delays in establishing the National Environment Protection Council are disturbing.

3.19 In May 1994, Mr Barry Carbon, the Executive Director of the Commonwealth Environmental Protection Authority stated that the Council might not be in existence for another 18 months (that is by the end of 1995) due to the complexity of the interactions between the Commonwealth and the States and the need for extensive negotiation and discussion.⁹

3.20 The Committee notes with some concern that Western Australia has now withdrawn from the process of establishing the Council, the Western Australian Environment Minister strongly attacking the concept of the NEPC in May 1994:

There is no evidence that NEPC will improve environmental protection, environmental management or sustainable development in Australia... The NEPC proposal is symptomatic of ever-increasing Commonwealth intrusions into environmental issues on which it often has little expertise or practical experience ... NEPC goes far beyond

⁹ Australia, Senate Estimates Committee, Canberra 24 May 1994, pp C25-C26.

political concerns about States' jurisdiction and Commonwealth roles. NEPC could jeopardise efficient protection of the environment, most immediately confusing water quality strategies. Its complex and new powers and processes would bring new frustration and uncertainties to investors and other Ministerial Councils. It is unnecessary and harmful.¹⁰

3.21 The Committee is concerned about this lessening in the political will needed to evolve a cooperative and standardised national approach to environmental issues. Environmental degradation is a national problem and measures for its alleviation need to be pursued on a national scale. It would be most unfortunate and irresponsible for opportunities for job creation in the environment industry to be hindered by any lack of commitment by the Commonwealth and State governments to national strategies.

3.22 Manufacturing industry would benefit from the development of a consistent national approach and is also concerned about the lack of progress. The Process and Technology Manager of Australian Newsprint Mills commented in February 1994:

It is now almost two years since the IGAE was signed and there appears to be little progress so far. There seems to be little evidence of cooperation between the parties and little to encourage industries that there has been any significant change in the attitudes of the parties. Are we any further advanced than when the States of Australia individually decided on their State's railway gauge?¹¹

3.23 The Committee does not wish to see the development of national guidelines, standards and protocols deferred pending the formal establishment of the Council. Considerable progress could be made in drafting agreed documents which could be subsequently ratified by the Council. This could be achieved through sub-committees or working groups of ANZECC, such as those used to develop initiatives like the National Waste Minimisation and Recycling Strategy and the National Packaging Guidelines. The Committee notes that in the 1994 Budget, the Commonwealth allocated funding for the Council of \$1.8 million over two years to meet the costs of developing national environmental protection measures as well as the Commonwealth's contribution to administering the Council.

3.24 The Committee views with considerable concern the delays in establishing the National Environment Protection Council and the decision by Western Australia to withdraw from the process of establishing a national approach to environmental regulation. The Committee recommends:

- (2) that the Commonwealth urges the Government of Western Australia to accept the importance of comprehensive national environmental standards and, in the national interest, reconsider its position towards the establishment of the National Environment Protection Council.**

¹⁰ Foreword, *The proposed NEPC. Analysis and criticism of the concept by the Government of Western Australia*, Federalism and the Environment, Thought Starter Paper No. 1, May 1994.

¹¹ Thurley D, *State - Federal Intergovernmental Cooperation and Effective Regulations, Effects on Development*, Economic Growth with Clean Production Conference, Melbourne, February 1994.

3.25 Should Western Australia decide against participation, however, the Commonwealth must proceed with the other States, leaving the way open for Western Australia to join later.

Commonwealth Government environmental administration

3.26 The Department of the Environment, Sports and Territories has the main responsibility for environmental matters. The Department's activities cover the development of policies, the implementation of programs and the administration of legislation relating to the protection and conservation of the environment, at both the national and international level.

3.27 The Commonwealth Environment Protection Agency (EPA) is an agency within the Department. It was established to:

- . provide a firm base of knowledge of the state of the environment;
- . improve the management and protection of the environment;
- . promote community education and information about the environment; and
- . help develop industry standards, guidelines, codes and targets.

3.28 The Commonwealth EPA administers the *Environment Protection (Impact of Proposals) Act 1974*, which ensures that environmental considerations are taken into account in Commonwealth decision making. The Commonwealth EPA also represents Australia's interests as part of the international community of environmental protection agencies. One of the Agency's initial priorities on its formation in 1992 was the establishment of the National Environment Protection Council. The Commonwealth EPA also administers other important Commonwealth environmental legislation such as laws controlling waste dumping at sea and the management of hazardous wastes. However, being simply a part of DEST, the Commonwealth EPA has no legislation backing. It has a facilitative and educative role, rather than a coercive role.¹²

3.29 A number of other Commonwealth departments have responsibilities affecting both the environment itself and the environment industry. For example, within its responsibilities for energy matters, the Department of Primary Industries and Energy (DPIE) undertakes, as part of the National Greenhouse Response Strategy, a range of programs aimed at increasing the efficiency of energy use. Other programs administered by DPIE include the National Landcare Program, the Murray-Darling Basin Initiative and the Farm Forestry Program. The Department of Employment, Education and Training administers the Landcare and Environment Action Program (LEAP). Other departments with major responsibilities for environmentally related activities include the Department of Industry, Science and Technology (environment management industry), Department of Tourism (eco-tourism) and the Department of Foreign Affairs and Trade

¹² McPhail I, 'The Role of CEPA and NEPA', *Australian Environmental Law News*, No.2, June 1992, p 66-68.

(international environmental conventions, environment trade and development assistance). Apart from the programs administered by DEET, job creation is not a prime objective of the above activities. As well as the departments with direct responsibilities for environmental matters, actions of other departments such as the Departments of Defence, Transport and Communications can have major impacts on the environment.

3.30 These divisions of responsibility for matters affecting the environment (which are mirrored in State administrations) inevitably result in a degree of neglect, overlap and conflict between competing agencies unless satisfactory coordination arrangements are in place. Apart from inter-departmental coordination, close cooperation and consultation between government and industry is also essential.

3.31 The Committee considers that the problems of fragmentation and lack of coordination of measures affecting the environment between the three levels of government are severe enough, without further fragmentation within the Commonwealth administration itself. While the specialist departments and agencies involved have legitimate responsibility for administering the various programs, there is a need for some more formal coordination mechanisms to replace the present largely ad hoc arrangements.

3.32 There is naturally the danger that a more formal coordination mechanism could result in unnecessary reporting requirements and consequent delays or diversion of effort. To best encourage and stimulate the environment industry to create employment, it is essential that Commonwealth departments and agencies closely coordinate all policies and programs with implications for the environment and employment. The Committee believes that it would be helpful if the Commonwealth Government were to establish a high level consultative group from the departments and agencies involved. Its purpose would be to coordinate the development of Commonwealth environmental policies and programs with potential for employment creation.

3.33 The Committee recommends:

- (3) that the Commonwealth Government establish a high level inter-agency coordinating group, chaired by the Secretary of the Department of the Environment, Sport and Territories, to raise the level of interdepartmental cooperation and consultation on environmental policies and programs with potential for employment creation.**

Scope for action by the Commonwealth Government

3.34 The Committee examined the scope for the development of policies which the Commonwealth Government could undertake on its own initiative to stimulate the environment industry. These actions are seen as complementary to cooperative policies developed with the States through the NEPC, ANZECC and other coordination mechanisms. Traditionally the scope for direct action by the Commonwealth has been in the areas of fiscal policies, purchasing and industry support.

Fiscal measures

3.35 In 1992, the Commonwealth Government indicated in the National Strategy for Sustainable Development that it would consider the increased use of economic instruments, including support programs and taxation measures, to deal with environmental problems. Fiscal measures which could be considered include the provision of credit, favourable tariffs, bounties and taxation measures such as excise, sales taxes and depreciation allowances. Consideration of such measures would have to recognise criteria set by the World Trade Organisation.

3.36 DEST identified the opportunity to shift the tax burden away from labour and toward resource inputs as an area with clear potential for providing incentives to sustainability while at the same time promoting employment growth. The extent of subsidies to resource use and their negative effects were outlined:

Even today, water, sewerage, energy, forestry and waste disposal operations in Australia are rarely expected to cover costs and earn a normal rate of return on capital invested. For example, water charges for private irrigators in New South Wales recover only about 70 per cent of operating costs and none of the capital costs... Financial subsidies take the form of recurrent and capital budget allocations and additions to public debt. Payment for these must be met from government revenues, which largely constitute taxes on productive activities. Alternatively, payment may necessitate a cutback in government services leading to decreased employment with the associated multiplier effects.¹³

3.37 The Commonwealth Treasury cautioned, however, that due account needs to be taken of the Government's fiscal objectives. Other questions which should be considered include:

will an existing taxation instrument represent a least-cost solution for the economy as a whole, or would other instruments - such as new and specific environment charges, government outlays, measures based on property rights, or regulation - prove more appropriate?

will a taxation instrument provide an equitable solution to the environmental problem?

will there be unintended flow-on effects which create economic and/or environmental problems?¹⁴

3.38 In evidence to the Committee, Treasury officers advised that the key message they wished to convey was the importance of targeting the specific instrument (economic or regulatory) to the source of the environmental objective, adding that:

The further away you get from that nexus the more likely you are to find that your measure will cut across other objectives and not be as effective as you would have wished.¹⁵

¹³ DEST, Submission to White Paper on Employment, March 1994, p 14.

¹⁴ Treasury, *Submission* No. 105, p 3.

¹⁵ *Evidence*, Mr David Borthwick (Treasury), Canberra, 19 April 1994, p. 549.

3.39 Turning to specific proposals, Treasury officers expressed a clear preference for economic measures other than taxation measures, commenting that:

... from first principles, if faced with arguments to encourage home insulation or solar hot water investments or things of that sort, we would suspect the first best economic instrument to use would be the proper pricing of electricity with an appropriate return on cost of capital, the proper pricing of fuels used in home heating, and so on.

3.40 A number of fiscal measures were suggested to the Committee and because they relate to particular terms of reference are discussed in the following chapter of this report. In general, these measures included wholesale tax concessions for environmentally preferred products and plant and equipment used for environmental purposes, enhanced depreciation rates and investment allowances for environmentally benign plant and equipment, and heavy tariffs on imports competing with local sourced environmentally preferred products.

3.41 The Commonwealth Treasury noted that most of these proposals involved forgoing revenue and, if implemented without offsetting fiscal measures, would be inconsistent with the Government's medium term fiscal objective, as well as detracting from sustainable employment growth in the longer term.¹⁶

3.42 The Committee notes that despite the Treasury position, the Commonwealth Government does use its taxation powers to achieve environmental objectives. A recent example is the heritage conservation taxation rebate which came into operation on 1 July 1994. This initiative, which was recommended by the House of Representatives Standing Committee on Environment and Conservation in 1986 and initially rejected by Treasury,¹⁷ provides for a rebate of twenty cents in the dollar for approved expenditure of at least \$5000 on heritage conservation works.

3.43 The Committee noted the views of the Treasury in relation to the use of the Commonwealth's taxation powers for environmental objectives and recognises that the implications of any proposed measure for the Government's overall fiscal objectives should be fully evaluated. The Committee considers, however, that there is scope for the use of the Commonwealth Government's taxation powers to compensate for market imperfections and influence consumption patterns for environmental purposes.

¹⁶ Treasury, *Submission No. 105*, p 4.

¹⁷ Report of House of Representatives Standing Committee on Environment and Conservation, 'Fiscal Measures and the Achievement of Environmental Objectives', November 1986. The Government responded to the report on 1 December 1988.

3.44 Taxation of more environmentally harmful resource inputs instead of labour inputs could be expected to increase both the demand for labour and efficiency in resource use. DEST drew the Committee's attention to a statement from Mr Fred Argy in a paper prepared for the Committee for Economic Development of Australia in 1993:

... a shift from taxing income and hence work and saving, to taxing consumption and wealth can be good for the economy and the environment, especially if new or higher taxes are concentrated on environmentally unfriendly products or activities ...¹⁸

3.45 The Committee recognises the complexities of the application of taxation powers and the problems in determining the real net environmental and employment gains but considers that the potential benefits are such that the Commonwealth Government should investigate the potential of its fiscal powers to achieve employment and environmental objectives.

3.46 The Committee recommends:

- (4) that the Commonwealth Government establishes a high level group including representatives from the Department of the Environment, Sport and Territories, the Department of Industry, Science and Technology, the Department of Primary Industries and Energy and the Treasury to develop options for using fiscal measures to stimulate both cleaner production in industry in general and the development of the Australian environment industry.

Commonwealth Government purchasing policies

3.47 The use of the Commonwealth Government's purchasing power to encourage the Australian manufacture of environmentally preferred products was raised in several submissions, mainly those advocating cleaner production or establishment of a viable market for products made from recycled materials. More stringent 'Country of Origin' labelling and preference for Australian suppliers were also suggested as means of assisting Australian producers who are disadvantaged by having to meet higher environmental standards than their overseas competitors.

3.48 In relation to the environment industry, the EMIAA advised the Industry Commission that:

... Australian governments at federal, state and local level account for more than 60 per cent of demand for local environmental waste management equipment, systems and services products. The majority of these purchases are by government business enterprises (GBEs) and local government bodies.¹⁹

¹⁸ Argy F, *An Australia that Works: A Vision for the Future: A Long Term Economic Development Strategy for Australia*, prepared for the Committee for Economic Development of Australia, 1993.

¹⁹ Industry Commission, Report No. 33, *Environmental waste management equipment, systems and services*, Canberra, 1993, p 125.

3.49 Commonwealth Government purchasing policies have been the subject of an inquiry by the House of Representatives Standing Committee on Industry, Science and Technology. In its report tabled in Parliament in March 1994, the Committee advised that the annual procurement budget of the Commonwealth Government has been estimated variously between \$8 billion and \$12 billion and that the combined purchasing budget of Commonwealth, State and local governments is approximately \$30 billion.²⁰

3.50 The Standing Committee on Industry, Science and Technology expressed serious concerns about several aspects of Commonwealth Government purchasing policy including a lack of success by government agencies in implementing policies aimed at maximising competitive opportunities for Australian and New Zealand suppliers. The Committee made a number of recommendations including the establishment of a National Procurement Board. On environmental issues the Committee was concerned to ensure that Australian companies complying with local environmental regulations were not disadvantaged and recommended that:

where the Australian Government imposes identifiable net cost disadvantages on local suppliers through imposition of environmental standards, the extent of that net cost disadvantage be taken into consideration in price and access terms in Government purchasing and tender evaluations.²¹

3.51 In view of the above inquiry, the Committee did not undertake any detailed investigation of the Commonwealth Government's purchasing policies. The Committee agrees, however, that government purchasing power represents a powerful means of encouraging cleaner production and the manufacture of products less harmful to the environment.

3.52 The Committee notes that the Commonwealth Government has responded to the recommendations of the inquiry into purchasing in the White Paper on Employment and Growth of May 1994. It has agreed to implement a number of its recommendations including the establishment of a National Procurement Board to increase the efficiency of government purchasing.

3.53 In 1992, the Department of Administrative Services published the *Better Buying: Better World* strategy to facilitate the application of the Commonwealth Government's environmental policies to Commonwealth purchasing. The strategy spells out an environmental purchasing policy and provides broad guidance to buyers and users. No evidence was provided to the Committee, however, that the strategy is being implemented to any extent. The strategy is, nevertheless, well defined and should be used in the development of purchasing criteria and specifications.

3.54 The Commonwealth Government, through its purchasing power, is in a position to significantly encourage the development of environmentally responsible Australian industry and thus create employment opportunities. As the Department of Industry, Science and Technology has stated:

²⁰ House of Representatives Standing Committee on Industry, Science and Technology, *Australian Government Purchasing Policies: Buying our Future*, first Report, March 1994, p 1.

²¹ *ibid*, Recommendation No. 45, p 122.

As a major purchaser of goods and services, the Government's purchasing capacity can be used to strategically promote opportunities for the development of Australian industry without compromise on quality and price.²²

3.55 The Committee recommends:

- (5) that the National Procurement Board proposed by the Standing Committee on Industry, Science and Technology be established as a matter of urgency and that it then develops purchasing policies which require the inclusion of relevant environmental criteria in specifications and purchasing guidelines.
- (6) that the proposed National Procurement Board liaises with the States and local government authorities to develop and harmonise environmental criteria to be used in government purchasing.

Industry support

3.56 The environment industry can take advantage of government assistance programs. These include the Industry Innovation Program, the International Science and Technology Program, the Cooperative Research Centres Program and the National Industry Extension Service. The Commonwealth has also taken several other initiatives and introduced a number of programs aimed specifically at assisting the environment industry. The Department of Industry, Technology and Regional Development (DITARD) advised the Committee that government initiatives have addressed some of the impediments to development of the environment industries by:

identifying and promoting Australia's capabilities in this sector (eg publication of reports);

actively encouraging the formation of industry networks (eg the Environment Management Industry Association of Australia (EMIAA) and the Australian Environment Management Export Corporation (AUSTEMEX)); and

providing support for the development of Australian environmental technologies (eg Industry Research and Development Grants, establishing the Cooperative Research Centre for Waste Management and Pollution Control).²³

²² DIST, Annual Report 1993-94, p 49.

²³ DITARD, Executive Summary, *Submission* No. 96, p 2.

3.57 In Working Nation, the White Paper on Employment and Growth, the Commonwealth Government announced further measures to assist industry in general with the prime objective of building a competitive environment and, within this environment, building competitive firms. Particular measures which could assist the development of the environment industry included:

- . improved access for small and medium companies to the 150 per cent taxation concession for research and development;
- . provision of \$48 million over four years to small high technology companies to promote early commercialisation;
- . measures to assist small and medium business enterprises to access finance by developing benchmarks to assist financial institutions in their lending decisions and by encouraging companies to obtain expert advice on export finance facilities;
- . development of a capability in environment policy analysis within the Department of Industry, Science and Technology to ensure that environmental objectives are met at a minimum cost to industry;
- . establishment of a new office named AusIndustry, within the Industry, Science and Technology portfolio, to bring together all the Commonwealth's business assistance programs under a unified marketing structure; and
- . additional support for Australian firms and consortia bidding for major infrastructure projects in Asia.

3.58 Since then, the Commonwealth Minister for Industry, Science and Technology has announced a \$4.5 million strategy to further develop Australia's environment management industry. This funding will establish a Project Development and Technology Diffusion Network designed to assist firms to win contracts. The Network will identify and aid the development of 'project teams' and facilitate the establishment of consortia between Australian firms. It will be administered by the Cooperative Research Centre for Waste Management and Pollution Control.

3.59 The above initiatives have specific relevance to the environment industry, particularly the pollution control and waste management sectors which are characterised by small, innovative high technology companies. The Committee also welcomes the move towards consolidating the Commonwealth's range of business assistance programs under AusIndustry. There remains concern, however, that unless the new programs and initiatives are adequately funded and staffed from the start, business will be quickly disillusioned and the Government's employment creation objectives will not be attained.

Export facilitation

3.60 There are a number of Commonwealth Government activities aimed at assisting the environment industry to establish and maintain overseas markets. Financial assistance schemes administered by Austrade to promote exports include the Export Market Development Grants Scheme and the International Trade Enhancement Scheme,

which provides concessional loans and/or advances. Export credit insurance, export finance and other such financial support is available from the Export Finance Insurance Corporation.

3.61 The wider use of Australia's aid program to promote the Australian environment industry was raised in several submissions. Australia's development cooperation program is already playing a significant role in generating business for Australian firms and organisations. Aid program expenditure on environment-related activities amounts to over \$100 million annually. The Australian International Development Assistance Bureau (AIDAB) advised the Committee that a recent study estimated that the aid program generated purchases of Australian goods and services to the order of 90 per cent of the aid budget.²⁴ There are also substantial benefits in terms of flow-on contracts and exports. It could reasonably be concluded that the current aid program expenditure on environment-related activities supports between 1500 and 2000 permanent jobs in Australia.

3.62 Specific programs administered by AIDAB include the Development Import Finance Facility (DIFF) and the Private Sector Linkages Program. The DIFF finances high priority projects in developing countries involving the provision of capital goods and some services from Australia. In 1992-93 DIFF allocations for environmental projects totalled \$12 million representing 10 per cent of total DIFF expenditure of \$120 million. The Private Sector Linkages Program was introduced in 1993 and aims to promote economic growth in the Asian region through activities which link market-related enterprises in Australia to equivalent enterprises in selected developing countries. To date, support valued at \$1 million has been provided for eight environment-related activities. A further program offered jointly with the Commonwealth EPA is the Environmental Cooperation with Asia program which provides grants of between \$10 000 and \$100 000 to projects such as environmental assessment reports, feasibility studies and conferences on specific technologies and environmental management projects.

3.63 The DIFF program would appear to have more commercial benefits for Australia than other avenues of aid expenditure. An AIDAB review of the DIFF program concluded that:

The \$285 million of DIFF funding covered by the study generated \$972 million of business, with ultimate benefits which could be in excess of \$1.35 billion. This means that returns to Australia are in the order of five to one. Firms participating in the DIFF program reported greater credibility in international markets. They also increased their investment in plant and equipment, undertook new research and development initiatives, and benefited from greater international experience for their staff.²⁵

3.64 The Committee welcomes the increase to \$130 million of total DIFF funding provided in the 1994-95 Budget. This included \$20 million for a new Green Development Import Finance Facility designed to support overseas infrastructure projects with positive environmental benefits.

²⁴ AIDAB, *Submission No. 104*, p 5.

²⁵ *ibid*, p 6.

3.65 Government and industry have cooperated in the establishment of the Australian Environment Management Export Corporation (AUSTEMEX) which is the export arm of the Environment Management Industry Association of Australia. AUSTEMEX services the international environment management market with state-of-the-art skills available from Australian private industry and government, providing integrated solutions to problems of pollution control and waste management. Austrade provides funds towards the operating expenses of AUSTEMEX and Austrade's National Manager, Environment Industries, is also the Export Development Manager of AUSTEMEX.

3.66 The Commonwealth Government's trade and development assistance programs are a good example of active cooperation between government and industry in providing a framework within which business enterprises in the environment industry can develop export markets. It is essential, however, that both the ongoing programs and the recent initiatives are adequately resourced.

3.67 The Committee recommends:

- (7)** that the Commonwealth Government through the Department of Industry, Science and Technology, Austrade and the Australian International Development Assistance Bureau significantly increases funding and staff resources to support the Australian environment industry in overseas markets, particularly those in the Asia-Pacific Region.

CHAPTER 4: POLICIES FOR SUSTAINABLE EMPLOYMENT GROWTH IN POLLUTION CONTROL AND ENVIRONMENTAL PROTECTION

4.1 There is already considerable public interest and concern relating to pollution control and waste management. Industry, commerce and governments are responding to these pressures with a range of initiatives including the development of strategies, legislation, codes of practice, publicity campaigns and support for technological development. The Committee examined ways and means by which these ongoing activities could be used as opportunities to stimulate employment. At the same time, the Committee sought to identify new initiatives and action which could be taken to overcome impediments of an institutional or financial nature.

The global environment industry

4.2 The global environment industry is already large and has prospects of substantial future growth. In 1990, the OECD estimated the market for environmental (pollution control and waste management) goods and services at about \$270 billion which represents a substantial market, exceeding the \$250 billion world aerospace market.¹ Global corporations have evolved to service this market. As an example, Waste Management Technologies is, in terms of revenue, the size of aircraft manufacturer Lockheed, almost as big as the energy and defence corporation Westinghouse and larger than chemical giant Monsanto.²

4.3 The OECD Environment Industry, Trends and Issues report states that the OECD accounts for some 85 per cent of the total world environmental equipment and services market. The largest national market is the United States which at \$110 billion in 1990, comprised about 40 per cent of the world market. The largest sector of the world environment market is water and effluent treatment which represents 30 per cent of the total. Other major sectors are waste management (20 per cent) and air quality control (15 per cent). It is noteworthy that the environmental services industry, which is largely based on engineering and consultant services to solve specific environmental problems, represents about 25 per cent of the world environment market.³

4.4 In the OECD as a whole, the environment market is almost evenly divided between the public and private sectors with the public sector responsible for more than 50 per cent of purchases in Europe and about 40 per cent in the US. As in Australia,

¹ *The OECD Environment Industry: Situation, Prospects and Government Policies*, OECD, Paris, 1992, pp 6-7.

² *The Environment Industry - Profiting from Pollution*, *The Ecologist*, Vol 24, No. 2, March/April 1994.

³ *The OECD Environment Industry, Trends and Issues*, Paris, 1991, p 6.

public sector spending is mainly by local municipalities rather than federal governments and is particularly prominent in water and effluent treatment which accounts for 65 per cent of public sector environmental expenditure.

4.5 A significant global trend which has major implications for the emerging Australian environment industry, is the internationalisation of the industry, as described by the South Australian Government:

In the past few years, the environmental management industry has embarked on globalisation strategies led by the large multinationals from Europe and the United States. There is an increasing trend for environmental equipment and service suppliers to enter foreign markets through direct investment, cross-border mergers and acquisitions, joint ventures or collaboration with foreign partners.⁴

4.6 Although detailed statistics on employment are scarce, the OECD has made a rough estimate that in 1990 there were about 1.7 million employees in the OECD pollution control and waste management equipment and services industry, of which 600 000 were in Europe, 850 000 in the United States and Canada and 200 000 in Japan.⁵

Future prospects for the global environment management industry

4.7 There can be little doubt that the world environment industry will continue to grow rapidly. The OECD has forecast that the world market for the pollution control and waste management industry will increase at an annual average rate of 5 to 6 per cent to \$410 billion by the year 2000. Other forecasts predict even stronger growth. According to a study in 1992 by the International Finance Corporation, the worldwide market for environmental goods and services will reach \$820 billion by the year 2000.⁶

4.8 There will, however, be important changes in the future structure of the environment market. The OECD expects that the environmental management and services sector will increase in importance. The move towards cleaner process technologies will require greater engineering and analytical expertise in environmental management of the complete production process, thus reducing demand for end-of-pipe pollution control. The market for water and effluent treatment equipment is projected to have the slowest growth due to its current status as the largest market segment and the maturity of the technologies used. Waste management, including the treatment of toxic and hazardous wastes, is expected to be one of the fastest growing market segments due to stricter controls on waste disposal by direct landfill and the increasing emphasis on recycling and reprocessing of specific waste materials.⁷

⁴ South Australian Government, *Submission No. 97*, p 4.

⁵ *The OECD Environment Industry: Situation, Prospects and Government Policies*, OECD, Paris, 1992, p 21.

⁶ DITARD, *Submission No. 96*, Overview of Australia's Environment Industries, p 1.

⁷ *The OECD Environment Industry, Situation, Prospects and Government Policies*, Paris, 1992, pp 12-14.

The environment market in South-east Asia

4.9 While the environment market in the OECD countries is expected to grow steadily by 5.5 per cent per annum until the year 2000, a much higher growth rate could be attained in South-east Asia. Almost every country in the region faces severe environmental problems as the result of rapid economic growth, urbanisation and industrialisation which have all placed significant pressures on the environment. In its submission to the Committee, DITARD quoted estimates from the Centre for Business Research and Development of the National University of Singapore that water and air pollution in the region will increase by ten-fold over the next 15 years. This will result from an estimated 150-200 per cent rise in the volume of industries and a 300 per cent increase in the number of vehicles.⁸ It is in Australia's interest to participate in the business opportunities presented by the South-east Asian environmental market and, in so doing, to assist neighbouring countries to maintain environmental quality in our region.

4.10 The size of the Asia-Pacific environment market has been estimated at more than \$80 billion over the next five years.⁹ DITARD suggested that the greatest opportunities for Australia's environment industries are in the water and wastewater sector and that Indonesia, China and Malaysia are the most promising markets. In a report prepared for the South Australian Government, PPK Consultants suggested that the most attractive markets at present for South Australian organisations are the industrialising countries of China, Malaysia and Thailand and the newly industrialised countries of Hong Kong, Singapore, Taiwan and South Korea.¹⁰

4.11 A closer assessment of the opportunities in Indonesia, China and Malaysia was provided by DITARD and illustrates opportunities in water treatment:

In Jakarta alone, the increasing demand from the private sector and the beginning of upgrading and expansion projects for sewerage will provide opportunities worth \$350-400 million in the years to come;

In China only 20 per cent of wastewater is treated before discharge, a clear indication of the amount of work that needs to be done ... The Chinese government estimates around \$50 billion would be needed to overhaul all old factories with pollution control equipment; and

Total government funding allocated to urban sewerage in Malaysia is expected to be US\$200 million for the period 1991-95. These figures exclude expenditures by local municipalities and the private sector.¹¹

4.12 Substantial opportunities for Australian industry to make a tangible contribution to reducing the growth of coal-related greenhouse gas emissions were identified in a report released by DPIE in October 1994.¹² Specific opportunities identified included upgrading industrial boilers, improving power station efficiency, the supply of high grade

⁸ DITARD, *Submission No. 96, Overview of Australia's Environment Industries*, p 2.

⁹ Prime Minister's Statement on the Environment, December 1992.

¹⁰ *New Directions for South Australia's Economy*, Vol 2, Appendix IV, August 1992, pp 43-44.

¹¹ DITARD, *Submission No. 96, Overview of Australia's Environment Industries*, p 3.

¹² Coal and Climate Change - Consultants report prepared for DPIE, October 1994.

thermal coal, providing expertise to allow washing of locally mined coals and the draining of coal bed methane. Upgrading coal fired industrial boilers in China could reduce carbon dioxide by up to 80 million tonnes annually, which is equivalent to nearly 15 per cent of Australia's total carbon dioxide emissions in 1990.

4.13 Opportunities for Australian industry will be determined to a large extent by the availability and source of funds. DITARD pointed out that the demand for environmental goods and services by the public sector in the Asia-Pacific region will depend largely on aid from international donors. Realistic opportunities for Australian firms will only arise from multilateral funded projects from agencies such as the World Bank and the Asian Development Bank and AIDAB funded projects. DITARD added that:

Within ASEAN, total World Bank approved lending exceeds \$1.5 billion annually. The environment component of this lending has been, and is projected to continue rising at over 10 per cent annually and to exceed \$350 million by 1995. Australia is well placed to capture a significant share of this growing market.¹³

4.14 Australian success in exporting environmental technology, equipment and services to the Asia-Pacific region is not, however, assured. There is strong competition in the environment management market from other countries particularly the US, Japan and Germany. Dr John Cole of EMIAA agreed basically with the DITARD assessment that the main opportunities lay in neighbouring East and South-east Asia and ranked Indonesia first, followed by China, Thailand, Malaysia and Vietnam. He cautioned, however, against confusing need with market and identified the availability of soft credit facilities as a major factor in penetrating these markets.¹⁴

The Australian pollution control and waste management industry

4.15 The Australian pollution control and waste management industry is a diverse collection of organisations ranging from specialised manufacturers to government water authorities. The Industry Commission has quoted estimates that there are about 1200 firms in the pollution control sector of the Australian environment industry ranging from many new, relatively small research and development based equipment supply firms to a few large established engineering and construction companies. These larger businesses are often subsidiaries of international corporations, while the smaller firms are predominantly owner-managed.¹⁵ DITARD described the industry in the following terms:

... the industry, as yet, is very young. It is not characterised by a large number of big players. They tend to be smallish type players. They are developing on a science base, in many cases, without a huge history in commercialisation and are, therefore, vulnerable

¹³ DITARD, *Submission* No. 96, Overview of Australia's Environment Industries, p 3.

¹⁴ *Evidence*, Dr John Cole (EMIAA), Canberra, 15 November 1993, p 320.

¹⁵ Industry Commission, Report No. 33, *Environmental waste management equipment, systems and services*, Canberra, 1993, p 53.

purely as economic entities because they have not yet got major runs on the board in lots of cases.¹⁶

4.16 DITARD also advised the Committee that this sector of the industry is well supported by the strong consulting engineering firms in Australia and a strong public research and development base which undertakes significant environment management research, particularly in water and wastewater treatment.¹⁷

4.17 Pollution control and waste management have growing importance in the agricultural and food processing industries. The move by Australia's agricultural industries into the 'clean and green' international produce markets demands the maintenance of very high environmental standards. Export industries based on this image are extremely vulnerable to publicity from any incident which causes contamination. The development of more intensive agriculture such as the rapid growth of the cattle feedlot industry has stimulated regional economies, but has at the same time posed substantial challenges in waste management and in ensuring that feedlots are environmentally sustainable and acceptable to the community.

4.18 The recycling sector of the industry has shown significant growth in recent years, particularly that part of the industry collecting and sorting post-consumer waste. For example, DEST has estimated that four million homes are now serviced by kerbside recycling, over one third of all paper products used in Australia is recovered from the waste stream and 30 per cent of newspapers are recycled for use as packaging and insulation.

Potential for growth and employment creation in the Australian environment management industry

4.19 A strong home market will provide the platform on which the Australian environment industry can grow and prosper. The adoption of cleaner production technology by industry and improved treatment of wastes by both industry and public authorities will also result in substantial business opportunities for those sectors of the industry providing environmental goods and services.

4.20 Although there are no official statistics which cover the Australian environment industry, the Industry Commission noted that OECD estimates for 1990 suggested an Australian market for environmental waste management equipment, systems and services of about \$2.8 billion. The OECD estimate represents about one per cent of the global market and about 0.7 per cent of Australia's Gross Domestic Product. The Commission considers that the market is likely to be substantially higher.¹⁸

¹⁶ Evidence, Mr Robert McKeon (DITARD), Canberra, 23 September 1993, p 148.

¹⁷ DITARD, *Submission* No. 96, Overview of Australia's Environment Industries, pp 13-14.

¹⁸ Industry Commission, *Environmental Waste Management Equipment, Systems and Services* Report No. 33, September 1993, pp 41-42.

4.21 The Industry Commission estimated total government outlays on water supply services, sanitation and protection of the environment at some \$2.5 billion in 1990-91 of which \$1.8 billion was capital expenditure and the remainder current outlays. The mining sector spent \$612 million on equipment or processes used to reduce, control and abate pollution and wastes of which \$520 million was for capital equipment. Expenditure by selected manufacturing industries including the pulp and paper, chemical and basic metals industries was \$480 million of which capital expenditure was \$248 million.

4.22 There is apparently a substantial trade gap in environmental technology but in the absence of information on the import-export side, it is not possible to identify the size of the annual trade deficit with any confidence. DITARD was aware of this information gap and advised the Committee that it was working with the Australian Bureau of Statistics on developing industry-wide statistics on the environment industry including the development of import-export data.¹⁹

4.23 The environment has been targeted by the European Union as one of the three areas offering the greatest opportunities for increased export performance and employment within the European Union. The Committee considers that the Australian environment industry also has the potential to create substantial additional sustainable employment in the medium to longer term. As indicated above, there is considerable export potential in South-east Asia.

4.24 To take advantage of the opportunities opening up and to underpin sustainable employment growth, it is crucial that the environmental industry in Australia is technologically advanced and cost competitive. Evidence to the Industry Commission's inquiry into Environmental Waste Management Equipment, Systems and Services has ranked the Australian environment industry as being highly competitive in the Australian market in water treatment, waste water and sewage treatment, mine rehabilitation and consultancy services. It is ranked as 'medium competitive' in hazardous waste treatment, industrial remediation and the supply of monitoring and sensing equipment. Air cleaning and solid waste management have been ranked low. In international markets, the industry has been ranked as highly competitive in mine rehabilitation and consultancy services.²⁰

4.25 The Committee considers that from the evidence and submissions presented to the inquiry there is scope for the Australian environment industry to be one of the major growth industries of this decade. As DEST advises:

... with increasing concern domestically and internationally over environmental issues, environmental technology industries are certain to grow in the future. Those economies which support such growth will reap the financial and employment rewards from this increasingly important sector.²¹

¹⁹ Evidence, Mr Brian O'Gallagher (DITARD), Canberra, 23 September 1993, pp 158-159.

²⁰ Industry Commission, *Environmental Waste Management Equipment, Systems and Services*, Report No. 33, September 1993, p 63.

²¹ DEST, *Submission* No. 85, p 4.

4.26 Greater restrictions on industrial, sewerage and agricultural discharge to rivers creates opportunities for additional employment through recycling, and reuse for purposes such as agroforestry. The Committee visited the Goulburn Valley Water Authority sewage treatment farm at Shepparton where a number of jobs have been created from the establishment of a commercial tree plantation uses treated effluent. This project has demonstrated the potential for job creation in the treatment and reuse of effluent.

4.27 The Committee recommends:

- (8) that the Commonwealth encourage the productive use of liquid wastes by continuing to provide assistance for trial projects.

4.28 The water quality standards that must be achieved by industry to meet tighter market specifications and by Australian towns and cities to meet World Health Organisation standards, are also providing additional employment. Unless World Health Organisation standards can be met by industry, export opportunities may be lost.

Expenditure on pollution control in Australia

4.29 The Australian pollution control industry has alleged that expenditure on pollution control in Australia is insufficient. Expenditure on environment protection in Australia is 0.5 per cent of GDP compared with expenditure in the US and Germany in the order of 0.8 to 1.5 per cent of GDP. This could lead to the conclusion that Australia was lagging behind other OECD countries in expenditure on the environment. Dr Cole, of the EMIAA, however, cautioned against policies aimed at spending similar levels of GDP on pollution control as the more heavily industrialised OECD nations:

We should not compare ourselves to Europe or North America. We simply do not have the intensive secondary industry to say that we should be spending the same levels of GDP on pollution prevention; it is a nonsense. Environment management is very much case specific.²²

4.30 Dr Cole's view was supported by Dr Gul Izmir, of the NSW Environment Protection Authority who did not see the relative expenditures on environmental protection of Australia and other OECD countries as a significant issue. She explained further:

The amount of expenditure is also a function of the state of the environment. The US and Europe have to spend a lot on their environment because they polluted it. The condition of the rivers is much worse and the amount of air pollution in the US is much greater than we have here. If you have ever been to Los Angeles you would wonder how people live there. You would wonder, too, what is flowing through the rivers of Europe.

²² Evidence, Dr John Cole (EMIAA), Canberra, 15 November 1993, p 311.

They have to spend more. The amount spent is not really an exact impression of the amount of emphasis people put on the environment. The impression that Australian people place a lot of value on their environment and that it has a clean environment is valid.²³

4.31 While not ignoring the significant environmental problems being faced in Australia in specific regions, the Committee agrees that these problems should be addressed in the context of Australia's particular needs and circumstances. Although Australia can learn much from and utilise overseas experience, the Committee considers that there is little to be gained by Australia adopting without question any arbitrary target for expenditure on the environment or introducing policies and regulatory regimes which were developed to meet conditions in other countries. This is certainly not to say, however, that our current level of expenditure is adequate.

Cleaner Production and Best Practice Environmental Management

4.32 In recent years there has been a recognition by industry, particularly manufacturing industry, that clean production and waste minimisation makes good business sense. The 'Cleaner Production' concept for production processes has been defined by the United Nations Environment Program (UNEP) as conserving raw materials and energy, eliminating toxic materials, and reducing the quantity and toxicity of all emissions and wastes before they leave a process. It is achieved by applying know-how, by improving technology and by changing attitudes.²⁴

4.33 There is evidence that Cleaner Production can often bring considerable economic benefits. As an example, the Dow Chemical Corporation of the US has claimed savings of US\$100 million each year from its Waste Reduction Always Pays (WRAP) program for its Louisiana based unit alone. 600 projects have been undertaken over 10 years and the return on investment has averaged 205 per cent increasing to 300 per cent in the past two years.²⁵

4.34 Similar benefits have been identified in other countries such as France and Denmark:

French research has shown that about 50 per cent of such (cleaner) technologies have brought real energy and raw material savings, while Danish work has indicated that companies which invested in cleaner technologies experienced direct financial benefits in 44 per cent of the examples studied, with those benefits averaging 13 per cent of the investment cost.²⁶

²³ Evidence, Dr Gul Izmir (NSW EPA), Sydney, 22 September 1993, p 105.

²⁴ De Lardere J A, *The international context of cleaner production*, Economic Growth with Clean Production Conference, Melbourne, February 1994.

²⁵ Zoi C, *Partnerships for a healthy environment and a strong economy*, Economic Growth with Clean Production Conference, Melbourne, February 1994.

²⁶ Elkington J and Burke T, *The Green Capitalists*, Victor Gollancz, London, 1989, pp 178-179.

4.35 In Australia, whitegoods manufacturer Email Ltd is reported as saving about \$2 million per year in running costs at its cooking products plant in South Australia through lean, clean and green production methods. Installation of a new furnace resulted in a 90 per cent saving in the energy bill for the enamelling process and water consumption for the plant has been reduced by 75 per cent. The cost of pre-treating steel was reduced by 60 per cent through new technology which no longer required the handling or disposal of acid.²⁷ Further examples are from Du Pont Australia, Portland Aluminium and the Manildra Group. Du Pont Australia now earns \$100 000 per year from the sale of plywood pallets to a company making trusses for mines instead of disposing of them at an annual cost of \$10 000.²⁸ Portland Aluminium has reduced solid waste from 1000 to 45 cubic metres per month, cut the costs of waste disposal from \$1 million per year to less than \$50 000 and restored areas formerly designated for landfill into wetlands and recreational areas.²⁹ The Manildra Group has commissioned a plant at Nowra in New South Wales to use the residual carbohydrate in the waste stream of the company's starch and gluten plant to product fuel ethanol.

4.36 The installation of Cleaner Production processes is often driven by considerations of corporate profit rather than protection of the environment, as explained by the Chamber of Manufactures of New South Wales:

Increased corporate profit from regulatory compliance targeted towards pollution abatement is clearly recognised and provides a powerful driving force to engage in sound environmental practices. Replacement manufacturing equipment invariably aids environmental management. The decision to acquire such equipment is, however, more frequently driven by production and quality requirements than those applying to pollution abatement.³⁰

4.37 The Australian Manufacturing Council advocates the adoption of Best Practice Environmental Management (BPEM) to integrate environmental best practice into industry's strategic planning processes and production and servicing activities. The Council describes BPEM as the extension of advanced manufacturing techniques into environmental management. It implies a path of continuous improvement in all aspects of a firm's environmental operation. It also means a radically different attitude by management, unions and training institutions to management practices, skills development, devolution of responsibility and employee participation.³¹

4.38 The Australian Manufacturing Council reported that in 1991-92, half the manufacturing firms in a sample of 147 had undertaken environmental audits, 94 per cent of which had been within the previous two years. The size of firms impacted on the response, with larger firms making greater use of environment management programs. Ownership was also of significance with foreign owned firms nearly twice as likely to have adopted an environmental policy. This was attributed to the fact that foreign firms were more likely to be large corporations involved in environmentally sensitive industries. The

²⁷ *A clean green Email gains EPA plaudits*, Advertiser, 18 July 1994, p 31.

²⁸ \$110 000 saved in recycling, *Australian Financial Review*, 16 August 1994.

²⁹ 'Smelterweight' Champion of the World, *GEO Australasia*, July/August 1994.

³⁰ Chamber of Manufactures of NSW, *Submission No. 90*, p 5.

³¹ Australian Manufacturing Council, *The Environmental Challenge: Best Practice Environmental Management*, March 1992.

conclusion was drawn by the Council that small and medium Australian firms appear to have difficulty matching the performance of larger firms. This view was confirmed by the Australian Chamber of Commerce and Industry (ACCI):

... it is unarguable that sound environmental practices by all industries do make good business sense. That is why the larger businesses in this country have generally adopted comprehensive environment management programs. I think it gets very much to the heart of the challenge that we now face to provide effective ways of convincing small to medium sized enterprises to address the potential benefits to their efficiency and profitability, to put in place environmental management decision making and planning as part of their business planning and management structures.³²

4.39 The Commonwealth Government has established a number of programs to encourage Cleaner Production including the Cleaner Production Program and the EcoReDesign program administered by the Commonwealth EPA. The Cleaner Production Program encourages selected companies or organisations, with an emphasis on small to medium sized businesses, to review their entire production processes and to demonstrate how they can save resources, improve the quality of their products and maintain a competitive edge by introducing alternative cleaner production processes and practices. The EcoReDesign program aims to improve the environmental performance of manufactured consumer products for competitive advantage which includes minimising or eliminating waste, toxic emissions and other pollutants.

4.40 State Governments are also involved. The Australia Centre for Cleaner Production was established in Melbourne by the Victorian Government with the aim of assisting industry to achieve the dual goals of international competitiveness and environmental excellence through Cleaner Production and the Victorian Government also has a Cleaner Production Grants Program. The Australian Chamber of Commerce and Industry advised the Committee of its strong support for the Centre:

It is something that the Victorian business community strongly supports. We see it as essentially a mechanism for the networking between academia, CSIRO, industry and all the major players in this area ... because of the best practice demonstration programs that the Centre for Cleaner Production is running, companies are starting to see a competitive advantage through undertaking these sorts of processes. We believe that, at the end of the day, the best practice demonstration programs will be a more effective instrument for ensuring that companies undertake appropriate environmental approaches to their production processes and capital equipment purchases, rather than a traditional command control approach.³³

4.41 Whatever the motive, there are environmental benefits and potential for economic growth. It is not possible to quantify employment gains arising from the introduction of Cleaner Production, and the implications for sustainable employment will naturally vary from industry to industry or even within plants within the same industry. It could well be that in some industries the introduction of Clean Production technology could lead to fewer jobs, as pointed out by the Chamber of Manufactures of New South Wales:

³² Evidence, Mr John Martin (ACCI), Canberra, 23 September 1993, pp 182-3.

³³ Evidence, Mr Steven Shepherd (ACCI), Canberra, 23 September 1993, p 186.

The analysis that is the precursor to change in production practices, frequently reveals that existing levels of human resources are either excessive or not put to best use. After implementing of quality, resource and waste management systems, there is, in the Chamber's experience, a reduced need for personnel in some areas. The likely result is an overall reduction in staff numbers or at best, a shift in their distribution.³⁴

4.42 Cleaner Production will assist, at the very least, in the maintenance of jobs which in the longer term would have been lost without a move to more sustainable processes. Where Cleaner Production leads to lowered costs, the more competitive production would be expected to generate increased sales which would stimulate demand for labour. Jobs would also be created in the environment management industry resulting from the supply of equipment and services. Cleaner Production is also likely to contribute to safer, healthier working environments.

4.43 The Committee considers that the adoption of Cleaner Production technology and practices will greatly assist in resolving the potential conflict between industrial growth and protection of the environment. The momentum towards Cleaner Production by all sectors of industry should be maintained and encouraged and barriers to its introduction removed. In view of the strong support from industry, initiatives such as the Commonwealth and Victorian cleaner production programs and the establishment of the Australia Centre for Cleaner Production should be coordinated and Commonwealth funding greatly increased from the \$3.1 million originally committed in 1992.

4.44 The Committee recommends:

- (9) that the Commonwealth Government through the Commonwealth EPA and the Department of Industry, Science and Technology in consultation with industry associations increases funding for the demonstration of the benefits to be obtained by industry from Cleaner Production to a minimum of \$5 million per year.
- (10) that the Commonwealth Government extends the use of Cleaner Production technology and practices in all its facilities and those operated by Commonwealth government business enterprises, including a requirement for annual reporting of progress on reducing discharges to the environment.

Environmental regulations and standards

4.45 A significant number of submissions from industry and government raised issues relating to the environmental regulatory regime in Australia. It was argued that efficient and effective environmental regulation and equally importantly, its consistent enforcement, are essential if the present and emerging opportunities for growth of the environment industry are to be realised. Evidence to the Committee and discussions with

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Australian Chamber of Manufactures of NSW, *Submission No. 90*, p 4.

representatives from the environment industry from Australia and overseas confirmed the view of the OECD that the development of the environment industry is driven primarily by regulation:

Environmental regulation sets the agenda on environment issues and stimulates demand for different types of pollution control equipment and services. Most OECD countries have well developed environment markets due to the establishment of a broad legal framework for environmental protection and the high priority afforded to environmental objectives. The largest and most technically advanced environment markets, and also environment industries, have developed in those countries with the most comprehensive and effective environmental regulations ... Variations in environmental policies and regulations have been instrumental in the development of specific environmental markets and products in different countries.³⁵

Effect of environmental regulation on industrial competitiveness

4.46 The important issue of whether more stringent environment regulation will reduce Australia's competitiveness in export and import replacement industries was raised in several submissions. While reductions in employment could possibly occur in the short term, the Committee considers that higher environmental standards can induce technological innovation and improve the long term competitiveness of industry:

It can be argued that countries with higher environmental standards can gain a competitive advantage in the environmental goods and services industry by inducing the technological change required to meet these standards. Both Germany and Japan, with comparatively high environmental standards, have captured a large share of the world market for environmental goods and services. The competitive advantage can create economic growth and thereby new job opportunities. As the cost-effectiveness of environmental regulations are improved, the prospects for competitiveness and economic growth are improved.³⁶

4.47 The Australian Chamber of Manufactures suggested that reform of the regulatory process would create jobs:

Indeed, ACM believes reform of the legislative process would provide a stronger focus on job creation, investment and economic activity. Reform is needed because the legislative instruments such as those that apply to environmental controls, trade waste limits and land use zoning have the capacity to restrict manufacturers.³⁷

4.48 There is little doubt that inefficient or inappropriate environment regulation can impose high costs on the community by seriously hindering economic growth and development and at the same time failing to preserve and protect the environment due to difficulties in enforcement. It is therefore necessary to ensure that environmental regulation is both efficient and effective.

³⁵ The OECD, *Environment Industry: Situation, Prospects and Government Policies*, OECD, Paris, 1992, pp 19-20.

³⁶ NSW Government, *Submission* No.83.

³⁷ Australian Chamber of Manufactures, *Submission* No. 91, p 8.

Deficiencies in present environmental regulatory regimes

4.49 A number of deficiencies in the regulatory regime for the environment in Australia were referred to the Committee. These included excessive complexity, fragmentation of regulatory authorities, non-uniformity in criteria and standards and ineffective monitoring and inconsistent enforcement of regulations. Similar deficiencies were identified by participants in the Industry Commission inquiry into Environmental Waste Management Equipment, Systems and Services.

4.50 Specific instances of inconsistencies in regulations included the following example from the Australian Chamber of Manufactures in relation to limits on discharges of formaldehyde to sewers:

Formaldehyde initial limits are actually based on occupational hygiene exposure of the sewer workers in the actual sewers when the formaldehyde is down there. We came up with a reasonable balance. We agreed to differ slightly on about a factor of two on the actual emission level. But the emission level being used in Sydney is 10 times lower than the emission level being used in Melbourne.³⁸

4.51 An example of a company faced with higher charges following environmental improvements was given by Australian Paper:

An example is our Botany mill in Sydney in relation to our water charges. We have managed, over time, as part of our environmental improvement strategy to drastically reduce the volume of water that goes out as effluent into the sewer system. But, in doing so, one of the materials that remains in the effluent ... is then found in a higher concentration because you have a lower volume of water. We are charged according to the concentration of that material so, as we have improved our environmental performance, reduced our water usage, reduced our effluent, our water charges have gone up. We would say that that does not make any sense.³⁹

4.52 While the Committee is not in a position to comment on the technical aspects of what should be the appropriate emission levels for particular substances or whether present standards in Australia are more or less stringent than in other OECD countries, the above examples illustrate the increased costs incurred by industry due to the lack of uniformity and consistency in environmental regulation.

Fragmentation of responsibility for environmental regulation

4.53 The division of responsibility between the levels of government has given rise to a proliferation of regulations particularly at State and local government level. The resultant complexity of the process of obtaining approval for new developments has undoubtedly acted as a deterrent to the development of new enterprises and the consequent employment creation.

³⁸ Evidence, Dr Richard Strauch (Australian Chamber of Manufactures), Melbourne, 9 March 1994, p 425.

³⁹ Evidence, Ms Kerrie Milburn-Clark (Australian Paper), Melbourne, 9 March 1994, p 391.

4.54 The process normally involves the State governments using their substantial powers over land use planning, building standards, pollution controls and heritage conservation, and local governments using development controls, land use zoning and local environment plans. The costs are difficult to quantify but have been described as substantial, particularly where the complexity of the process leads to delays. The Bureau of Industry Economics found that all companies included in a 1990 survey complained about the delays encountered through the number of regulatory authorities they had to deal with; the lack of coordination between authorities within and between the States; the lack of uniform standards leading to conflicting demands; frequent and unpredictable changes to the rules governing environmental approval; failure by authorities to observe time limits and uncertainty as to what was required to satisfy environmental standards.⁴⁰

4.55 The Brisbane City Council also identified non-uniformity in regulations within and between States as a major problem for the waste management industry, advising that the Council:

... generally has more stringent policies with regard to transport, storage, treatment and disposal of wastes than the surrounding local authorities. Waste management companies that attempt to comply with Brisbane City Council standards are often undercut by companies dumping in the surrounding localities. There is an urgent need for the Federal and State Governments to set uniform standards for waste management. This is particularly the case with regard to siting of landfills, groundwater protection standards, water and air quality standards.⁴¹

4.56 The Australian Chamber of Commerce and Industry commented on the uncertainty faced by industry:

Environmental policies are made by all three levels of government in Australia. While this inquiry may be primarily concerned with federal policies, it should recognise that the States' various environmental policies cause high levels of uncertainty about corporate obligations, especially for companies that have national operations. Compliance costs are unduly high.⁴²

4.57 DITARD saw the uncertainty in environmental regulation as a significant impediment to the environment industries and called for national consistency:

Clearly defined environmental standards, goals, guidelines and protocols which are not subject to frequent alteration would also reduce uncertainty, thus reducing barriers to investment (with consequent employment benefits). In addition, national consistency in standards, goals, guidelines and protocols has the potential to contribute to business efficiency by reducing regional barriers to trade.⁴³

⁴⁰ Hawkins B, *Environment Approval Processes for Major Industrial Processes*, National Environmental Law Association Conference, July 1993.

⁴¹ Brisbane City Council, *Submission No. 99*, p 3.

⁴² ACCI, *Submission No. 88*, p 3.

⁴³ DITARD, *Submission No. 96*, pp 15-16.

4.58 There is industry support for the establishment of national standards. For example, Pacific Waste Management Pty Ltd advocated the need for national minimum waste management standards in its submission, adding in evidence that:

At this time there are no standards. I hark back to the idea that without those standards we have a lot of substandard operations in existence which are harmful to both human health and the environment. Further, when there are no national minimum standards, companies are very reluctant to invest substantial dollars in state-of-the-art technology for handling waste, be it in recycling, composting, landfilling or whatever process.⁴⁴

4.59 The Committee agrees that while the problems caused by inconsistency in regulation can be readily identified, the issue of how nationally consistent regulations can be developed is not so clear-cut. The proposed National Environment Protection Council will no doubt eventually provide a uniform coordinated approach to environmental protection but, as discussed in Chapter 3, it would be unwise to expect any significant outcomes in the short term. The development of a nationally consistent approach to environmental regulation and the implementation of nationally harmonised environmental standards should proceed without further delay. This will both protect the environment and enable industry in general and the waste management and pollution control industry in particular to develop planning and investment strategies on a firm and stable basis.

4.60 The structuring of the NEPC as a Ministerial Council will inevitably result in lengthy processes of consultation and negotiation at ministerial and official level. The need for decisions to be approved by two thirds of the members of the Council poses the danger of relatively low environmental standards being accepted to achieve agreement.

4.61 For the Commonwealth and the States to agree on national standards a degree of compromise will be necessary. Any weakening of standards for particular regions or industries operating substantially below best practice should be resisted unless there is clear evidence that the outcome will not adversely affect the environment.

Development of more efficient regulatory regimes

4.62 Several submissions drew the Committee's attention to the need for a more innovative approach to environmental regulation to increase its effectiveness and efficiency. As the NSW Government advised:

Traditional approaches to pollution control through regulation specify the pollution levels permitted for each source or the technology to be used for each source. Standards have generally been based on existing technologies and economic circumstances of individual firms. This can impede research and development into new technology that can meet current standards more cheaply or that can prevent pollution and solve an environmental problem. Legislation and regulation will be most effective where it promotes and encourages technological change.⁴⁵

⁴⁴ Evidence, Mr R O'Hara (Pacific Waste), Sydney, 22 September 1993, p. 4.

⁴⁵ NSW Government, *Submission* No. 83.

4.63 In a research paper prepared for DEST in 1993, the traditional 'command and control' model of environmental regulation is described as being generally effective in meeting environmental objectives but it tends to be inflexible and imposes a high cost on the community.⁴⁶ While command and control regulations still have an important role in controlling small waste dischargers without the technical capability to properly manage wastes, more flexible regulatory approaches to pollution control can greatly promote economic growth in specific industry sectors and effectively reduce pollution.

4.64 The Committee agrees with views expressed in several submissions that regulations should be outcome oriented rather than process oriented to provide scope for lowering the cost of achieving environmental objectives. The Environment Institute of Australia, for example, stated that environmental standards:

... should be much more outcomes focussed. We should be looking at the environmental objectives we hope to achieve rather than setting a standard for the sake of it. It is the impact on the environment which is much more critical. Just having a tight standard does not mean that we can protect the environment.⁴⁷

4.65 The Committee notes and agrees with the views of the Industry Commission that:

... there is a strong case for greater use of outcome-oriented regulation instead of process-oriented regulation. The major advantage of outcome-oriented regulation is the flexibility allowed to polluters to select least-cost technologies for achieving the required environmental outcome ... greater use of economic instruments could also benefit the EWMESS industry by boosting demand, particularly for innovative technologies.⁴⁸

4.66 Whichever approach is taken to environmental regulation there will be a need for a high level of consultation with industries affected, and a need for regulations to be soundly based on scientific grounds. As the Australian Water and Wastewater Association advised in relation to water standards:

Scientifically determined water quality standards must be used, not politically or popularly agreed levels, since the implications of incorrect standards can be profound ... upon this work will depend many critical decisions which will drive the market for processes, equipment and hence employment in the wider pollution market. If the scientific basis for standards is flawed, then there is a serious potential for millions of dollars to be misspent, even though jobs might be created as a result.⁴⁹

4.67 The Committee recommends:

(11) that national environmental standards should be outcome oriented (rather than process oriented), stringent and rigorously based on scientific grounds.

⁴⁶ James D, *Using Economic Instruments for Meeting Environmental Objectives: Australia's Experience*, Research paper prepared for DEST, June 1993.

⁴⁷ Evidence, Mr Warwick Giblin (Environment Institute of Australia), Sydney, 22 Sept 1993, p 48.

⁴⁸ Industry Commission, Report No. 33, *Environmental waste management equipment, systems and services*, Canberra, 1993, p 92.

⁴⁹ Australian Water and Wastewater Association, *Submission No. 81*, pp 4, 7.

4.68 It is argued that economic instruments provide the tools for more efficient environmental regulation and there are a number of economic instruments which can offer polluters a financial incentive to achieve environmental goals. They include taxes, effluent and product charges and tradeable emission permits. Environmental taxes attempt to account for the external costs of polluting activities. Effluent charges which are levied on the amount of discharge and product charges levied on the price of a product whose manufacture causes pollution provide direct incentives for pollution control.

4.69 Tradeable emission permits allow trading of pollution permits between companies up to a limit on the total pollution discharge. Under such schemes companies with lower pollution control costs can sell surplus permits to firms facing higher costs of pollution abatement. As long as permits are comparatively scarce, there will be an economic incentive to firms to reduce pollution in the most efficient way possible, thus providing a stimulus to innovation. Several such schemes have been introduced into the US with mixed results. The main difficulty appears to have been the establishment of an efficient market with most trading in permits being undertaken within companies themselves.

4.70 Australia's experience in the use of economic instruments to meet environmental objectives was examined in a research paper commissioned by DEST in 1993. The only example of tradeable rights in Australia is a scheme introduced in 1992 as part of the Murray-Darling Basin Salinity and Drainage Strategy. Under this scheme, salt credits generated by capital works aimed at reducing salt entering the river system can be traded between states. Under the Strategy for Ozone Protection approved by the Australian Environment Council in 1989, it was originally proposed that a system of tradeable permits for chlorofluorocarbons (CFCs) would be used. Subsequent negotiations with industry led, however, to the adoption of direct regulations and fees to cover administrative costs.⁵⁰

4.71 There is no one regulatory or economic instrument which will cater for all environmental needs. A more innovative approach to environmental regulation, through application of economic instruments to particular situations, could result in greater effectiveness but the experience so far is, in practical terms, fairly limited.

4.72 The Committee notes the cautious approach proposed by the Commonwealth Treasury, that consideration of the increased use of economic instruments to deal with environmental problems should be subject to a careful assessment of their benefits and costs.⁵¹ The Committee, nevertheless, in principle strongly supports this use of the economic instruments approach. An examination of the direct and indirect effects on employment would be of particular significance in any assessment of the application of economic instruments.

⁵⁰ James D, Using Economic Instruments for Meeting Environmental Objectives: Australia's Experience, Research paper prepared for DEST, June 1993.

⁵¹ Treasury, *Submission* No. 105, p 3.

4.73 The Committee recommends:

- (12) that where feasible the Commonwealth Environment Protection Agency develops and incorporates economic instruments within environmental regulatory regimes to provide clear positive incentives for compliance.

Self regulation and industry involvement in environmental regulation

4.74 Major sectors of Australian industry have recognised the need for industry to be sustainable in the longer term and have themselves introduced a range of innovative measures to protect the environment. For example, the rapidly developing feedlot industry has attracted criticism on the grounds that feedlots cause contamination of streams, generate unacceptable odours and risk degradation of ground water. The industry responded by establishing, through the Australian Lot Feeders Association, a self regulatory system to ensure that feedlots meet recognised minimum standards in respect of environmental management. This involves an accreditation program based on compliance with a quality assurance system.

4.75 The Australian Chemical Industry Council (ACIC) has adopted the Responsible Care program for the Australian chemical industry. Under the program a series of codes is being developed to address company functions including waste management. The Council claims that almost all member companies are working on waste reduction and that most major companies have pledged 50 per cent wastes reduction over the next five years.

4.76 In evidence to the Committee, ACIC advocated a 'co-regulation' approach to environmental control. This approach comprises a partnership between industry and government with government endorsement or accreditation of companies' own internal environment management systems and severe penalties for contravention:

All the companies in ACIC that would comply with responsible care would have their own management systems. Some would have very well articulated management systems. We believe that that goes a very considerable way towards our self-regulation and commitment to maintaining our own standards. We want the formal government endorsement of those systems, still with agreed performance outcomes. That really means less compliance monitoring and less intervention in terms of prescription and how processes are managed. It means incentives at some point. It also probably means pretty tough penalties for contravention. From our company's point of view, we would accept that as a trade-off.⁵²

4.77 The concept of co-regulation for fairly sophisticated and major industries was strongly supported by the Australian Chamber of Manufactures which saw co-regulation as cost-effective for very large companies but inappropriate for smaller operations:

⁵² Evidence, Ms D Suggett (ACIC) - Melbourne, 9 March 1994, p 405.

At some point in company size and sophistication it drops right through the floor and is impossible to achieve. So there will always be some size of company that wants regulation. It wants hard and fast rules about how high to jump; that is its way of operating.⁵³

4.78 For environmental self-regulation and co-regulation to be effective and accepted by regulatory authorities and the community, there is a need for the establishment, accreditation and certification of individual companies' environment management systems. This would provide third party scrutiny in a manner similar to that provided for quality management systems under international standards for quality management. A large percentage of major purchasers of goods and services now require their suppliers' quality systems to be certified to these standards of quality. Although there is a growing demand in Europe for environmental certification, there is some resistance by Australian industry to environmental accreditation. Standards Australia advised that:

... some sectors of industry continue to see environmental management systems, and the related Standards, as a threat rather than an opportunity ... Government support and recognition of these initiatives would help overcome such barriers and must surely benefit Australia in the medium to long term.⁵⁴

4.79 Independent environmental certification is a relatively new process and may take some time to develop but, if more vigorously pursued, it could give a stimulus to the environment industry and provide a verifiable basis for industry self regulation. State environmental regulation may also increasingly involve independent certification as part of the environmental approval and licensing process. For its part, the Commonwealth could require independent certification to ensure that its major suppliers and recipients of assistance comply with environmental standards.

4.80 The Committee recommends:

- (13) that within three years the Commonwealth Government implement a requirement that companies whose operations impact on the environment, and which receive significant government grant assistance or obtain major government contracts, obtain certification of their environmental management systems.

Enforcement of environmental regulations

4.81 Lack of or inconsistent enforcement of environmental regulations was raised as a disincentive to polluters to improve environmental performance. The Industry Commission examined the enforcement of environmental requirements by different agencies and found that there was no uniform approach to enforcing environmental regulations in Australia. Regulatory agencies adopt a mixture of cooperative approaches,

⁵³ Evidence, Dr R Strauch (Australian Chambers of Manufactures), Melbourne, 9 March 1994, p. 416.

⁵⁴ Standards Australia, *Submission* No. 86, p 3.

focussing on conciliation and negotiation, and adversarial approaches placing more emphasis on prosecution and other deterrents. An assessment of the effectiveness of the different strategies would require detailed information which is not readily available.⁵⁵

4.82 Australian courts have been content with fines for pollution offences unlike the tough enforcement of environmental legislation in Germany, Denmark and the US where company executives have been jailed for major pollution offences. This more stringent enforcement has served to stimulate the environment management industry in those countries. NSW has, however, enacted legislation of which a major feature is the reversal of the onus of proof for directors so that provided pollution has occurred, directors have to prove that they were not personally responsible. NSW courts have imposed fines of \$75 000 on companies and fines of up to \$15 000 on directors, mainly for water pollution offences. An increase in the number of companies undertaking environmental audits and establishing environmental management systems could be attributed to some extent to this legislation.⁵⁶

4.83 The Committee considers that environmental regulations will not be effective without adequate monitoring and enforcement, and agrees with the recommendation of the Industry Commission that governments should direct environmental agencies to collect and publish information on monitoring and enforcement programs, possibly as part of the process of producing State of the Environment Reports.

4.84 The Committee recommends:

- (14) that Commonwealth and State Ministers responsible for the environment direct their environment agencies to collect and publish information on the effectiveness of monitoring and enforcement programs as part of the process of producing State of the Environment Reports.**

Community right to know

4.85 Self regulation approaches to environmental regulation are unlikely to be entirely effective unless backed some form of government or public scrutiny. The capacity of public opinion to persuade companies to be less polluting has also been shown to be effective as an environmental regulation strategy in its own right.

4.86 The United States has enacted community right to know legislation requiring companies to report the release of chemicals in a Toxic Release Inventory (TRI). The legislation, known as the Emergency Planning and Community Right to Know Act (EPCRA) incorporates three main elements:

⁵⁵ Industry Commission, Report No.33, *Environmental Waste Management Equipment, Systems and Services*, 1993.

⁵⁶ Much tougher laws in European countries, Australian Financial Review, 16 August 1994.

- . an annual inventory of estimates of designated toxic chemical releases, compiled by the Federal (and some State) EPAs from annual Toxic Chemical release forms (TRI forms) provided by industry;
- . an annual inventory of designated hazardous (and extremely hazardous) chemicals compiled by State and local authorities from chemical inventory reports provided by industry; and
- . provision of Material Safety Data Sheets (MSDSs) to the public by manufacturers, whenever they are required to prepare MSDSs under occupational health and safety laws.

4.87 The EPCRA is the most advanced legislative scheme for community right to know and the only scheme which has been in operation for any substantial period of time. There is therefore, considerable empirical evidence as to its effectiveness.⁵⁷ Professor Neil Gunningham of the Australian Centre for Environmental Law advised the Committee that the most effective aspect of EPCRA is undoubtedly the TRI, which has had a dramatic impact on levels of toxic emissions. The initial inventory, containing 1987 data, was released in 1989:

... in its first year revealed that 22 billion pounds of harmful chemicals had been discharged into the environment by manufacturing plants covered by the inventory. These alarming statistics brought substantial remedial action from industry and government;

... demonstrated that the vast majority of toxic chemical emissions are not regulated by government; and

... enabled citizens to develop a 'league table' of toxic polluters, to compare one company's performance with another's and to compare the same company's performance over consecutive years and to produce national pollution score cards.⁵⁸

4.88 Increased public scrutiny has forced the chemical industry in the United States to invest in strategies for reducing wastes.⁵⁹ The Commonwealth Environment Protection Agency reported that a government review of the TRI in the United States found that half of all reporting facilities had made one or more operational changes resulting from the inventory program. The review reported by the Commonwealth EPA also found that the Chemical Manufacturers Association viewed the inventory as a tool to help facilities identify equipment leaks and other inefficiencies that increase their emissions.

⁵⁷ Professor N Gunningham, *Submission* No. 106, p 7.

⁵⁸ Professor N Gunningham, *Submission* No. 106, p 8.

⁵⁹ Johnson J W, 'Chemical Industry Cleans Up its Act' *Forum Appl Res Public Policy*, 8 (1), 1993 p 65.

4.89 The response of industry to community pressure can also result in more efficient operations and savings. The Commonwealth EPA also reported that an independent study in the United States had found that 29 chemical manufacturing facilities participating in the TRI program had reduced losses of chemicals with 181 individual source reductions. A total of \$US 21 million was saved at 14 of the plants with most savings between \$16 000 and \$350 000 per year. Only one facility reported a net cost increase. Most showed a cost recovery period for the capital investment of less than 18 months.⁶⁰

4.90 Experience with the TRI apparently exceeds expectations. Industry has generally found that savings realised as a result of reduction in waste generation have more than offset the cost of undertaking the inventory and reducing the losses.⁶¹ Professor Gunningham submitted that the EPCRA has been successful in generating considerable public scrutiny and criticism of manufacturers' operations, provoking community debate about the location and development of industrial facilities close to residential areas and creating substantial public backlash. This prompted a number of major chemical manufacturers to modify and improve their environmental control strategies even in the absence of government legislation requiring them to do so.⁶²

4.91 In his submission to the Committee, Professor Gunningham identified several limitations of the community right to know approach:

... does not guarantee a 'right to act', and this is undoubtedly one of its most serious limitations;

... inventories do not give information on risk assessments, the impacts on human health and the environment, the relative potency of substances or their cumulative affects;

... inventories of hazardous chemicals (as adopted in the USA under EPCRA) do not in themselves mean that hazards are minimised or systems put in place to deal with emergency response. Rather, they rely on public interest groups and local communities to use the information to campaign for improved practices;

... problems occur with distortion of information compiled in the TRI;

- national aggregate figures on toxic emissions can produce staggering results which draw attention to pollution by the manufacturing industry. But this type of information is of little practical use except to enable international comparisons. Only local or facility based figures provide more broadly useful information;

... the US EPCRA is designed to cover only pollution and hazardous chemicals in industrial facilities. It does not cover chemical use in the agricultural context, where the need for data is great.⁶³

⁶⁰ Commonwealth Environment Protection Agency, *National Pollutant Inventory, Public Discussion Paper*, 1994, p 28.

⁶¹ *ibid*, p 12.

⁶² Professor N Gunningham, *Submission No. 106*, p i.

⁶³ Professor N Gunningham, *Submission No. 106*, p 47-49.

4.92 Specific limitations have been identified in the United States EPCRA:

The US legislation has shown that it has particular limitations which should be taken into account when Australian legislation is prepared. In the US, only a limited range of facilities are required to report their toxic releases, and polluting exempt facilities include storage facilities, sewage treatment plants, power plants, solid and hazardous waste incinerators, federal facilities, dry cleaning businesses and mining operations. US Right to Know legislation also includes only 320 chemicals on which reports must be submitted, out of the more than 60 000 chemicals currently in use in the US. The scheme relies on self-reporting - that is, the companies report their own emissions - and the figures may not always be reliable. The maximum amounts which can be used or emitted from a facility before a report is required can be quite high.⁶⁴

4.93 The United States legislation only applies to manufacturing facilities with at least 10 full-time employees that manufacture, import, or process at least 25 000 pounds, or otherwise use at least 10 000 pounds, of a toxic chemical. As a result, the TRI data represent just 'the tip of the toxic tower', according to the United States congressional Office of Technology Assessment.⁶⁵

4.94 Despite these limitations it is clear that community right to know legislation could make a significant contribution to environmental regulation and, to the extent that it prompts companies to modify their practices, could also provide a stimulus to the environment industry. The Commonwealth EPA concluded that the United States TRI is one of the most successful and cost-effective regulatory tools, contributing significantly to pollution reduction, waste minimisation and cleaner production in the United States.

4.95 Similar inventories are required or are proposed in some European countries and a National Pollution Inventory (NPI) has been proposed for Australia. The Prime Minister's statement on the environment in December 1992 included a commitment of \$5.9 million over four years to establish a legislated NPI in cooperation with State and Territory governments. A possible framework for the NPI is still being established through a process of consultation and review begun by the Commonwealth EPA. The main features of the Prime Minister's proposal are that the NPI will:

- . stimulate waste minimisation and cleaner production;
- . be publicly available;
- . progressively bring together data on emission of pollutants to the air, water and land;
- . be a national database;

⁶⁴ Larry O'Loughlin and Clare Henderson, 'Who Wants to Know', *Chain Reaction*, No. 67, October 1992, p 35.

⁶⁵ Ethan Shenkman, 'Right-to-Know More', *The Environmental Forum*, July/August 1990, p 21.

- . be tabled annually in parliaments in Australia; and
- . lead to cost benefits for industry.⁶⁶

4.96 Details of a proposed NPI have been circulated by the Commonwealth EPA. It has been suggested that the NPI be composed of six elements, the first of which will be modelled on the United States TRI. This will require annual returns by industry on specific chemical releases, including both pollutant discharges and waste transfers from their facilities.

4.97 It is intended that the NPI be a mandatory system underpinned by Commonwealth or Commonwealth and State legislation. However, initial introduction of the NPI will be as a voluntary scheme to allow the development of a better understanding of the nature and value of the process. It is envisaged that Commonwealth legislation would establish the NPI. The legislation could contain model provisions including a requirement for annual returns from facilities under direct Commonwealth control.

4.98 One option is for State and Territory legislatures to enact parallel laws enabling annual emission information from industry. When in place this would prepare the way for mandatory reporting, expected to be required from 1995.

4.99 It is proposed that the key requirements in any laws, whether parallel or in a single jurisdiction, would be:

- . community right-to-know provisions;
- . proper trade confidentiality protection for industry;
- . requirement for designated industries to submit annual returns of releases to the environment;
- . requirement for organisations submitting returns to certify that proven and technically sound estimation techniques have been applied and truly reported;
- . sanctions for false reporting;
- . procedures for establishing agreed reporting protocols and criteria for information to be reported;
- . public availability of inventory information to be facilitated by Commonwealth and State agencies; and
- . requirements for reports required by joint legislation to be presented annually to Parliament.

⁶⁶ Commonwealth Environment Protection Agency, 1994, p 1.

4.100 The NPI will not be a substitute for existing licensing and monitoring programs. The Commonwealth EPA points out that inventories are indicators of pollutant loads discharged to the environment. They are source oriented and contribute to the measurement of pollution prevention and waste minimisation. They identify points of possible stress on the environment and, while not measuring environmental quality directly, they may indicate where direct measurement of environmental quality is appropriate. Further, when coupled with techniques for modelling dispersion, assimilation or fixation of the pollutants released, they can help to estimate environmental quality.

4.101 In 1993 Senator Powell introduced a bill to give legislative effect to a system enabling the community to access information about certain toxic chemicals and the existing procedures in place to deal with emergencies involving the spill or release of those chemicals.⁶⁷ According to Senator Powell this bill addressed the need for the 'formal dissemination of information concerning toxic chemicals' by making freely available to the public, information relating to the use, manufacture, storage, transportation, recycling and treatment of toxic chemicals.⁶⁸

4.102 This bill, which was re-introduced by Senator Chamarette in September 1993, seeks to establish legislation which will compel corporations and relevant persons to disclose details relating to toxic chemicals which are involved in their industrial practices and which may affect the health or environmental welfare of the community. Professor Gunningham suggested that the bill is of limited practical use as it fails to reflect existing structures for regulation of pollution and chemicals, or the policy ideas of non-government organisations. Nonetheless, the introduction of the bill has put community right to know on the agenda of the Commonwealth Parliament.⁶⁹

4.103 The NPI could provide the basis for an effective community right to know mechanism and it is proposed that it be supported by legislation. The Committee notes the conclusions of Professor Gunningham:

... the benefits of community right to know, not only to the public and community groups, but also to business, may be very substantial. Former US EPA Administrator William Reilly on the basis of the USA experience asserts that CRTK is 'one of the most effective instruments available' for reducing toxic air emissions. In Australia, appropriately designed, enforced and resourced community right to know, would provide an essential basis for achieving similar benefits here.⁷⁰

4.104 The Committee agrees that some form of community right to know pollution control mechanism would be a very valuable addition to environmental regulation in Australia and would complement direct regulation processes and self regulation by industry. The implications for employment are not quantifiable but, if industry is prompted to respond by modifying its procedures to minimise waste it could lead to operational efficiencies and provide a stimulus to the environment industry.

⁶⁷ Toxic Chemicals (Community Right to Know) Bill 1933.

⁶⁸ Senator Janet Powell - *Second Reading Speech*, Senate Debates - 19 May 1993, P 810.

⁶⁹ Professor N Gunningham, *Submission No. 106*, p 16.

⁷⁰ Professor N Gunningham, *Submission No. 106*, p 54.

4.105 The proposed National Pollution Inventory has the potential to be an effective and valuable pollution control measure. The Committee considers that, provided the Commonwealth moves expeditiously to develop and implement the Inventory, it will not be necessary to further consider the bill presently before the Senate.

4.106 To be fully effective as a community right to know mechanism the National Pollution Inventory will need to extend beyond the chemical industry to include all possible sources of pollution including facilities where chemicals are used, stored and reprocessed. It will also need to include the operations of governments. This could require State and Territory governments to either enter into agreements with the Commonwealth or to enact complementary legislation. It will also need to include mandatory public reporting on the environmental performance of all the factories and sites required to provide information under the proposed legislation. This will enable the community to compare the performance of individual companies and government instrumentalities and to apply pressure to reform pollution prevention procedures.

4.107 The Committee recommends:

- (15) that the Commonwealth Government, in cooperation with the State and Territory governments, move as quickly as possible to develop and implement the National Pollution Inventory as a community right to know measure.**

4.108 The proposal that the NPI be voluntary in its initial stages will provide an opportunity for government, industry and the community to gain valuable experience and make necessary adjustments, but the legislation should clearly provide from the outset that it will become binding, will have wide application and will require mandatory public reporting on an individual plant or factory basis.

4.109 The Committee therefore further recommends:

- (16) that the legislation establishing the National Pollution Inventory provide that compliance with mandatory public reporting requirements be made compulsory (except for commercial-in-confidence considerations) within three years of the enactment of the legislation.**
- (17) that the legislation establishing the National Pollution Inventory require the provision of sufficient information for the public to be able to assess the environmental performance of particular sources of pollution.**

4.110 The Committee also recommends:

- (18) that the proposed National Pollution Inventory apply to all Commonwealth government instrumentalities.**

CHAPTER 5: POLICIES FOR SUSTAINABLE EMPLOYMENT GROWTH IN WASTE MANAGEMENT AND RECYCLING

5.1 As our economy has grown, our use of resources has also grown even more rapidly and has caused an increasing flow of wastes into the natural environment. In 1992, the Commonwealth EPA estimated that each year more than 14 million tonnes of solid domestic, commercial and industrial waste are disposed of in Australian landfills. Australia's level of waste is equivalent to about one tonne per head of population and is one of the highest in the world. As well as discharge of waste waters to sewage, more than 200 000 tonnes of liquid and solid industrial wastes are taken to special landfills and treatment facilities throughout Australia. Household and private garden waste and various other wastes collected by local government authorities make up about half the total waste stream. The remainder comes from industrial and commercial wastes (35-40 per cent) and building and demolition wastes (15 per cent).¹

5.2 The Committee notes that almost all solid waste is disposed through landfill and that in metropolitan areas there is a fast diminishing availability of suitable space for landfill. While incineration is a preferred option in many European nations, in Australia incineration is strongly opposed by some community and other interest groups.

5.3 *The major providers of solid waste management services are local government authorities whose principal role is the collection of solid wastes from households and the operation of landfill sites, waste transfer stations and recycling centres. A number of private contractors operate waste disposal facilities both privately and on behalf of government authorities. In 1993, the Industry Commission estimated the total annual cost of solid waste disposal in Australia at \$675 million.*²

5.4 Recycling is an integral part of waste management along with landfill disposal and incineration. A number of submissions to the Committee from the recycling industry and community groups suggested that significant employment opportunities existed and that governments should provide assistance for the recycling industry through various direct support and fiscal and tariff measures.

5.5 The recycling sector of the industry has shown significant growth in recent years, particularly that part of the industry involved in collecting and sorting post-consumer waste. For example, DEST has estimated that four million homes are now serviced by kerbside recycling, over one third of all paper products used in Australia is recovered from the waste stream and 30 per cent of newspapers are recycled for use as packaging and insulation.

¹ CEPA, National Waste Minimisation and Recycling Strategy, 1992.

² Industry Commission, Report No. 33, EWMESS inquiry, 1993, p 51.

5.6 As with other sectors of the environment industry, employment figures are scarce but a Victorian study in 1992 provided an estimate of recycling employment in Victoria:

... there are about 2500 people employed in this field in Victoria at present, if all paper recycling activities are included (commercial and industrial sources as well as domestic). The distribution of this employment is broadly as follows: paper 1000; glass, aluminium and plastics 750; collection and sorting 600-800; local government 100. These job numbers cover collection, sorting, direct transport, processing, some marketing and coordination/supervision.³

5.7 Evidence to the Committee from the Recyclers Association of Victoria indicated that the kerbside collection and sorting of household recyclables would employ between 600 and 800 persons on a full-time basis. Over the past five years the number employed has doubled in Victoria following increases in both the range of products collected and the volume.⁴

5.8 Studies in the United States have indicated that approximately 2000 jobs are created for each million tonnes of waste handled in recycling operations annually.⁵ Brisbane City Council advised that potential existed for a total of 725 jobs which could be created from the introduction of environmental technologies in waste collection and disposal, recycling, materials recovery facilities and composting plants.⁶ In July 1994, the New South Wales government launched a campaign entitled 'The 50 per cent solution' which aimed at halving the waste dumped in Sydney's landfills by the end of the decade. Under this plan it is estimated that at least 1000 jobs would be created to recover energy and reusable raw materials from Sydney's waste. On the basis of these broad estimates, it would be reasonable to conclude that scope exists for the creation of several thousand jobs Australia-wide. The Committee cautions, however, that many jobs which could be created are unskilled and, where hand sorting is required, the work can be unpleasant.

5.9 Moves towards more sophisticated and environmentally acceptable methods of solid waste disposal, such as the waste transfer and landfill facilities established by the Brisbane City Council, cannot be expected to create large numbers of jobs. Much of the operation is highly capital intensive rather than labour intensive and any new jobs are likely only to replace positions displaced from older operations.

5.10 In June 1992 the Commonwealth Government issued the National Waste Minimisation and Recycling Strategy. The strategy set an overall target of a 50 per cent reduction in waste going to landfill by the year 2000 and established planning targets for recycling of a number of materials including plastics, glass and paper. While several states have accepted this plan, major difficulties have subsequently arisen in its implementation, largely as a result of marketing difficulties impacting on the financial viability of recycling. There is considerable enthusiasm from the general public for recycling but the lack of opportunities to actually recycle materials collected in some areas is damaging this high level of interest.

³ Report of the Victorian Fibre Processing and Sustainable Development Jobs Council, *Jobs and the Environment*, August 1992.

⁴ Evidence, Mr D Bourke (Recyclers Association of Victoria), Melbourne, 9 March 1994, p 356.

⁵ Renner M, *Creating Jobs in Industrial Countries, State of the World*, 1992.

⁶ Brisbane City Council, *Submission No. 99*, p 4.

5.11 The Brisbane City Council advised the Committee that the waste management strategies at all levels of government are inadequate and in many cases non-existent. The Council advocated the formulation of a legislative strategy by the Commonwealth Government with regard to:

- . national targets for waste minimisation;
- . the recycled content of products;
- . the recyclability of packaging and products and regulation of packaging in general; and
- . container deposit legislation where appropriate.⁷

5.12 Pacific Waste Management raised the issue of the need for national minimum waste standards as well as *standard waste definitions to provide a degree of certainty* for companies in the waste management industry. In evidence to the Committee, Pacific Waste stated:

Generally speaking, in our activities there are no minimum standards. The issues of solid waste management have generally tended to be neglected. As a result, we believe that there is not only a commercially uneven playing field but also every opportunity for the future degradation of the environment and a risk to human health. We are saying that there is a very definite need to implement a policy that will protect those two issues and, in doing so, offer employment opportunities.⁸

5.13 Standard waste definitions are necessary in any formulation of national waste management standards. As Pacific Waste explained:

... unless the waste is characterised it is hard to know which is the correct means of disposing of it ... The problem is that people like ourselves are working with a degree of uncertainty ... We are saying that there needs to be redefinition and reclassification of waste and the manner in which it can be disposed of so that you can have certainty within the manner in which you operate.⁹

5.14 The Committee notes that policies relating to the growth prospects of the solid waste management industry in Australia were comprehensively examined by the Industry Commission in the course of its inquiry in 1993 into Environmental Waste Management Equipment, Systems and Services. The Committee agrees, in general, with the recommendations of the inquiry as they relate to this industry, particularly the recommendations that charging structures for landfill services should be linked to use of those services and that full cost recovery should be pursued. Full cost recovery could be achieved by charging for environmental damage and applying a commercial rate of return on the community's investments in waste management assets. More efficient pricing of landfill disposal will encourage waste minimisation by industry through cleaner production and will also provide a direct incentive for householders to minimise waste through recycling and other means such as composting.

⁷ Brisbane City Council, *Submission* No. 99, p 3.

⁸ *Evidence*, Mr R O'Hara (Pacific Waste), Sydney, 22 September 1993, pp 3-4.

⁹ *Evidence*, Mr R O'Hara (Pacific Waste), Sydney, 22 September 1993, pp 11-12.

5.15 The Committee recommends:

- (19) that the Commonwealth Government encourages State and Territory governments and local government authorities to implement the recommendations of the Industry Commission relating to the introduction of charging structures for landfill that are based on the user pays principle together with full cost recovery.

The need to create markets for recycled materials

5.16 Without doubt the most important factor in creating employment and even maintaining existing employment in the recycling industry is the establishment of sustainable markets for the recycled materials. The general public is responding well to the concept of sorting recyclables from other wastes. For instance, almost 70 per cent of Sydney residents are participating in kerbside recycling. Local government authorities and their contractors are consequently building an extensive infrastructure to collect and sort recyclables. The Committee was advised that nationally about 48 per cent of paper, 62 per cent of aluminium cans and 42 to 44 per cent of glass are being collected. The percentage of plastics collected is much lower.¹⁰ The majority of material presently recycled is collected from industrial sources. For example, of the one million tonnes of paper which is presently recycled, over 80 per cent is from industrial sources rather than the more visible kerbside collections.

5.17 The volume of recyclable materials collected continues to grow with, for example, the collection of glass in Australia increasing from 150 000 tonnes in 1988 to around 300 000 tonnes in 1992. Prices received generally do not meet the costs of collection and sorting, and the Committee was advised by the Recyclers Association of Victoria that:

Many recycling programs are currently at the cross roads with the possibility of greater expansion if markets were stabilised and a change in the attitude of local governments or the termination of recycling ... If the latter were to occur, the progress achieved over the past four years in waste minimisation in the community would be lost along with many hundreds of jobs.¹¹

5.18 The lack of established markets and unstable prices for recyclables has resulted in a reluctance by some local government authorities to enter into long term arrangements with contractors for the collection and sorting of recyclables. The Waste Contractors and Recyclers Association of New South Wales advised the Committee that part of the reason that two year contracts were selected was the fact that councils did not have enough faith in the stability of recycling markets. The Councils did not know exactly what they would be forced to pay and what was the best system to implement, considering the present instability.¹² To encourage contractors to invest in state-of-the-

¹⁰ Evidence, Mr C Johns (Waste Contractors and Recyclers Association of NSW), Sydney, 22 September 1993, pp. 34-5.

¹¹ Recyclers Association of Victoria, *Submission No. 60*, p 3.

¹² Evidence, Mr A Johnston (Waste Contractors and Recyclers Association of NSW), Sydney, 22 September 1993, p 34.

art technology and provide longer term employment opportunities, local government authorities will need to demonstrate a firm commitment to recycling programs. One source of finance for local government could be the imposition of an additional charge on landfill disposal to subsidise recycling programs.

5.19 There are a number of causes of the marketing problems for recyclables including:

- . the increased volumes of recycled materials being collected is leading to a supply of materials that is greater than the demand from the reprocessors;
- . a drop in export prices due to dumping of recyclables in developing countries by industrialised nations;
- . decreases in prices of virgin materials, particularly in the plastics industry; and
- . more stringent product specifications from purchasers.

5.20 Examples of collection costs and prices received were provided to the Committee by the Waste Contractors and Recyclers Association of NSW:¹³

	Collection Cost \$/tonne	Price Received \$/tonne
Waste paper	90	50
Glass bottles	107	100
PET bottles	1203	600
Aluminium cans	910	830
Liquid paper board	692	200

5.21 The prices received for recyclables are subject to considerable variation and the figures above can only be considered as indicative. The differentials between collection costs and prices obtained are believed to be even wider for other materials such as steel food cans and other plastics such as PVC and HDPE bottles.

5.22 Discussions with the recycling industry and purchasers of recyclables indicated that although the collectors and sorters were generally concerned about the prices paid, there were ready markets for glass and aluminium. There were also ready markets for waste office paper and cardboard but there was a surplus of waste newsprint in some regions. The ANM newsprint mill in Albury, NSW, which opened in March 1994, will take some 65 000 tonnes of newsprint per year. A surplus of waste newsprint from the 150 000 tonnes per year presently recovered is expected to remain until recently announced increases in newspaper recycling capacity come into production.

¹³ Waste Contractors and Recyclers Association of NSW, *Submission No. 56, Appendix A.*

5.23 The recycling of plastics has run into major difficulties. Plastic containers have a very high volume to weight ratio which adds to the cost of collection. Sorting is also a major problem because up to eight different types of plastics are used as containers. Although particular plastic containers carry a logo which is either in the form of a triangle with a number code to identify that type of plastic or just a logo denoting that the container is recyclable, the Committee was advised by recyclers that the general public remains very confused about which plastics can be recycled.

5.24 Full Cycle Plastics, which is a company reprocessing post-consumer plastic, advised the Committee that demand for reprocessed material was low and that some of the company's production was being stored. The factory cost of producing reusable plastic from the 800 000 used milk containers the company used to receive each week exceeds \$800 per tonne, including a purchase price of \$475 per tonne for the used containers. It is obviously very difficult for reprocessed material to compete against prime resin, the world price of which has fallen from \$1800 per tonne in 1990 to \$1250 per tonne in 1993.¹⁴

5.25 The proceeds to local government authorities from the sale of recyclables are unlikely to cover the collection costs in the foreseeable future but savings in the costs of the alternative of disposal through landfill can be significant. For example, Frankston City Council in Melbourne has estimated that in 1993-94, operation of the Council's Recycling Centre has saved 13 000 cubic meters of landfill disposal which would have cost \$232 000. The sale of recyclables realised about \$100 000 so that a total benefit of \$332 000 was obtained to set against collection costs which exceeded the revenue from the sale of recyclables.

5.26 It is therefore clear that apart from glass, aluminium cans and some grades of waste paper, there is little prospect of the collection and processing of recyclables being financially viable in the near future on the basis of costs being met by revenue from the sale of the reprocessed materials. Essentially the collection, sorting and processing of most recyclables must be considered as a service rather than a business and essentially an extension of the household garbage removal service.

5.27 A feature of the recycling industry over many years has been the involvement of community based organisations utilising a high degree of volunteer effort. An organisation which has received a number of awards is the Kingfisher Centre at Aspley in Brisbane. The Centre recycles glass, aluminium cans and other materials but does not accept paper, steel cans or plastics. The income of the Centre is \$10 000 per year and it provides 260 hours of work per week and work experience for 43 persons with disabilities.

¹⁴ Full Cycle Plastics, *Submission* No. 26, p 8.

5.28 The Committee notes that community based organisations such as the Kingfisher Centre are performing a useful role in mobilising the community to participate in recycling while providing work experience rather than paid employment for disabled people. There is a danger, though, that the lack of markets and the prices paid for recyclables will harm the financial viability and diminish the enthusiasm of volunteer groups. Although regular kerbside collections will lower the amount of materials such as glass bottles and aluminium cans deposited at voluntary recycling centres as has happened at the Kingfisher Centre, a need exists for the provision of facilities for recycling materials such as household goods, furniture, toys and batteries. The Committee encourages local government authorities to support the involvement of community groups in setting up recycling centres for this purpose.

Policies to encourage the establishment of sustainable markets for recyclables

5.29 There is no point in recycling for recycling's sake or recycling regardless of the economics. Economic, fiscal and regulatory measures should aim at an optimal level of recycling to maximise environmental benefits at minimum cost to the community.

5.30 Recycling provides employment opportunities that could be either expanded or severely curtailed depending on the viability of future markets. The environmental benefits are also significant and the Committee considers that, in general, the Commonwealth should consider measures which will stimulate markets for recycled products without causing any undue market distortion for existing suppliers with the risk of net job losses. At the same time, any measures discriminating against the use of recycled products should be identified and removed.

5.31 In relation to wastepaper, the Committee was advised that the most pressing need was to secure a market for newsprint. The Committee recognises that technical factors in paper production limit the amount and type of waste paper which can be used as a feedstock to produce a particular grade of recycled paper. There is also a limit to the number of times paper can be recycled, due to the breakdown of fibre during each paper production cycle. However, there are two areas where scope exists to increase the use of waste paper.

5.32 Firstly, imports account for about 54 per cent of the fine papers used in Australia and import replacement by local production would result in increased usage of waste paper. Australian Paper advised the Committee that the company wished to regain market share for Australian production through a large reinvestment program aimed at improving quality, productivity and environmental performance. The company added that imports were increasingly from low cost, highly sophisticated producers such as Brazil and Indonesia which were advantaged by being classified as developing countries thus receiving a concession on the general tariff. Australian made paper was also competing with imported products with misleading country of origin labelling which gives the impression that these imported products were manufactured locally.¹⁵ The Committee notes that the Commonwealth Government has announced that developing country preferences will be phased out or removed for all but the least developed countries. The country of origin issue is also being addressed by the Government which

¹⁵ Evidence, Mr K Milburn-Clark (Australian Paper), Melbourne, 9 March 1994, p 375.

has introduced legislation into the Parliament to amend the *Trade Protection Act 1974* to ensure products which have their origin in Australia are accurately labelled and to give customers a reliable means of identifying Australian products.

5.33 Secondly, Australian companies have announced investment plans which include recycling facilities. Australian Paper has announced a \$50 million investment at Fairfield, Melbourne which will increase its collection of office paper by 40 000 tonnes per year and newsprint by 20 000 tonnes per year. Pratt Industries has announced a proposal to build a newsprint facility in Sydney which could ultimately have the capacity to recycle 270 000 tonnes of waste newsprint per year to produce 250 000 tonnes of newsprint. The facility would include a de-inking plant for the recycling of used newspaper and would have an initial capacity of 135 000 tonnes of newsprint per year.

5.34 These initiatives, together with the Commonwealth Government's decision that by the end of June 1996, 90 per cent of Commonwealth purchases of certain paper products should be recycled or otherwise environmentally preferred, should significantly assist in providing markets for the present surplus of waste paper. However, a discussion paper by DEST setting out options for the Commonwealth's purchase of recycled paper was severely criticised by the paper industry and is now being revised. The implementation of a purchasing strategy to favour recycled paper is therefore likely to be delayed. The Commonwealth EPA is also developing scientific criteria for the definition of environmentally preferred paper. These criteria will need to be simple to administer, consistent and should provide a standard with which Australian manufacturers can comply.

5.35 The issue of establishing markets for recycled plastics and the factors involved are much more complex. The costs of collecting and sorting the different types of plastics used are high. There are, however, promising technical developments which will increase the market for recycled plastic, such as the launch by ACI Petalite of its new recycled PET bottle which can be used as a food and beverage container.

5.36 Several submissions to the Committee advocated the imposition of a mandatory content of recycled material requirement on specific products such as plastic supermarket bags. The Committee notes that several states in the US have enacted minimum recycled-content laws for a number of products to reduce the amount of material disposed in landfill. However, the Committee recognises on the basis of evidence provided to the inquiry, that the problems of availability of landfill sites in Australia are nowhere near as acute as in parts of the US. While mandatory content legislation will establish markets for recycled plastics, there is a danger that considerable additional costs could be incurred by the community as a whole. Mandatory content legislation could, however, create a significant market for recycled material and the Committee considers that this option should be seriously examined by the Commonwealth and State governments. It may become necessary to establish mandatory requirements for the use of recycled materials in certain products if stable markets for recyclable material do not emerge.

5.37 The Committee recommends:

- (20) that to stimulate the market for recycled materials, the Commonwealth Government investigate the environmental, employment and economic costs and benefits of imposing a mandatory requirement for a minimum content of recycled material in specified products, and that it develop standards for the use of recycled materials.

5.38 Submissions from the Waste Contractors and Recyclers Association of New South Wales and the Australian Recycling Technologies of Ballarat, Victoria advocated the exemption or reduction of sales tax on materials with a high content of recycled material to encourage their wider use. Certain paper products made wholly from recycled fibre were exempted from wholesale sales taxation by the Commonwealth Government in October 1989. Local paper producers objected to the exemption on the grounds that it:

- . favoured imported products;
- . disadvantaged the use of papers with significant, but less than 100 per cent recycled content; and
- . did nothing to encourage greater recycling of newsprint.

5.39 Following these objections the exemption was removed from several products including tissues, exercise books and paper bags. The exemption remains for some products, including writing papers and envelopes. Australian Paper advised the Committee that there is no evidence that the 20 per cent sales tax exemption has improved wastepaper recycling in Australia but has, on the contrary, encouraged imports, misallocated scarce resources and is seriously jeopardising major local investment and employment. For example:

In the case of both brown and white bags, the sales tax exemption has had an environmental cost - by diverting a scarce resource to a single use application (corrugated boxes and business papers can be recovered and recycled four or five times); and, an economic cost - through the loss of environmentally-sound and otherwise competitive local products to imports.¹⁶

5.40 Despite the evidence of the unforeseen consequences which can arise from the use of fiscal measures, the Committee considers that there remains a substantial case for the Commonwealth Government to stimulate the market for recycled products through exemptions from, or reductions in, sales tax for particular products. Before implementing any such measures there should be wide consultation with industry and the community to ensure that, as far as possible, the end results of the incentive are consistent with the objectives of encouraging recycling and stimulating employment in Australia.

¹⁶ Australian Paper, *Submission* No. 103, Amcor attachment, p 2.

5.41 Representatives of the pulp and paper industry have advised that uncertainty about Commonwealth Government policies on sales tax exemptions on paper products and definitions of environmentally preferred paper is a factor constraining significant investment of some \$300 million in new and replacement capacity. While the Committee recognises that governments have a clear responsibility to develop policies from environmental considerations for the community as a whole rather than for particular industry sectors, such policies should be developed without undue delay and should set a consistent framework within which industry can make investment decisions.

5.42 The Committee recommends:

- (21) **that to stimulate the market for recycled products, the Commonwealth Government, in full consultation with industry and the community, investigate the environmental, employment and economic benefits and costs of exempting or reducing wholesale sales tax on specified products with a minimum content of recycled material.**

Incineration of wastes to produce energy

5.43 The alternative of incineration of waste to produce energy mainly in the form of electricity is a method of waste management widely used in highly industrialised countries with strict air quality regulations, such as Japan and Germany. Community attitudes in Australia to incineration of wastes to produce energy are based on perceptions of older technology rather than modern plants operating under strict emission controls. Apart from community concerns, the Committee was advised that the cost of incineration would, in general, be much higher than the cost of disposal by landfill in Australia. From an employment perspective, Pacific Waste Management advised the Committee that incineration would not normally operate with fewer people than landfill.¹⁷

¹⁷

Evidence, Mr R O'Hara (Pacific Waste), Sydney, 22 September 1993, p 8.

CHAPTER 6: POLICIES FOR SUSTAINABLE EMPLOYMENT GROWTH IN USE OF LESS-POLLUTING ENERGY SOURCES

6.1 To define this sector of the environment industry, it was necessary for the Committee to establish certain parameters as a basis for its considerations. For the purpose of this inquiry, the Committee did not confine its considerations to renewable energy sources or what are known as non-conventional energy sources but focussed on all energy sources with lower releases of greenhouse gases than coal and petroleum based energy sources. The nuclear option was excluded from consideration as it has been rejected by all major political parties in Australia. For security, safety and economic reasons as well as environmental considerations the Committee agreed that discussion of the use of nuclear energy for electricity generation in Australia is irrelevant.

6.2 The Committee also recognises that one of the most effective strategies to mitigate global warming is a combination of energy conservation and improvements in the efficiency of energy end-use. The Committee therefore considered the demand side of energy use as well as the supply side.

6.3 The Australian Bureau of Agricultural and Resource Economics has estimated that 5.8 per cent of Australia's energy use was derived from renewables in 1991-92.¹ Renewable energy forms included in this estimate are hydro-electricity, biomass (mainly bagasse and domestic wood heaters) and domestic solar water heaters.

The Australian renewable energy industry

6.4 The Australian renewable energy industry, not including the solar water heating sector, consists of about 100 small and medium sized firms with an annual turnover of about \$100 million.² DITARD advised that the renewable energy industry's strengths include world leading technologies in solar photovoltaic cells, solar hot water systems, power electronics and a world class scientific and technical skills base, as well as the advantage of Australia's proximity to the Asia-Pacific region. DITARD added that there were some significant impediments to the industry's development including:

its lack of maturity, comprising as it does a large number of small firms many of which do not possess sufficient scientific, technical and business skills to develop and effectively market technologies on a world scale; and

¹ ABARE, *Energy demand and supply projections Australia 1992-93 to 2004-05*, 1993.

² DIST, Annual Report 1993-94, p 71.

the presence of large monopoly suppliers in the traditional sector of the energy market whose cross-subsidising and other market-distorting practices impede the uptake of renewable energy systems which would otherwise be viable in the domestic marketplace.³

6.5 The Australian Solid Fuel and Woodheating Association advised that the industry directly employs over 4000 people excluding fuelwood suppliers and has a turnover conservatively estimated at \$140 million. Wood heaters are installed in almost one million homes.⁴ With the exception of the woodheating industry, employment in alternative energy sectors is not high. While the construction phase of hydro-electric power stations provides substantial short-time employment, their operation and maintenance provides only small numbers of jobs estimated at best at between one and two persons per \$1 million of capital investment.⁵ Bagasse, the fibrous residue of sugar cane, is used to provide process heat and electricity for sugar processing and refining, with excess electricity supplied to the grid. This application does not involve significant employment.

6.6 After woodheating, the solar industry is the most mature and commercial of the renewable energy industries but total employment remains relatively small. The Australian solar water heating industry has a turnover of about \$30 million and directly employs about 350 people.⁶ Solar/electric water heaters, which on average use electricity for some 30 per cent of their heat output, impose one-third of the greenhouse gas emissions of an electric water heater. Emissions can be reduced by a further 75 per cent if solar water heaters are boosted by gas rather than electricity. An expansion of the industry would be highly beneficial to the environment, even if it did not involve the creation of significant additional employment.

6.7 Photovoltaic cells use silicon technology to convert solar radiation directly to electricity and have been commercialised worldwide since the mid-1970s. Australia's market share in world photovoltaic systems is 8 per cent, with Telecom Australia being the world's largest user of photovoltaic systems. Two companies manufacture photovoltaic cells in Australia from imported silicon wafer and assemble them into modules. The combined present production output is about 2 megawatts capacity per year with 40 per cent of the output exported, mostly to Asia.⁷ One of the two companies advised the Committee that annual turnover is about \$25 million and some 120 persons are employed. Although the cost of solar cells has dropped substantially since the 1970's, photovoltaics are only competitive in Australia in specialised niche applications such as remote area power supply systems and power for telephone repeaters and navigational aids.

6.8 Other sectors of the renewable energy industry are very small. For example there are only two manufacturers of small wind generators in Australia. These are owner-operated employing less than five persons.

³ DITARD, *Submission No. 96*, p 14.

⁴ Australian Solid Fuel and Woodheating Association, *Submission No. 89*, p 1.

⁵ ANZ Solar Energy Society, *Submission No. 75*, p 21.

⁶ DITARD, Report on Renewable Energy Industry Workshops, June 1993.

⁷ ANZ Solar Energy Society, *Submission No. 75*, p 16.

Scope for employment creation in the renewable energy industry

6.9 The Committee considered the scope for job creation arising from the substitution of carbon based energy sources by less polluting energy sources, to reduce the release of greenhouse gases. The most important of the greenhouse gases is carbon dioxide (CO₂) which is estimated to account for over 70 per cent of Australia's greenhouse gas emissions. The energy sector, including transport, is responsible for about 67 per cent of CO₂ emissions. Methane is another important greenhouse gas and the energy sector contributes about 17 per cent of all methane emissions.⁸

6.10 To achieve significant reductions in greenhouse gas emissions, it will be necessary to promote a number of energy supply and demand options. The Department of Primary Industries and Energy has suggested that these include:

- . improving energy efficiency and energy conservation;
- . moving from energy sources which produce higher amounts of CO₂ to energy sources which produce lower amounts; and
- . substitution by non-carbon producing energy sources for fossil fuels.⁹

6.11 Moving from energy sources which produce higher amounts of CO₂ to energy sources with lower CO₂ production, such as changing from coal fuelled power stations to gas fuelled power stations is unlikely to create long term employment. In this particular example, a net reduction in employment would in fact occur with job losses in coal mining, transportation and coal and ash handling at the power station.

6.12 There is scope for employment creation in the use of renewable energy technologies such as solar and wind energy which are generally more widely distributed geographically and hence more labour intensive than the supply of conventional fossil fuelled energy. The Committee considers, however, that despite claims made by some advocates of renewable energy, it would be unrealistic to expect the creation of substantial numbers of jobs in the short to medium term. The Australia and New Zealand Solar Energy Society provided some estimates of job numbers using US studies. These indicate that per million dollars of annual expenditure, solar water heater manufacturing employs about 10 jobs compared with 3-5 jobs for most energy utilities.¹⁰ While good prospects for increased exports of photovoltaic systems were suggested to the Committee, the number of jobs which could be created would not be huge, the Solar Energy Industries Association advising the Committee that:

A multi national company which manufactures PV modules in Australia currently employs about 90 people in direct production. If their output was increased by 100% their employment numbers would have to go up by about 20%.¹¹

⁸ National Greenhouse Gas Industry 1988 and 1990, DEST, 1994.

⁹ DPIE, *Energy and the Environment*, Discussion Paper No. 1, 1992.

¹⁰ ANZ Solar Energy Society, *Submission No. 75*, p 23.

¹¹ Solar Energy Industries Association, *Submission No. 28*, p 6.

6.13 The increased production of ethanol for blending into petrol or diesel to reduce the levels of exhaust emissions has the potential to create employment, particularly in rural areas. Ethanol can be produced from a number of agricultural crops including sugar cane and wheat, and research is proceeding into its production from cheaper feedstocks such as agricultural residues and woody-fibrous materials. There are already commercial applications, for example, the Manildra group of companies has recently commissioned an ethanol plant using the residue from wheat starch production as a feedstock and a Tasmanian company is planning to produce ethanol from potato waste.

6.14 The Committee notes that to produce 10 per cent of Australia's total liquid fuel needs some 80 regional plants close to the feedstock would be required. A CSIRO study is reported as indicating that each plant would create 150 direct jobs in producing, harvesting and transporting feedstock and operating the plant. On this basis 80 plants would have the potential to create 12 000 jobs.

6.15 In many applications the use of less polluting energy sources is more capital intensive and can provide more employment opportunities than coal and petroleum based energy sources of equivalent capacity. A US study indicates that generating 1000 gigawatt-hours of electricity per year is estimated to create 248 jobs in a solar thermal facility and 542 jobs on wind farms, compared with 116 jobs in an equivalent coal-fired plant.¹² In evidence to the Committee, DPIE and the Solar Energy Industries Association of Australia stated that the renewable energy industry was labour intensive without offering any specific figures. DPIE commented that the additional jobs created were directly proportional to the greater capital requirements needed to utilise renewable energy sources compared with coal and petroleum based energy:

... in the broadest of broad terms, when you develop a power supply system, the employment generated per dollar of investment in a power supply system is approximately proportional to the actual capital cost of the system. For example, if you were trying to compare a 100 megawatt coal-fired power plant with an equivalent power producer, or with a wind farm providing the same amount of power, you would need something like 300 megawatts of wind - it is a matter of how often the wind blows - to give the same amount of kilowatt hours. At the moment, wind power costs one and a half to two times per unit for coal-fired plants. So on these sorts of numbers you are looking at a capital cost of something like four and a half to six times a coal-fired power plant ... I believe you would find that the actual employment required to establish that wind power plant would be in that same general ratio, in broad terms. In other words something like four and a half to six times as much as the coal-fired power plant.¹³

6.16 The net addition to the labour market may be small, but an increased use of less-polluting energy sources would create significant employment in more widespread applications. This would more than offset any job losses resulting from reduced use of fossil fuels.

¹² Renner M, *Creating sustainable jobs in industrial countries*, State of the World, 1992.

¹³ Evidence, Mr I Walker (DPIE), Canberra, 2 June 1994, p 597.

Commonwealth Government support for energy management and renewable energy sources

6.17 Apart from programs aimed at general industry assistance, the Commonwealth Government has maintained for many years a range of programs aimed at encouraging efficiency in energy use and supporting research into development and application of renewable energy sources. The States also have a number of programs with similar objectives.

6.18 The Commonwealth's major program designed to reduce greenhouse emissions through the implementation of measures addressing energy use is the National Energy Management Program (NEMP) administered by the DPIE. This program has a current annual level of funding of \$5.5 million. Activities under the program include the Renewable Energy Promotion Program, the Enterprise Energy Audit Program and the Local Energy Efficiency Projects Scheme. The latter scheme provides support of up to \$10 000 to organisations seeking to improve energy efficiency and reduce energy waste in their local areas.

6.19 In 1993, the administration of the NEMP was reviewed by the Australian National Audit Office and its effectiveness was assessed by independent consultants. Both reviews identified serious deficiencies in the Department's management of the program. In a review of the audit report presented to Parliament in May 1994, the Committee recommended that the program be restructured and expanded to a level that will do more towards attaining the Government's greenhouse gas emissions reduction target.¹⁴ The Minister for Primary Industries and Energy has since advised the Committee that the NEMP is being restructured with a more defined focus on a smaller number of energy efficiency programs.¹⁵

6.20 Recent measures introduced by DPIE to promote renewable energy sources include the provision of \$1.5 million over three years to jointly fund the United Nations Industrial Development Organisation (UNIDO) Centre for Applications of Solar Energy in Perth and \$6 million over three years to promote the use of solar water heaters by establishing and demonstrating innovative financing mechanisms.

6.21 There are also significant marketing opportunities for the renewable energy industry. Global concerns about the impact of coal and petroleum based energy supply have led to increasing interest in the use of renewable alternatives. DITARD advised that, for example:

Already the global installed capacity of photovoltaic technology has increased from one megawatt in 1978 to 55 megawatts in 1992. Moreover it is expected that the demand to the year 2000 will be in excess of 1200 megawatts, requiring annual production in each of the next seven years to be greater than the total capacity presently installed.¹⁶

¹⁴ House of Representatives Standing Committee on Environment, Recreation and the Arts, *Greenhouse Response - Effectiveness of the implementation of an Interim Program*, May 1994.

¹⁵ Letter from Senator the Hon. Bob Collins, Minister for Primary Industries and Energy, 1 September 1994.

¹⁶ DITARD, *Submission* No. 96, p 13.

6.22 DITARD also advised that the market for renewable energy technologies in the Asia-Pacific region will be worth several billion dollars over the next decade.

Bodies such as the World Bank point to opportunities for photovoltaic electrification of rural areas in Indonesia and the Philippines, for water pumping throughout Asia, and for wind farms in Indonesia and India.¹⁷

6.23 The Commonwealth Government supports, through Austrade, the Australian Energy Systems Exporters' Group known as AUSTENERGY, which has a membership of about 70 organisations in the private and public sectors. AUSTENERGY members provide consulting services in all renewable energy technologies and have undertaken training programs for international clients including the United Nations and the World Bank.

6.24 The Commonwealth Government is also taking a number of initiatives to boost the use of alternative transport fuels, particularly ethanol. In the 1994-95 Budget, DPIE was allocated funding of over \$8 million for the establishment of an ethanol pilot program, a bounty scheme for ethanol used as a transport fuel and associated research and development.

6.25 The Commonwealth Government actively supports renewable energy R&D. Between 1978 and 1992-93, the Commonwealth provided some \$41 million for solar, wind, biomass, hydro and geothermal energy R&D. Initial program support was provided to a wide range of technologies but as the program developed, effort was concentrated on those technologies offering the best prospects for early commercial success. Under this strategy, priority was given to the development of low temperature applications (domestic water heating) and remote area power supplies.¹⁸ Since 1990, most Commonwealth energy R&D funding has been directed through the Energy Research and Development Corporation (ERDC). Allocations to alternative energy research by ERDC averaged \$7 million per year from 1990 to 1992.

6.26 The Committee considers that while the programs and activities outlined above have worthwhile objectives, there remains a fragmentation of effort between departments. In view of the potential environmental and economic benefits of increasing energy efficiency and the use of renewable energy sources, there is a need for a greater funding commitment and a rationalisation of the activities currently undertaken.

6.27 The Committee recommends:

- (22) that the Commonwealth Government rationalises existing programs aimed at the promotion of increased energy efficiency and the demonstration of renewable energy technologies.

¹⁷ DITARD, *Submission No. 96*, p 13.

¹⁸ DPIE, *The Australian Renewable Energy Industry*, 1993.

- (23) that Commonwealth support for energy efficiency and renewable energy initiatives be coordinated through a high-level group to include the Department of Primary Industries and Energy, the Department of Industry, Science and Technology, the Department of the Environment, Sport and Territories and the Department of Transport.

Efficiency in energy use

6.28 Several submissions pointed out measures which would increase the efficiency of energy use and which would also create employment. State Projects, the professional arm of the New South Wales Public Works Department, attempted to quantify the costs and benefits suggesting for instance that, in their experience, to achieve potential electricity savings of \$30 million per year an up-front investment of \$60 million would be required, noting that it would have a pay-back period of two years. The investment of \$60 million to reduce energy use would be largely spent on energy auditing services and the supply and installation of equipment, and could create 500 jobs over two years. Environmental benefits would be obtained from the conservation of about 100 000 tonnes of non-renewable energy resources per year and a reduction of about 250 000 tonnes per year in emissions of greenhouse gases.¹⁹

6.29 US experience indicates that reducing energy use via improved efficiency is cheaper and creates more jobs than supplying the equivalent amount of saved energy from either conventional or renewable energy sources. Measures to reduce residential energy use ('weatherisation') were particularly labour intensive, generating 60-80 job-years per \$1 million of expenditure.²⁰ Although weather conditions are more extreme in the US than in Australia, a similar employment outcome, if smaller, could be expected in Australia through the installation of measures such as ceiling and wall insulation, double glazing and more efficient lighting and heating. There would seem to be little doubt that increasing the efficiency of domestic energy end-use will create employment as well as reducing emissions of greenhouse gases. With the existing impediments to better energy use it is likely that little will be achieved without a strong initial boost.

6.30 The Committee recommends:

- (24) that the Commonwealth Government in cooperation with the states:

- . develop a jointly funded scheme for modifying existing housing of low income earners, to increase energy efficiency and create employment; and
- . encourage energy efficient design of new housing.

¹⁹ NSW Public Works Department, State Projects, *Submission* No. 23.

²⁰ Renner M, *Creating Sustainable Jobs in Industrial Countries*, State of the World, 1992.

6.31 In its review of the Audit Report on the NEMP, the Committee called for the program to be expanded to match the size of the problem and the potential benefits:

The NEMP needs to be greatly expanded to provide a level of resources more adequate to address the size of the problem and the benefits that could be achieved. The current level of expected funding in each of the next three years is a derisory \$5.5 million. This is grossly inadequate given the potential annual savings of \$1.5 billion that the Government estimated could be realised if its emission reduction target is achieved.²¹

6.32 In light of the advice from the Minister for Primary Industries and Energy that the NEMP is being restructured as previously proposed by the Committee, the Committee now recommends:

- (25)** that the Commonwealth Government increase funding for the National Energy Management Program to at least \$10 million per year for the next three years with an increased focus on the industry sector and with job creation potential as one of the key factors in the allocation of funding.

6.33 The Committee considers that it is essential that the Commonwealth Government demonstrates a strong commitment to, and takes positive action to increase, energy end-use efficiency and the use of less-polluting energy sources within its own facilities and agencies. As an example of the positive approach needed, the Committee noted that in March 1994 President Clinton signed Executive Order 12902 described as an aggressive mandate to improve energy efficiency and water conservation in Federal buildings nationwide and to increase investment in solar and other renewable energy. Savings of \$US1 billion annually in reduced energy bills could possibly be achieved. Key provisions of the Executive Order include:

- reductions in energy consumption in Federal buildings by 30 per cent by 2005 over 1985 levels;
- increases in energy efficiency in agency industrial facilities by at least 20 per cent by 2005 compared to 1990 levels;
- the US Department of Energy to develop a program to significantly increase the use of solar and other renewable energy sources;
- an obligation for agencies to designate buildings to demonstrate the best energy and water efficiency, and renewable energy technologies to the public; and
- requirement for agencies to strive to purchase products in the top 25 per cent of their class for energy efficiency, wherever such products are cost-effective and meet the agency's performance requirements.

²¹ House of Representatives Standing Committee on Environment, Recreation and the Arts, *Greenhouse Response - Effectiveness of the Implementation of an Interim Program*, May 1994.

6.34 Targets for energy efficiency improvements in Commonwealth buildings were announced in the Prime Minister's Statement on the Environment in December 1992. Taking 1992-93 as the base year, the Government aims to reduce energy use by 15 per cent within five years and 25 per cent within ten years. Potential energy cost savings in Commonwealth buildings were assessed at between \$30 million and \$46 million per year.

6.35 As part of an evaluation of the NEMP in 1993, consultants to DPIE observed that there has been a long history dating back to 1981 of Commonwealth Government activities directed towards improving the efficiency of its own use of energy in buildings. The consultants noted, however, that in an efficiency audit undertaken by the Australian National Audit Office in 1992,²² progress being made towards achieving efficiency improvements was considered as being too slow.²³

6.36 The Committee considers that the Commonwealth Government should reaffirm its commitment to energy efficiency improvements and publicise the results obtained. The targets and time frame proposed in 1992 are not ambitious enough given the potential savings and environmental benefits.

6.37 The Committee recommends:

(26) that the Commonwealth Government, through the Department of Primary Industries and Energy, target reductions in energy usage in Commonwealth buildings and facilities of at least 25 per cent by 2000 based on 1992-93 usage, and report annually to Parliament on progress in energy saved, reductions in greenhouse gas emissions and savings in energy costs.

(27) that the Commonwealth Government, through the Department of Primary Industries and Energy, implement a program to increase the application of renewable or less-polluting energy resources within its own agencies and business enterprises.

Less-polluting energy sources

6.38 There is an extensive range of alternative energy sources that are less polluting than conventional sources. Several, such as hydro-electricity and domestic solar water heating, are fully commercial with well-developed technologies. Others such as the use of hot dry rock geothermal technology and wave power are at an early stage of development and many years away from commercialisation in Australia. The Committee agreed that, in view of its focus on employment opportunities, it would concentrate mainly on those technologies which could provide jobs in the short to medium term.

²² Australian National Audit Office, *Efficiency audit: energy management of Commonwealth buildings*, Audit Report No. 47, 1991-92.

²³ George Wickenfeld and Associates, *Evaluation of the National Energy Program*, Report to DPIE, October 1993.

6.39 There is no single preferred less-polluting energy source which could replace a significant proportion of coal and petroleum based energy use. Most renewable energy sources such as hydro-electricity, tidal energy and wind energy are site specific and their development to date has been dependent to a large extent on local energy demand.

Solar and wind energy

6.40 DPIE considers that the increased use of solar water heaters is the single largest technical opportunity to reduce emissions of greenhouse gases from the residential sector in the short to medium term. So far more than 300 000 Australian households have solar water heaters. A market penetration of 43 per cent has been achieved in the Northern Territory, key factors being the provision of solar rebates by the government and the absence of electricity at off-peak rates. Elsewhere consumers are unwilling to outlay three times the initial cost of equivalent electricity or gas water heaters. Another factor has been the aggressive marketing of off-peak electricity by electricity authorities. As a result market penetration of solar water heaters in states such as Victoria is less than one per cent.

6.41 The major barriers to more widespread adoption of solar water heaters are economic, not technical. The Solar Energy Industries Association of Australia advised the Committee that the up-front cost of installing solar water heaters was typically \$2500. Third party financing schemes whereby purchasers can pay off the initial cost through energy bills could therefore dramatically increase sales.²⁴

6.42 The Committee considers that there is also scope for the Commonwealth and State governments to show a lead by installing solar water heaters in all new government houses and replacing worn-out electricity and gas heaters with solar systems. According to an Australian Bureau of Statistics survey in 1990, only 6100 or 1.7 per cent of the estimated 354 000 public housing units in Australia have solar water heaters.²⁵ A large proportion of these would be in the Northern Territory where most public housing units have solar systems. The absence of any commitment from governments provides little incentive for the private sector to invest in solar water heaters. The installation of solar water heaters will increase the initial cost of housing and could raise equity issues, such as whether tenants of houses with solar water heating should pay higher rents to reflect the increased capital cost of the house. However, with increased production and bulk purchasing, the initial capital cost of solar units should fall. The resolution of minor equity issues should not be beyond the ability of government housing authorities to resolve.

²⁴ Evidence, Mr R Prowse (Solar Energy Industries Association), Melbourne, 9 March 1994, p 432-4.

²⁵ ABS, 1990 Survey of Income and Housing Costs and Amenities, Cat No.4136.0, Information Paper 'Characteristics of Dwellings'.

6.43 The Committee recommends:

- (28) that the Commonwealth Government install solar water heaters in all new Commonwealth housing, such as Defence housing, and replace current gas and electricity units with solar systems wherever possible.
- (29) that the Commonwealth Government review the Commonwealth State Housing Agreement with a view to encouraging the states to install solar water heating in public housing wherever possible.

6.44 The 'EnergyCard' scheme announced by DPIE in August 1994 following an agreement between the Commonwealth Government and Macquarie Bank is a promising initiative to increase the use of solar water heaters. Using the EnergyCard, which is similar to a credit card, consumers will be able to buy solar water heaters and other energy efficient products with loans at 9 per cent interest without any deposit. The Committee welcomes the introduction of the EnergyCard scheme but considers that its attractiveness could be enhanced if consumers were provided with the alternative of making repayments as part of their energy bills. There would also appear to be scope for energy utilities and local government authorities to lower the initial capital cost of solar water heaters by bulk purchasing units for consumers to buy through the EnergyCard.

6.45 The Committee recommends:

- (30) that the Commonwealth Government strongly support, promote and extend the development of third party financing schemes for solar water heaters such as the 'EnergyCard' scheme, including arrangements for consumers to meet repayments as part of their energy bills.

6.46 The Committee was advised by the Australian and New Zealand Solar Energy Society that costs of electricity from photovoltaics are competitive with alternatives for remote area power supplies. About 20 000 isolated homesteads in Australia rely on diesel or petrol generators to supply their power needs. The immediate potential market is for 20 megawatts of photovoltaic modules with a value of about \$120 million.

6.47 The Commonwealth and New South Wales Governments have taken several initiatives to encourage the use of renewable remote area power supplies (RAPS). The New South Wales Government's Remote Area Power Supply Assistance Scheme provides grants to assist residents in remote areas to either be connected to the grid or to purchase a RAPS system, the cost of which can range between \$15 000 and \$50 000 depending on size. The Commonwealth's Renewable Energy Promotion Program administered by DPIE is aimed mainly at the promotion of renewable energy RAPS.

6.48 Several submissions drew the Committee's attention to the subsidy of rural grid connected customers by other electricity consumers, the Committee recognises the social and economic benefits to remote communities from grid supply and would not support

the suggestion that electricity charges to existing rural consumers be raised to assist the competitive position of the renewable energy industry. The Committee considers that a better alternative would be to extend the New South Wales RAPS scheme as suggested by the Solar Energy Industries Association of Australia:

If such a scheme were introduced in the rest of the country - and there is a rudimentary scheme in Victoria, which only offers a maximum of \$3000 rebate - I believe that there would be remarkable stimulus to the renewable energy industry. The offshoot would be a lot of jobs and a lot of exports.²⁶

6.49 The Committee recommends:

- (31) that the Commonwealth Government in cooperation with the states develop a jointly funded scheme to subsidise remote area power supplies using renewable energy technologies through the introduction of schemes similar to the New South Wales Government's Remote Area Power Supply Assistance Scheme as it applies to renewable energy sources.

6.50 Wind energy has applications in both stand-alone remote area power supply and in electricity supply to the grid through wind energy farms. The technology is mature with about 20 000 grid-connected windgenerators worldwide with a total installed capacity of over 2000 megawatts.²⁷ Several States have undertaken demonstration wind energy projects and in March 1994 Australia's first commercial wind farm was officially opened at Esperance, Western Australia. This wind farm consists of nine wind turbines which will generate 2 megawatts of power providing 30 per cent of the local region's power needs. It is expected that 1.9 million litres of diesel fuel will be saved per annum which will reduce CO₂ emissions by 5000 tonnes.

6.51 Of the renewable energy technologies to emerge in the past 10 to 15 years, DPIE considers that wind farms are probably the most promising and lowest cost option in the short term.²⁸ The Committee noted, however, the decision of the Victorian Government in May 1994 to withdraw support for a proposed 10 megawatts capacity wind farm in South Gippsland on the grounds that the higher cost of electricity could not be justified when the State already had a power surplus. The Committee considers that wind energy represents a significant non-polluting resource (apart from noise and visual pollution), the development of which would assist in achieving reductions in greenhouse gas emissions. The Victorian project would have provided valuable experience in the design, construction and operation of a wind farm connected to the main Australian electricity grid which could be expected to lead to further business opportunities in Australia and overseas.

²⁶ Evidence, Mr R Prowse (Solar Energy Industries Association), Melbourne, 9 March 1994, p 430.

²⁷ ANZ Solar Energy Society, *Submission No. 75*, p 18.

²⁸ DPIE, *Renewable Electricity for Australia*, Discussion Paper No. 2, 1992.

6.52 The Committee recommends:

- (32) that the Commonwealth Government provide financial assistance to State governments to support the construction of demonstration grid-connected wind farms on at least three sites within Australia.

Biomass

6.53 Apart from hydro-electricity, the largest present source of renewable energy for electricity generation is bagasse which is the residue from sugar cane. Bagasse is burnt to provide process heat and electricity in sugar mills with any surplus being exported to the electricity grid. Much of the bagasse is burnt inefficiently and DPIE has estimated that the one third of the energy which is wasted could be used for electricity production.²⁹ A major factor restricting efficient cogeneration has been the price paid by the electricity supply authority for the electricity supplied to the grid by sugar mills during the crushing season.

6.54 Methane gas produced in landfills has been utilised in recent years to produce electricity and process heat and there is scope for increasing use of this resource. Although not a renewable energy source in the strictest sense, another more abundant source of energy is the use of methane gas drained from coal mines. Methane discharged from landfills and coal mines contributes significantly to the greenhouse effect since methane is estimated to contribute 7.6 times as much to global warming as CO₂ per unit volume of gas emitted.³⁰ New South Wales and Queensland are actively investigating the development of coal seam methane and two coal companies are already generating electricity from this source.

6.55 While there would not be scope for the creation of substantial employment, there are significant environmental benefits to be gained from the efficient use of the above biomass energy sources. A concerted effort is needed from biomass producers, energy supply authorities and governments to overcome the technical and institutional barriers to the more efficient use of these resources.

Ethanol

6.56 The Commonwealth Government is committing a significant amount of funding for the encouragement of the use ethanol as an alternative transport fuel. The use of ethanol for this purpose is well established in the US where corn is used as a feedstock and in Brazil, using sugar cane as a feedstock. Ethanol-petrol blends were most recently introduced into the Australian fuel market in 1992 by BOGAS which is a joint venture by Bowen Petroleum and Caltex Australia. BOGAS uses ethanol produced from the residue of wheat starch production by the Manildra Group at Nowra, New South Wales.

²⁹ DPIE, *Renewable Electricity for Australia, Discussion Paper No. 2, 1992*, p 7.

³⁰ DPIE, *Energy and the Environment, Discussion Paper No. 1, 1992*, p 4.

6.57 A blend of 10 per cent of ethanol with petrol can generally be used in existing engines without requiring any modifications. Dr Reeves of APACE Ltd drew the Committee's attention to the need for a new Australian Design Rule requiring ethanol compatibility in all vehicles manufactured in Australia and imported into Australia from a specified date, possibly January 1997, adding that cars manufactured in Australia for export to the US were already required to be fitted with fuel system components compatible with not only ethanol but methanol and a whole range of other products.

6.58 Use of ethanol has considerable environmental benefits since apart from a reduction in carbon monoxide emissions, carbon dioxide equivalent in volume to that emitted during combustion is effectively recycled through the growth of crops for ethanol production. While estimates of its net greenhouse effect vary, it seems likely that it is at least 50 per cent less than petrol.

6.59 A crucial issue for the development of ethanol as a transport fuel is the availability of ample supplies of feedstocks at a cost low enough for ethanol to compete with petroleum fuels on an unsubsidised basis. The Committee agrees with Dr Reeves that ethanol production from feedstocks which could be used as food is not sustainable in the longer term and ethanol production should be based on agricultural residues and by-products.

6.60 Dr Reeves advised the Committee that lignocellulosic (woody type) biomass grown in association with agricultural food and fibre production is available in large quantities. Examples are grain and cotton stubbles, bagasse, and forest silvicultural and harvest residues. Examples of processing wastes are grain hulls and sawdust. Other possibilities are the use of woody weeds, waste paper and municipal solid wastes. The possibility that ethanol production could provide a market for silvicultural thinnings and thus encourage the efficient management of plantations and natural regrowth forests is particularly attractive.

6.61 As noted above a fuel ethanol industry could create a significant number of jobs which would mainly be in rural areas since, as in sugar production, it would not be economical to transport feedstock over long distances. APACE Ltd advised the Committee that to substitute 20 per cent of Australia's current petrol and diesel demand, 110 plants would be required, each creating some 120 - 150 new permanent rural jobs in feedstock production, collection, transport and processing. This translates to between 13200 and 16500 new jobs not counting multiplier effects - a similar number of jobs to the 12 000 forecast by the CSIRO to provide 10 per cent of fuel requirements.

6.62 The Committee understands that the US Department of Energy is undertaking a coordinated public-private effort to make ethanol fuel from lignocellulosic feedstocks a fully competitive alternative by the year 2000. Dr Reeves advised the Committee that:

The whole focus of our work is to develop and demonstrate the technologies that will enable conversion of celluloses to ethanol without subsidy. That is also the direction of the US and Europe. The US have set themselves a target of having demonstrated that sort of technology by the end of this decade. It is also our target, but due to the announcement in the Prime Minister's 1992 environment statement we have the opportunity to take the lead - but if we do not seize it, it will happen in the US or Europe.³¹

6.63 The potential for the development of this industry has been recognised by the Commonwealth Government which announced in December 1992 that, subject to the outcome of a \$50 000 feasibility study, Commonwealth support of \$2.2 million would be provided on a dollar-for dollar basis with industry for the construction of a demonstration plant to convert woody fibres into fuel ethanol.

6.64 In 1993, the Commonwealth committed further funding of \$3.94 million for research and development. DPIE advised that the feasibility study on the demonstration plant is proceeding and four small scoping or investigative studies have been undertaken through ERDC to delineate the work which has been carried out to date. The Committee notes that as a result of these initial studies, proposals to undertake a series of research projects were initiated by ERDC in October 1994.

6.65 The use of ethanol produced from agricultural wastes would provide a significant opportunity to reduce greenhouse gases, protect the environment, encourage efficient forestry management and provide substantial employment in rural areas. The Committee supports the Government's initiatives but is concerned that the speed at which the necessary research, development and demonstration activities are proceeding is too slow considering the potential national gains.

6.66 The Committee notes the potential benefits to the environment and employment which could arise from the development of a fuel ethanol industry in Australia and recommends:

(33) that the Commonwealth Government, through the Department of Primary Industries and Energy, commit the available funding for the development and demonstration of technologies for the production of ethanol from woody and agricultural residues without further delay.

(34) that the Commonwealth Government urgently develop an Australian Design Rule for motor vehicles, allowing ethanol compatibility in all new vehicles.

³¹ Evidence, Dr R Reeves (APACE Ltd), Canberra, 1 September 1994, p 624.

Tidal energy

6.67 The Committee considered a proposal by Mr Bob Charles, Member for Latrobe, that the Commonwealth Government should establish a pilot plant to prove the technology, engineering and cost estimates for the development of the tidal energy resources of the Kimberley region of Western Australia. Mr Charles described the potential:

For at least 30 years we have well known that the energy potential of the rise and fall of the tides in the Kimberleys offers us the opportunity to totally replace our current electricity generating system several times over. So we can, by simply building barrages across a number of inlets in the Kimberleys and putting turbines in the walls, produce enough electricity to drive Australia.³²

6.68 In 1991, a Select Committee of the Legislative Assembly of Western Australia examined the commercial feasibility of generating electricity from the ocean tides in the Kimberleys and concluded that long term plans should be made to harness Kimberley tidal power as one of the range of renewable energy resources that Australia will need to employ to achieve sustainable development and to reduce greenhouse gas emissions. The Select Committee did not identify any potential large scale electrical load which could provide a local market for tidal energy and suggested that the electricity be used to produce hydrogen by electrolysis of water. The prospective natural gas pipeline between the Pilbara and the Eastern States could possibly be used to convey a mixture of hydrogen and natural gas.³³

6.69 The Committee recognises that tidal energy is unlikely to be developed in the short term and in the absence of a local customer for the tidal energy, the costs of electricity delivered to major population centres would be significantly higher than from fossil-fuelled plants using conventional accounting methodology. The resource is, however, huge and virtually non-polluting although there would be considerable disturbance to the marine estuarine environment. While the operation of a tidal power station would employ few persons, the construction phase would provide substantial shorter term employment opportunities. Although a number of studies have been undertaken through the years, there could be merit in constructing a pilot plant to prove the technology and verify estimates. This would provide a firm base for a realistic assessment of the economic feasibility of Kimberley tidal energy and discussions with prospective energy users.

³² *Evidence*, Mr R Charles MP, Canberra, 15 November 1993, p 331.

³³ Report of the Legislative Assembly Select Committee on Energy and the Processing of Resources, Perth, Western Australia, November 1991.

6.70 The Committee recommends:

- (35) that the Commonwealth Government seek the cooperation of the Western Australian Government in undertaking a joint assessment of the feasibility of constructing a pilot tidal power plant in the Kimberley region to provide a basis for evaluating the prospects for the long term development of the resource.

Commercialisation of renewable energy sources - a market oriented paradigm

6.71 There has been considerable research effort in Australia and overseas into the development of renewable energy technologies but the main problem is marketing and commercialisation, as described by the ERDC:

The major challenge for renewable is not to invent more of them. It is to get them into a reliable market at a price which is competitive with energy derived from fossil fuels, and without disrupting the economy ... Australian research has produced a wide range of renewable energy innovations. It is abreast or ahead of international competitors in a number of areas, such as solar cells ... However, the record for commercialising these technologies is patchy. While not unique to renewables, a significant problem is moving the technology from the research laboratory into the market place.³⁴

6.72 The ERDC suggested that in developing an energy policy to minimise the effects of energy on the environment a market oriented paradigm could be considered, namely:

For any given application, minimise external energy requirements, then, use appropriate energy sources as efficiently as possible, then, supply that energy as efficiently as possible in a way that minimises end user costs and emissions output.³⁵

6.73 The ERDC suggests that applying this paradigm effectively will require:

- . performance-based legislation requiring external standards to be met;
- . capital investment in the application of new energy supply and use technologies;
- . research to develop to commercialisation, more efficient and renewable energy conversion technologies; and
- . education of end users in the economic and environmental benefits of reducing energy requirements and therefore reducing adverse environmental consequences of energy supply and use.

³⁴ ERDC, *Submission* No. 108, p 4.

³⁵ *Ibid*, p 7.

6.74 The Committee agrees with the basic thrust of this paradigm which is essentially the development of a market-based strategy to stimulate the renewable energy industry in Australia and create sustainable employment. The Committee considers, however, that the education of consumers, particularly low-income consumers, on the economic benefits to be obtained by reducing energy requirements should also be accorded a high priority. There is also no need to wait for the enactment of performance-based legislation and commercialisation of innovative technologies. Several technologies such as solar water heating are already fully commercialised and to increase their market share requires essentially a long term commitment from governments and energy authorities to their practical application.

6.75 For successful marketing and commercialisation, it is essential that renewable energy systems be demonstrated to prove their technical and economic performance. The costs of the demonstration phase are an order of magnitude greater than the research and development phases. The Committee agrees with the suggestion from the ERDC that the traditional approach to demonstration of new concepts by constructing facilities in remote areas should be changed in favour of siting demonstration plants near existing infrastructure centres to enable more cost effective monitoring and evaluation.

Impediments to the development of renewable energy sources

6.76 Several submissions to the inquiry commented that major impediments to the growth of less-polluting energy sources were the hidden subsidies to fossil technology arising from access to cheaper finance and the failure to account for environmental costs. The Australian and New Zealand Solar Energy Society drew attention to the hidden subsidy to fossil fuels through:

the provision of long-term but low-return government financing to energy projects such as new coal-fired power stations while competing technologies such as solar water heaters, energy efficient buildings and wind generators must be financed from short term private sources.³⁶

6.77 DPIE referred to a number of different types of market failures inhibiting the greater use of renewable energy including:

... lack of knowledge about the technologies by potential users; the lack of established sales and support infrastructures for emerging industries; existing cross-subsidies for some conventional energy sources ... risk and the ability of individual firms to gain the benefits of particular programs ... financing arrangements for renewables where capital costs often have to be borne by end users whereas the capital costs of conventional energy systems are often, even usually, met by large organisations where access to finance is not the same sort of issue; and there is the issue of externalities, although there is a major problem there in terms of quantification.³⁷

³⁶ ANZ Solar Energy Society, *Submission No. 75*, p 3.

³⁷ *Evidence*, Mr I Walker (DPIE), Canberra 2 June 1994, pp 583,4.

6.78 The Committee agrees that existing less-polluting technologies should be assisted to compete with technologies based on fossil fuels through access to finance on equal terms and agrees in principle to the inclusion of environmental charges in energy pricing. The Committee recognises, however, that complex issues are involved. Activities such as electricity generation are State government responsibilities. There are also substantial variations in the impacts of pollutants and considerable difficulties involved in the measurement and valuation of environmental externalities. These difficulties should not, however, preclude serious consideration of action to incorporate environmental charges into energy prices.

6.79 The importance of this issue has been recognised by the Commonwealth and State governments. As part of the National Greenhouse Response Strategy, ANZMEC and ANZECC are to undertake a national investigation of the incorporation of externalities in the energy sector. This national externalities study will investigate national methodological issues involved in identifying and quantifying the externalities associated with particular energy technologies, and the economic, environmental and social impact of incorporating externalities into energy prices. The Committee is concerned, however, that although the study was scheduled to commence in 1993, as at September 1994 the consultants' brief had not yet been finalised.

6.80 The Committee recommends:

- (36) that the Australian and New Zealand Minerals and Energy Council and the Australian and New Zealand Environment and Conservation Council without further delay implement the decision to investigate the pricing structures of the energy sector including environmental costs.**

Greenhouse Gas Emissions Tax

6.81 One of the fiscal measures proposed to the Committee was the introduction of a tax on emissions of greenhouse gases or an energy tax in the form of a 'carbon tax'. A suggestion was made by DEST that such a tax could be used as a revenue substitute for other taxes such as payroll tax which were a disincentive to the employment of human resources.³⁸

6.82 The Committee noted that carbon-related taxes had been introduced in Scandinavia and were under consideration in the European Union. Australia already has a variety of taxes on fossil fuels, particularly in the transport sector. There are a number of complexities associated with consideration of the carbon tax issue and in order to examine these possible direct and indirect affects, the Committee commissioned a consultancy from the Australia Institute to identify and outline the issues associated with the introduction of greenhouse gas emissions taxation in Australia. The report of the consultancy is at Appendix C.

³⁸ DEST, *Employment and Ecologically Sustainable Development*, a submission to the White Paper on Employment, March 1994.

6.83 The consultants considered 'greenhouse gas emissions taxation' to mean taxes levied on fossil fuels at rates reflecting their carbon content and have therefore used the term 'carbon taxation'. The consultants conclusions included:

- . Carbon taxation would increase the relative costs of energy compared to labour and that would tend to reduce unemployment. In addition, unemployment could be further reduced depending on how revenues from carbon taxes are spent. For example, revenue from carbon taxes could be used to reduce payroll taxes, to reduce the budget deficit, to reduce company taxes or be spent on public infrastructure.
- . There is a *prima facie* case that the substitution of a carbon tax for payroll tax would have net economic benefits for Australia and would make a significant contribution to meeting Australia's commitment to limiting greenhouse gas emissions. However, the evidence is not conclusive and there remain some significant gaps in our understanding of the impacts of the proposed shift in the tax system.
- . The analysis which supports the conclusion that carbon taxation would unduly affect business costs generally assumes that production methods are currently such that there is no technical inefficiency, and that carbon taxation would leave unaffected the future course of technological change in Australia. To the extent that these assumptions are incorrect, that conclusion would need revision. If there are inefficiencies and carbon taxation encourages technological developments that reduce dependence on fossil fuels, then the impact of a carbon tax on business costs would be less severe.

6.84 The consultants recognised that carbon taxation would involve benefits and costs, some of which cannot easily be compared numerically. The weights attached to the different environmental and economic effects are a crucial factor. The consultants identified the principal areas of doubt and the issues which need further development to include:

- . the precise form a carbon tax would take, including its relationship with existing taxes on fossil fuels;
- . the impact on employment and other macroeconomic aggregates of the tax and the disbursement of the revenue generated by the tax;
- . whether agreement can be reached with State Governments over a fair and efficient system of collecting and distributing carbon tax revenues;
- . the feasibility of designing a carbon tax package, including revenue disbursement, that minimises the equity costs involved;
- . the likely technological changes, especially in the longer term, induced by increased fossil fuel prices and the benefits to Australia of those technical changes; and

the development of a program for introducing tax changes that would satisfy investors that Australia remains a desirable place in which to invest.

6.85 The consultants saw a need for the Government to commission further work on carbon taxation as a high priority, arguing that it should be possible for a 12-month study to provide the information on which a decision on the introduction of carbon taxation, and the use of the revenues generated, could be based. Any such study would need to include the following elements:

- it should use at least two economy-wide models to analyse the effects of a carbon tax and compare the results;
- it should receive detailed inputs from Commonwealth and State Treasuries as to the administrative implications of introducing a carbon tax and using the revenue for the reduction of payroll tax;
- it should focus on the likely short-term and long-term effects of a carbon tax on technological change in range of affected industries.
- it should undertake modelling work on the impact of tax packages on household incomes so as to determine their equity effects; and
- it should learn as much as possible from experience overseas with carbon and similar taxes.

6.86 The Commonwealth Treasury identified some constraints on Australia's ability to levy environmental taxes, pointing out that Australia has to remain an attractive destination for business investment by both foreigners and Australians if it is to secure strong employment growth:

Australia's relatively abundant and cheap energy is a source of comparative advantage to us as a destination for energy-intensive (including transport-intensive) manufacturing. This advantage helps to offset what some investors might see as comparative disadvantages - for example, less resort to selective tax concessions, such as tax holidays for new investment. If Australia were to reduce its comparative advantage in energy by, say, unilaterally imposing a high carbon tax, it could prove quite destructive to employment growth if it tipped the balance of investors' perceptions of our attractiveness as a location for energy intensive investment.³⁹

6.87 In discussions on the possibility of a trade-off between pollution taxes such as carbon taxes and payroll tax, Treasury officers stated that payroll tax is nowhere near as bad a tax as is commonly supposed and that its incidence is very akin to a broad based consumption tax in terms of its economic impact. Treasury also expressed some doubts

³⁹ Treasury, *Submission* No. 105, p 2.

on whether abolition of payroll tax would lead to increased employment, describing employers putting forward this view as applying 'do-it-yourself' economics and adding:

Individual businessmen see that a payroll tax increases the cost to them of employing labour but does not increase the cost of employing a labour saving piece of machinery, a capital investment of some sort. However, the sort of second round and longer run effects can pick up the fact that for those business people that are producing capital goods they too are also paying payroll tax. So the cost of capital goods and labour saving investments and so on are increased to all those businesses which are making investments. That is one reason why the longer term impact of payroll tax and its incidence becomes a little less clear.⁴⁰

6.88 The Committee notes, however, that even though employers may, in the view of Treasury economists, be applying 'do-it-yourself' economics, they are nevertheless in the real world of the market place and have well-developed perceptions that increases in wages, taxes and charges on labour are a strong disincentive to employing additional staff.

6.89 The Australian Chamber of Manufactures is opposed to the concept of carbon taxes, quoting a study by London Economics in 1992 which showed that a unilaterally imposed carbon tax, sufficient to achieve Australia's greenhouse gas interim planning targets, would spell the end of Australia's steel industry and most of the aluminium industry. The Chamber advised:

Should a carbon tax or other energy tax be proposed as an environmental policy, the Committee needs to be aware that imposing these taxes would have a major detrimental impact on Australia's economy and employment.⁴¹

6.90 The Committee recognises the concerns of manufacturing industry on the implications of the imposition of a carbon tax on important sectors of industry. On the material available to the Committee, it is not possible to make any recommendation as to whether a carbon tax should be introduced or not. There is no doubt, however, that a carbon tax would encourage the use of renewable energy technologies, result in greater efficiency in the use of fossil fuels and stimulate switching into less polluting fuels, but there are also a number of serious concerns about the effect of a carbon tax on certain sectors of the economy. The Committee considers, therefore, that carbon taxation and particularly its effects on employment should be subject to further examination along the lines outlined by the Australia Institute but with a particular emphasis on the implications for employment.

⁴⁰ Evidence, Mr T O'Brien (Treasury), Canberra, 19 April 1994, p 554-5.

⁴¹ Australian Chamber of Manufactures, *Submission No. 91*, p 17.

6.91 The Committee recommends:

- (37) that the Department of the Environment, Sport and Territories, the Department of Primary Industries and Energy, the Department of Industry, Science and Technology and the Treasury jointly undertake a detailed examination of the issues associated with the introduction of greenhouse gas emissions or carbon taxation in Australia. The implications for industrial activity and employment of using the revenue from a carbon tax to reduce direct taxation on labour inputs should also be addressed in this examination.

Need for a national renewable energy strategy

6.92 The Australian and New Zealand Solar Energy Society suggested that the Commonwealth and State governments agree to a coordinated program of promotion of the Australian renewable energy industry and a program for a renewable energy purchase obligation favouring Australian-made equipment. If coordination through existing institutions proves unsatisfactory, consideration could be given to the establishment of a joint Commonwealth/State Renewable Energy Commission which would have a support, advocacy and management role.

6.93 The Committee agrees that the Commonwealth should continue to take a leading role in supporting the development and commercialisation of less-polluting energy sources. It also agrees with DPIE that the government's approach should be based on facilitating the market rather than attempting to pick individual technologies as winners.

6.94 As part of national strategies for Greenhouse Response and Ecologically Sustainable Development agreed in December 1992, Commonwealth and State governments undertook to implement a number of measures to diversify energy sources. These measures included facilitation of cogeneration schemes by providing fair buy-back prices for the purchase of surplus electricity and expanding the use of renewable energy sources in generating electricity. The majority of these measures were to be implemented through the Commonwealth/state cooperation procedures of the Australian and New Zealand Minerals and Energy Council (ANZMEC). On the basis of evidence provided, the Committee was unable to ascertain any significant progress by the Commonwealth and the States in implementing coordinated policies to facilitate the use of less polluting energy sources.

6.95 The Committee notes that in the United Kingdom, electricity companies are required to contract for a specified minimum generating capacity from renewable energy sources which is effectively a levy on electricity consumers. Examples of such sources are landfill and sludge digestion gas, municipal and general industrial waste, hydro-electricity and wind power. The introduction of a renewable energy purchase obligation for the electricity supply authorities in Australia would greatly stimulate the renewable energy industry. However, as a first step the Committee considers that the Commonwealth and the State governments should develop a strategy for the wider use of less-polluting energy sources with targets and milestones along the lines of the National Waste Minimisation

and Recycling Strategy. An alternative energy strategy should include the establishment of a coordinating body such as the proposed Renewable Energy Commission. To demonstrate its commitment, the Commonwealth will need to provide substantial funding support.

6.96 The Committee recommends:

- (38) that, as part of its undertaking to reduce greenhouse gas emissions, the Commonwealth Government through the Department of Primary Industries and Energy develop a National Renewable Energy Strategy, including the establishment of a Renewable Energy Commission to coordinate Commonwealth and State government action to implement the strategy.

6.97 The Committee notes that ERDC has developed a 'Renewable Energy Sources and Systems Research Strategy', which defines a number of objectives for the development of renewable energy sources in Australia:

The 5 Year objectives of the Strategy are:

- To set up consortia in high priority technologies for coordinated R&D activities;
- To demonstrate the cost competitiveness of renewable energy electricity systems in niche markets in the 0.1 to 10 megawatts power range (for example, isolated townships and mining companies);
- To demonstrate the cost competitiveness of renewable systems for process heat in selected industrial markets; and
- To set up commercial preconditions for marketing renewable electricity systems in the megawatt range.

The 10 Year objectives are:

- To develop and commercialise renewable technologies so that at least 100 megawatts of renewable electricity systems are installed to displace diesel fuel used in isolated grids;
- To develop economic short-term energy storage systems which are economically suitable for the unique characteristics of renewable energy sources and systems; and
- To explore long-term energy storage options suitable for renewable energy systems.

The 15 Year objectives are:

- To develop and commercialise renewable technologies so that at least 300 megawatts of renewable energy systems are installed in isolated electricity grids;
- To develop economic long-term energy storage systems which are suitable for the unique characteristics of renewable energy sources and systems;

- To achieve cost-competitiveness of renewable electricity systems in some state grid applications;
- To install at least 200 megawatts of renewable electricity systems (not including existing hydro) in Australia in state grids; and
- To have an export industry based on renewable energy technology.

The 20 year objectives are:

- To generate 10 per cent of Australian electricity and 20 per cent of process and domestic heat by renewables.⁴²

6.98 The Committee supports the above objectives and considers that they provide a sound base for the development of the proposed National Renewable Energy Strategy. The Committee is concerned, however, that to increase the use of renewable energy sources as an important measure to help meet Australia's commitments on the reduction of greenhouse gases, a more urgent time scale than that proposed by ERDC will be needed.

6.99 The Committee recommends:

- (39) that the Commonwealth Government incorporate the Renewable Energy Sources and Systems Research Strategy developed by the Energy Research and Development Corporation into the National Renewable Energy Strategy, and examine means by which its implementation could be hastened.

⁴² ERDC, *Submission* No. 108, pp 5-6.



CHAPTER 7: POLICIES FOR SUSTAINABLE EMPLOYMENT GROWTH IN LAND MANAGEMENT

7.1 The Commonwealth Government has accepted that land degradation is a major national problem and, in the Prime Minister's 1992 Statement on the Environment, the Commonwealth promised an all-out effort to stop the degradation of our land and water. A commitment was made to spend \$426 million in the following four years under the National Landcare Program with the aim of returning vast tracts of degraded land to productivity or to a rehabilitated state.

7.2 The Commonwealth Government began to take an active role in the remediation of land degradation in 1983 through the National Soil Conservation Program. In 1989, a broad framework for the development of land management policies was provided by the National Soil Conservation Strategy released by the Commonwealth and the states. The Commonwealth and State Governments have now developed a range of responses, a feature of which is the inclusion of community based activities which recognises the fact that strong community support is essential for effective long term remedial action.

7.3 In 1992 the Prime Minister also announced the Commonwealth Government's commitment to the development of a comprehensive national system of protected areas. In cooperation with the states, a National Reserves System is to be established by the year 2000. The importance of a national system of reserves is recognised by all governments in both the Intergovernmental Agreement on the Environment and the National Strategy for Ecologically Sustainable Development.

7.4 There can be little doubt that land degradation is one of the most serious problems facing rural Australia. The Australian environment is highly susceptible to a number of different types of land degradation including erosion by wind and water, decline of soil fertility and structure, and increasing levels of salinity and acidity. From an economic perspective, land degradation can seriously reduce agricultural productivity. One study estimated the total loss in gross agricultural income in New South Wales alone was \$757 million (in 1988 dollars).¹ This does not include the environmental costs of land and river degradation or loss of biodiversity and habitat. DPIE advised that the problem is currently estimated to cost some \$2 billion per year in terms of lost production and associated environmental impacts.² The ongoing severe drought in large areas of Queensland and New South Wales will further exacerbate land degradation.

¹ Yapp T P, *et al*, Soil conservation and land degradation - finding the balance, Search, Vol 23, No.10, 1992, pp 308-10.

² Evidence, Mr R Walker (DPIE), Canberra, 19 April 1994, p 495.

7.5 The Committee included ecologically sustainable land management and the management of protected areas in its examination of environmental policies which could create jobs. The Committee notes that an assessment of the size of these sectors and the number of persons employed poses even more problems than an assessment of other sectors of the environment industry. For the purposes of this inquiry the Committee considered land management to include programs and activities designed essentially to overcome problems of land degradation and which include the encouragement of ecologically sustainable farming practices. This definition would also include the eradication or control of feral animals and introduced species of flora in sensitive areas.

7.6 A study undertaken by the Victorian Government in 1992 concluded that the community at large has begun to realise the economic value of well conserved natural systems through the emergence of new industries such as eco-tourism and the wildflower industry. It was reported that economic benefits can be obtained from nature conservation through:

... the provision of genetic stocks for the horticultural industry, agriculture and plantation and native forests silviculture and through providing source material for the pharmaceutical industry. In addition it has now been clearly established that preservation of natural systems has major economic benefits by preventing soil erosion and weed invasion, assisting pest control and through stock shelter. Farming in balance with natural systems has clear immediate economic benefits and is an essential part of long term strategies to prevent and control land degradation. Preservation of natural systems has important implications for the long term survival of farming and rural based industries.³

Potential for employment growth

7.7 Job growth in land management is limited essentially by the commitment of governments, landowners and the community, and the amount of funding available. The task of restoring degraded land is huge and can easily absorb the human and financial resources likely to be available. There is normally no immediate commercial benefit from improved land management and rehabilitation activities, so that a degree of government support is essential for land management to proceed. Once the benefits of land restoration are demonstrated, however, landowners and the community should be encouraged to provide resources and funding to undertake further work.

7.8 Several Commonwealth programs aimed essentially at providing job skills and training for the longer term unemployed have included land management programs of relatively short duration. This emphasis on the short term may have given rise to a perception that land management activities are only required on a temporary basis. This perception is wrong. Sustainable land management needs the constant attention and maintenance which can only result from permanent employment.

³ Jobs and the Environment, Report of the Victorian Fibre Processing and Sustainable Jobs Council, August 1992, p 60.

7.9 The potential for further employment in land management that might follow from the more wide spread adoption of ecologically sustainable land use practices and the more intensive management of protected areas is difficult to quantify. If the long term nature of the work is recognised and the back log is addressed in existing programs this potential could be quite substantial.

Decade of Landcare and the National Landcare Program

7.10 The Landcare movement is one of the most significant developments in natural resource conservation in Australia. The movement arose from voluntary groups undertaking soil conservation and tree planting and was actively supported by the unlikely, at that time, alliance of the National Farmers Federation and the Australian Conservation Foundation. The public awareness and profile of the Landcare movement was raised by the announcement in 1989, by the then Prime Minister, of the Decade of Landcare from 1990 to 2000.

7.11 The aims of the Decade of Landcare are to engender a landcare ethic in all Australians and to achieve the adoption of sustainable land use practices by land managers by the year 2000. The Decade of Landcare announcement was supported by a \$340 million funding commitment over the decade for landcare and related tree planting and remnant vegetation conservation programs. This funding commitment is likely to be well exceeded if the current spending level of over \$100 million per year is maintained.

7.12 The Commonwealth Government's main contribution is the National Landcare Program largely administered by DPIE. The program has three components:

- a Community Landcare component encompassing policies and relevant funding for community landcare action which acknowledges the community as a key stakeholder and critical in the development of a landcare ethos;
- a Commonwealth/State component encompassing policies and programs which the Commonwealth and States may undertake together; and
- a National component encompassing those activities which the Commonwealth may undertake in its own right, such as research and development.⁴

7.13 Community grants components of the One Billion Trees Program and the Save the Bush Program have also been included in the National Landcare Program. The One Billion Trees program aims to have at least one thousand million new trees planted by the year 2000⁵ while the Save the Bush program facilitates and supports the protection and management of Australia's remnant native vegetation, particularly outside national parks and reserves. These two programs are administered by the Australian Nature Conservation Agency.

⁴ DPIE, *Submission No. 101*, p 3.

⁵ The Minister for the Environment, Sport and Territories reported in March 1994 that it was estimated that approximately 550 million trees had been planted in the first four years of the program (House of Representatives Debates, p 1881).

7.14 Landcare has been well accepted by the rural community, with some 2000 groups now established. The number of reasonably active Landcare group members has been estimated at 25 000 and, perhaps more significantly, one in every four or five broadacre farmers is involved to some extent.⁶ A significant feature of Landcare is that farmers and conservationists, and government and community, supported by scientists are working together to a common purpose.

7.15 As an example of the issues considered by local groups, the Gympie and District Landcare Group in Queensland advised the Committee that the range of problems being addressed included:

poorly planned subdivision, problems associated with farming and grazing on steep lands, land slips, declining soil productivity, siltation of rivers and streams, erosion and nutrient levels in stream water.⁷

7.16 Funding for the National component of the National Landcare Program includes programs to address such problems as blue-green algae and eutrophication through assistance for upgrading sewage treatment plants to reduce the level of phosphorus entering the Darling River. An initiative with longer term implications for the environment industry is the provision of \$2.5 million over three years to demonstrate innovative low-cost Australian water management approaches and technologies with potential for commercial application.

7.17 Funding arrangements for Landcare were described by DPIE in evidence to the Committee:

For this current financial year the amount spent through our portfolio on the national landcare program is in the vicinity of \$105 million. Of that amount of money, some \$14-odd million goes to what we call community landcare. The Commonwealth-state component, as we call it, of the program is some \$51 million. There is a national component of some \$9 million. That is the core program, as we generally describe it. On top of that we also include a couple of other general items under the landcare umbrella: the Murray Darling basin initiative is \$18.5 million. Funding going to the Land and Water Resources R&D Corporation is some \$11 million. Then we have a couple of other small investments, including such things as the Cape York Peninsula land use study of \$1 million.⁸

7.18 The Committee considers that in comparison with the scale of the problems to be addressed and the commonly quoted losses of \$2 billion per year in agricultural production caused by land degradation, this level of funding is grossly inadequate, particularly when only \$14 million is made available for the community land care component. Landcare has some important factors in its favour. It is addressing issues of real community concern, it has wide community acceptance and a high public

⁶ Campbell A, *Landcare*, Allen & Unwin, Sydney 1994, pp 253-4.

⁷ Gympie Landcare Group, *Submission* No. 29, p 1.

⁸ *Evidence*, Mr R Walker (DPIE), Canberra, 19 April 1994, p 492-3.

profile, it is community based and provides jobs in rural areas. Success should be supported by a substantial increase in Commonwealth funding which will provide an opportunity to create significant additional employment and generate additional landcare activities.

7.19 The Committee recommends:

- (40) that in view of the scale of land and water degradation problems in Australia and the success and wide community acceptance of the National Landcare Program, the Commonwealth Government at the very least double its financial commitment to the Program over the next three years to a total of some \$200 million per year and that it allocate the main part of this increased funding to the community landcare component of the Program.

7.20 The Committee has a number of concerns relating to the structure and administration of the present program, particularly relating to employment aspects. These should be addressed prior to any increase in financial support. As a recent book by Andrew Campbell, a former national Landcare facilitator, explains:

But the level of funding is only part of the picture; the other critical element is the process by which funds are allocated. Funding, whether too much too soon, too hard to access, or obviously spoken for by state agencies, has a profound impact on a group's perceptions of landcare. It can be a catalyst or a constraint to Landcare group effectiveness.⁹

7.21 The majority of the Landcare funding goes to state agencies responsible for soil conservation and landcare. These agencies employ facilitators for Landcare groups, carry out most of the administration of funding and are the primary source of technical advice. There is a real risk that Commonwealth funding could easily become a substitute for state funding. While DPIE advised that the evidence does not necessarily bear out this charge, it is necessary to ensure that Commonwealth funding should only be directed to state agencies to generate additional activity and employment.

7.22 Campbell points out that Commonwealth funding for Landcare has been influential in forcing some states to adopt a more community based approach to land conservation but that the major recipients of increased national funding have been state government departments. This has assisted the states to more effectively support the Landcare movement but Campbell claims:

... there is no doubt that national funding has become an extremely important component of state land conservation budgets. This effectively means that government departments are competing with community groups for money from the same source.¹⁰

⁹ Campbell A, *Landcare*, Allen and Unwin, 1994, p 246.

¹⁰ Campbell A, *Landcare*, Allen and Unwin, 1994, p 247.

7.23 The Committee recommends:

- (41) **that Commonwealth funding under the National Landcare Program should only be directed to state government agencies subject to an unequivocal commitment by the agencies to use the funding to employ additional staff resources and be subject to regular reporting of the numbers of persons employed under the program.**

7.24 DPIE also advised that employment was not a high priority factor in deciding on which projects to fund, the major priority being national problems of land and water degradation.¹¹ The Committee accepts that the National Landcare Program is not a job-creation scheme as such, but regions whose agricultural base could be considered marginal, particularly those affected by the current drought, have a severe lack of job opportunities as well as problems of land degradation. There should therefore be scope for increasing the weighting given to job creation in assessing projects for support.

7.25 The Committee believes that for community groups to operate effectively over a long period, a high level of administrative support and training is needed. Unless such support is forthcoming the enthusiasm and dedication of facilitators, part time coordinators employed by some groups with grant funds and volunteers, particularly the Landcare group leaders, can rapidly decline. Landcare facilitators and coordinators play a crucial role in maintaining the effectiveness of the National Landcare Program but are often in a tenuous position and reliant on short term funding. Campbell refers to two studies that show that the role of government facilitators was a critical factor in the success of the Landcare groups. One of these studies, a consultancy commissioned by the National Landcare Program, reported that national funding for a network of facilitators and coordinators is easily justified on the basis of their impact on the effectiveness of landcare groups.

7.26 The Committee recommends:

- (42) **that to help ensure the long term survival and growth of the landcare movement, additional funding be made available under the National Landcare Program for structured training of Landcare facilitators, coordinators and group leaders.**

7.27 Training and education, in the form of demonstration and information projects for land owners is a most important aspect of the landcare program. Landcare groups need information that they can rely on and know will be of assistance to them. Regional education and demonstration facilities could provide a basis for activities such as extension programs, field days and group tours. They could also support regional networks of facilitators and coordinators. At least one such centre, the Hamilton Environmental Awareness and Learning Centre in Western Victoria, already exists and has been involved in a national training workshop for facilitators, coordinators and group leaders. The Hamilton Centre was established with funding from Greening Australia and

¹¹ *Evidence*, Mr R Walker (DPIE), Canberra, 19 April 1994, p 494.

now operates as a commercial venture. It provides a good model for the provision of demonstration and education facilities required to make Landcare fully effective.

7.28 One of the consequences of the major drought affecting Queensland and New South Wales is increased land degradation, soil erosion and contamination of waterways in low flow conditions. Once the drought breaks substantial remedial action will be required. Due to losses suffered under the drought and the cost of restocking and planting, few farmers will be in a position to fund landcare activities. The Committee considers that Landcare Groups in the drought affected areas nominated for Commonwealth assistance under the exceptional circumstances provisions should receive priority in funding allocations under the National Landcare Program, particularly for demonstration projects and educational programs on drought mitigation measures.

7.29 The Committee recommends:

- (43)** that Landcare Groups in drought affected regions currently eligible for Commonwealth assistance under exceptional circumstances provisions receive priority in funding allocation under the National Landcare Program.

LEAP, the Jobskills Program and the Regional Environmental Employment Program

7.30 The Landcare and Environment Action Program is administered by the Commonwealth Department of Employment, Education and Training. Over a 26 week period the program provides training and practical experience in a variety of landcare, environment, cultural heritage and conservation activities to young people who wish to participate in the development and implementation of conservation practices. LEAP is delivered through brokers contracted through DEET on the basis of a tendering process to manage training and vocational placements. Examples of brokers are Greening Australia, the Australian Trust for Conservation Volunteers and state government environment and heritage departments.

7.31 A related program with a significant environmental component is the Jobskills Program which is also administered by DEET. Jobskills aims to improve the long term employment prospects of those unemployed for 12 months or more. Jobskills placements are also for 26 weeks. DEET advised that up to 25 per cent of Jobskills participants were engaged in environmentally oriented work experience placements, especially in the area of restoration of degraded land.¹² For 1994-95, the total budget allocation for Jobskills is \$170 million to provide a total of 1 500 placements. The selection of participants, organisation of training and financial management is also undertaken by Jobskills brokers contracted by DEET.¹³

¹² DEET, *Submission No. 77*, p 6.

¹³ DEET, *Annual Report 1993-94*, p 152.

7.32 Following a proposal by Greening Australia, the Commonwealth Government announced a new initiative in the White Paper on Employment and Growth in May 1994. Named the Regional Environmental Employment Program (REEP) this new program aims:

... to create 5000 jobs in 1994-95 and 10 000 each year in the following years on projects to reverse environmental degradation. Projects will be developed within regional environmental plans and will be consistent with environmental priorities as well as meeting the needs of long term unemployed people. Priority will be given to participation of Aboriginal and Torres Strait Islander peoples and people with a disability.¹⁴

7.33 LEAP, Jobskills and REEP are significant programs. The 1993-94 expenditure estimate for LEAP was \$57.3 million and, by the end of June 1993, over 15 500 young people had been assisted. For 1994-95, the budget allocation is \$101.7 million to fund 12 700 program places. For 1994-95, the projected number of traineeships for environmental activities for the three programs is LEAP: 12 700, REEP: 5000 and Jobskills: 750 (based on 25 per cent of the total Jobskills placements) making a total of over 20 000 potential placements.

7.34 The Committee inspected several LEAP projects in various parts of Australia. It was quite clear that each of the projects had significant environmental or amenity benefits. Not only had the participants gained valuable experience but the projects they worked on were valuable in themselves. These projects go a long way to restoring the self esteem and motivation of unemployed persons and there appears to be no shortage of either worthwhile projects or candidates for employment. The shortcoming of these projects is that they provide employment for a short fixed term only, regardless of the need for such work to be done or the future employment prospects of the participants.

7.35 The Committee strongly supports the concepts of the LEAP, REEP and Jobskills programs. The real test though of the employment success of these schemes will be the numbers of participants who find sustainable full time work at the conclusion of the placement and the sustainability of the environmental projects undertaken under these programs.

7.36 The Government established a national monitoring program for the LEAP program in August 1993 and DEET is also evaluating the effectiveness of LEAP including the environmental outcomes. DEET advised some indications of results to date:

... It is very early within in the program, but the early figures show that about 43 per cent go on to what we call a positive outcome, which is either placement in a job that we have not subsidised or further education and training that we have not subsidised. That is also comparable with the Jobskills program.¹⁵

¹⁴ Working Nation, Policies and Programs, Canberra, May 1994, p 124.

¹⁵ Evidence, Dr T Mercer (DEET), Canberra, 19 April 1994, p 519.

7.37 DEET also advised that the views of LEAP participants had been sought on what they thought of the scheme.

It clearly shows that from the participants' point of view what they get out of the program is a significant enhancement in their confidence and self-esteem as well as basic skills. That is the sort of encouragement they need in order to feel confident to either go into Jobsearch or back into education. So it certainly has received a very positive reception from the participants. It was undertaken in about four states.¹⁶

7.38 In evidence DEET also stated that its primary objective was to provide training and work experience to get people ready for full-time employment, with the environmental outcomes of the program being a secondary objective. DEET advised that some of the brokers had expectations going beyond the primary objective to the secondary objective:

At times, the brokers have a different objective, such as an environmental or conservation objective. They may feel that they need to have higher skilled people to undertake the work. You might particularly find this in some conservation work. Our people might not have that level of skill. We are actually looking to build them up to that level of skill, whereas a broker might want them to have that level of skill on day one. They see it more as employment, whereas we are seeing it as training and work experience to get people ready for full-time employment.¹⁷

7.39 The Committee notes that the above programs are basically in the early stages of development and that they were designed essentially as labour market programs, although the employment and conservation objectives are more balanced in the REEP program. Not only should the environmental benefits that can be created be maximised, they constitute a strong case for the allocation of more resources. Furthermore to achieve the greatest environmental benefit and employment creation there needs to be greater integration of the two objectives. In this regard the REEP is likely to be the most beneficial program because the environmental aspects are to be based on regional environmental plans. The one-off environmental projects used to provide employment in the LEAP and Jobskills program have been individually worthwhile but there is no guarantee that they have been the highest regional environmental priority projects.

7.40 There is a need to monitor all environmental projects pursued under the three schemes to ensure they are delivering high quality and high priority outcomes. Accordingly the Committee recommends:

- (44) that the environmental benefits of the Landcare and Environment Action Program, the Regional Environmental Employment Program and the Jobskills program be regularly and closely monitored and evaluated, and that environmental benefits and employment benefits of the Landcare and Environment Action Program and the Regional Environmental Employment Program be given equal priority.

¹⁶ Evidence, Dr T Mercer (DEET), Canberra, 19 April 1994, p 521.

¹⁷ Evidence, Mr I Campbell (DEET), Canberra, 19 April 1994, p 517.

- (45) that at least 25 per cent of the funding available under the Landcare and Environment Action Program, the Regional Environmental Employment Program and the Jobskills program be allocated for expenditure in those rural areas with unemployment significantly above the national average.

7.41 The Committee further recommends:

- (46) that should the Regional Environmental Employment Program prove to be successful in delivering significant employment and environmental benefits, priority be given to allocating resources to it from labour market environmental programs.

7.42 Several submissions drew the Committee's attention to problems with the LEAP and Jobskills programs relating to the lack of sustainable jobs at the end of the placements and displacement of other workers. The Council of the City of Willoughby in Sydney identified the lack of permanent jobs:

Council does not have the capacity to employ Jobskills staff on a permanent basis after they have completed their course. Local Government is cutting back on staff, especially outdoor staff, and often fails to fill positions that have been vacated... It is extremely demoralising for Jobskills staff to complete a course only to find that there are no positions available. There is little point in continually training unemployed people in fields where there are no job vacancies.¹⁸

7.43 Another potentially serious problem identified by both the Council and Urban Bushland Management Limited, a bush regeneration company, is the effect of these programs on commercial operations. The Council advised that:

One of the less obvious consequences of the Jobskills Program is the impact of increased competition on private companies involved in bush regeneration. These companies, small or large, cannot compete with the cheap labour that Jobskills provides and often lose new or previously held contracts due to Councils trying to save money by having Jobskills workers perform in these areas.¹⁹

7.44 Urban Bushland Management supported the Willoughby Council's view adding some comments on the role of the brokers:

With a substantial extension of the existing programmes being proposed by several of the larger brokers, the situation can only become worse ... The major brokers are seemingly unconcerned and several are pursuing aggressive marketing practices to secure positions for their personnel. For Councils officers unwilling to replace existing workers with other unskilled personnel, pressure is being applied on a political level. In one recent case a Western Sydney council was told by the broker that they risked loss of future government grants for environmental work unless they undertook to place the LEAP workers.²⁰

¹⁸ Willoughby Council, *Submission* No. 100, p 1-2.

¹⁹ *ibid*, p 3.

²⁰ Urban Bushland and Management, *Submission* No. 34.

7.45 The Committee raised the issue of displacement of permanent employees with DEET and Greening Australia. DEET advised that one of the conditions under which the brokers and sponsors sign up is that there is not to be displacement. Members of the national monitoring committee for LEAP had visited and surveyed a number of LEAP projects in several states and had found no evidence of substitution. When asked if job substitution was occurring, a representative of Greening Australia advised that:

From our experience, the answer is no. Those programs are being used for environmental project work that would not have otherwise been paid for and, therefore, would not have been able to be done.²¹

7.46 Despite the above assurances, the Committee remains concerned that a substantial risk exists of Commonwealth program funds being used by local authorities to substitute for their own funds and that commercial bush regenerators will be displaced by trainees under employment programs, particularly during the current rapid expansion of these programs.

7.47 The Committee recommends:

- (47) **that the Department of Employment, Education and Training as a matter of urgency investigates whether trainees under the Landcare and Environment Action Program and the Jobskills program are displacing other workers in the environmental protection and regeneration industry and, if so, the extent of such substitution.**

7.48 The brokers and DEET face a considerable challenge to arrange environmental activities which will provide meaningful training, job experience and job opportunities for the longer term and younger unemployed. Nevertheless, the Committee concludes that LEAP and Jobskills have been very valuable programs and that REEP will probably achieve similar results. There is a very considerable backlog of work to be done and a continuing lack of alternative employment in many of the regions where these projects have been so valuable. There is a need for the environmental and employment aspects of these programs to be more closely integrated and given equal weight. In many cases this will mean that the employment contracts will need to be modified to allow the projects to be carried out at the right time of the year and for a more flexible period of time, often longer than six months.

7.49 Considerable funds have been allocated to labour market programs and the need for additional funding will depend largely on the unemployment rate. The Committee believes that, subject to evaluation confirming the positive environmental and employment outcomes of the LEAP and REEP, additional funding and resources should be provided to DEET to enable more unemployed persons to participate in these programs. Where appropriate, the participants in these programs should be employed for longer periods. The time limit of six months employment is not always appropriate or relevant to the nature of the projects which provide the work and there is a need for flexibility. Employment should be timed to maximise the environmental benefits and the

²¹ Evidence, Ms W McCaughey (Greening Australia), Canberra, 19 April 1994, p 538.

Committee recommends that:

- (48) that the length of employment offered to Landcare and Environment Action Program, Regional Environmental Employment Program and Jobskills trainees on environmental projects should be extended beyond six months where their continued employment will significantly enhance the environmental benefits of the project by, for example, ensuring that projects are adequately maintained.

Other Commonwealth environmental programs with employment implications

7.50 There are a number of other Commonwealth programs with environmental and employment implications. These include several forestry programs and the \$3.1 million River Murray Corridor of Green Program coordinated by Greening Australia which is aimed at creating and extending green corridors within 50 km of the Murray River.

7.51 Funding of \$3.7 million has been allocated under the Farm Forestry Program to implement 27 projects across Australia over the period 1992-93 to 1994-95, with the objective of promoting commercial wood production on cleared agricultural land. The largest project is situated in the Northern Rivers region of New South Wales and in a 12 month period it is expected that over 60 Jobskills placements will be provided.

7.52 The North Queensland Community Rainforest Reforestation Program is a joint initiative of the Commonwealth and Queensland governments in conjunction with eleven local councils. Expenditure on this program was \$1.1 million in 1993-94. The program is a major employer of LEAP trainees in North Queensland and DPIE understands that about half the initial 50 LEAP trainees have gained full time employment.²²

Local government programs

7.53 A number of environmental programs with employment implications are being undertaken by local authorities. The Committee notes that environmental levies on ratepayers have been introduced to fund environmental programs and the examples quoted to the Committee have not met with any significant opposition.

7.54 The Brisbane City Council has undertaken a number of initiatives which have employed over 1000 Jobskills and LEAP Program trainees in a range of projects. A particular initiative of note is the Bushland Acquisition Levy of \$6 per quarter per ratepayer for the acquisition and maintenance of natural habitat areas in Brisbane, particularly bushlands, wetlands and waterways vegetation. The acquisition program will

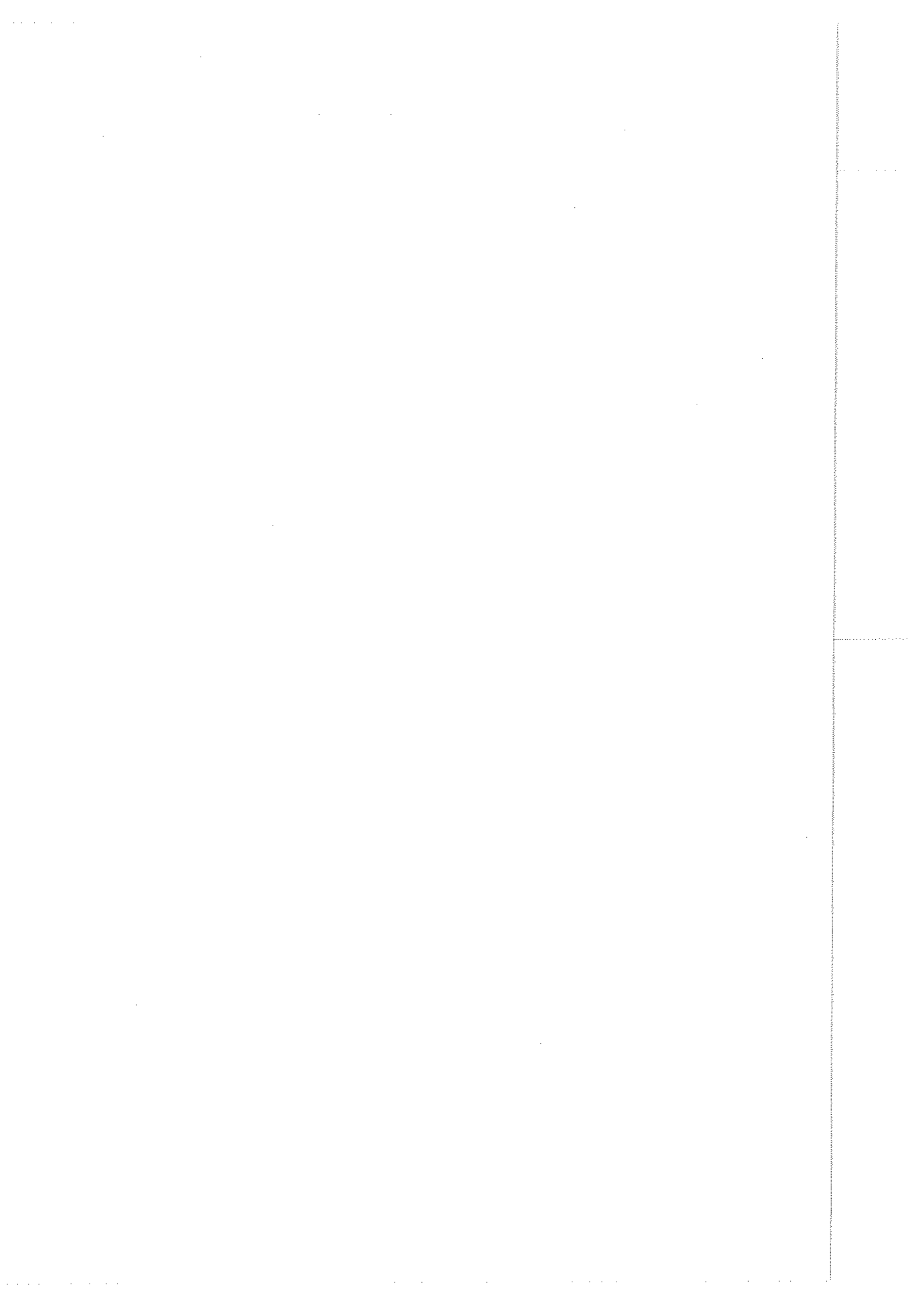
²² DPIE, *Submission No. 101*, p 7.

in the medium term fund some 90 jobs in bushland rehabilitation. An example from a rural area is the former Widgee Shire Council in Queensland which introduced an environmental levy on ratepayers to raise \$96 000 in 1993 to undertake a comprehensive environmental protection plan.

7.55 The Committee considers that there is considerable scope for other local government authorities to introduce levies on rates to fund similar programs and create jobs, particularly where the programs are integrated with other programs such as LEAP. It is, however, essential that the purpose of the levies be clearly identified and particular projects specified so that environmental levies are not subsumed into general revenues or used to substitute for current expenditures.

7.56 The Committee recommends:

- (49)** that the Commonwealth Government investigates the scope for it to support local government environmental projects either by coordinating Commonwealth programs, such as the Landcare and Environment Action Program, with local government environmental programs or by providing finance to supplement funds raised through environmental levies.



CHAPTER 8: POLICIES FOR SUSTAINABLE EMPLOYMENT GROWTH IN NATURE CONSERVATION AND ECOTOURISM

Management of protected areas

8.1 Several submissions drew the Committee's attention to the employment opportunities in managing protected areas. There is ample evidence that the establishment of parks and reserves and other conservation programs can be a significant contributor to local employment in rural and remote areas.

8.2 The Australian Nature Conservation Agency (ANCA) advised the Committee that irrespective of the amount spent on management of parks and reserves, except in the most remote and isolated areas, the returns from investing in protected areas exceed their costs. At Kakadu National Park, for example, annual tourist expenditure within the Park alone was in the order of \$30 million in 1990 compared with management costs of some \$10 million. At Kangaroo Island, benefits were estimated at \$3 - \$4 million compared with expenditure of \$0.5 million.

8.3 The employment aspects of park management were examined in an analysis of the contribution of the National Parks and Wildlife Service to the Tasmanian economy in 1986-87. The study found that the Service's total contribution to employment in 1986-87 was 2368 jobs or 1.2 per cent of Tasmania's aggregate employment in that year. The total contribution to income was just over \$61.5 million which was 1.25 per cent of Tasmania's Gross State Product in that year.¹

8.4 ANCA summarised its position on the employment creation aspects of expenditure on conservation:

In summary, spending on conservation is often in areas of high unemployment. This spending can be justified, even discounting the benefits of nature conservation, not only because of the employment directly generated, but because of the significant multiplier effects of conservation spending in areas of chronic high unemployment.²

8.5 The Committee considers that it is essential that adequate funding and staffing resources be provided to adequately manage national parks and areas designated as World Heritage areas. Steps have been taken in recent years to greatly expand protected areas but much more needs to be done to set aside a system of reserves that will adequately protect biodiversity in Australia. The need for a comprehensive national

¹ ANCA, *Submission No. 87*, p 4.

² *ibid*, p 4.

system of biodiversity reserves was identified by the Committee in the previous parliament in its report of the inquiry into the role of protected areas in maintaining biodiversity.³

8.6 The Committee is also concerned that the resources available for management of the expanded protected areas have not kept pace with the increase in responsibilities and the increase in visitor numbers. During inspections on Fraser Island, for example, the Committee found that there was a considerable backlog of essential work to be done, both to protect the environment and to develop facilities for park users. The lack of facilities for beach and lakeside camping presents a serious pollution hazard and there is an urgent need for loop bypasses to the eastern coast beach highway to provide safe, vehicle free access to the beach and to allow 24 hour vehicle passage regardless of tides. An obsolete and misleading tourism information display seen at a major island tourist destination reflects a serious lack of resources. The situation on Fraser Island is repeated throughout the country:

Innumerable management tasks receive inadequate attention in nature conservation areas at present. Farmers located close to protected areas complain of intrusion from feral animals living in the parks which kill their stock and damage their crops. They are also frequently concerned about the danger of fire started in parks in which shortage of funds has prevented the preparation of fire breaks and trails. Visitor facilities have been improved but it is easy to identify many parks where pathways, boardwalks and visitors centres should be built and the number of rangers multiplied.⁴

8.7 The Committee recognises that while State governments have the prime responsibility for the management of protected areas, there is nevertheless a national interest particularly in view of the Commonwealth Government's obligations to protect World Heritage areas. The existing States Cooperative Assistance Program administered by ANCA provides financial and other assistance to the states for park management and strategies to protect significant wildlife species, but the level of funding in 1992-93 was only \$860 000 spread over 32 projects.

8.8 This level of funding is grossly inadequate for the magnitude of the task involved. To supplement government funding, consideration could be given to extending the use of park entry fees to all national parks. Any revenue raised should, however, be clearly identified, used only for park management and upkeep and not diverted to general revenue or used to substitute for existing funding. The imposition of entry fees raises questions of equity and, as a minimum, concessional entry to parks should also be provided for pensioners and people receiving income support through the social security system.

8.9 Several measures which were identified in the second report of the Committee's inquiry into protection of biodiversity have the potential to create employment. These include additional funding and staffing resources for the Environmental Resources Information Network, funding to establish a tied grants program to meet the

³ House of Representatives Standing Committee on Environment, Recreation and the Arts, *Biodiversity The Role of Protected Areas*, January 1993.

⁴ Langmore and Quiggin, *Work for All, Full employment in the Nineties*, Melbourne University Press, 1994.

management costs of establishing new reserves, and additional funding for the Save the Bush and One Billion Trees programs to target areas of the proposed national biodiversity strategy. The Committee notes with concern that the Commonwealth Government is yet to respond to the recommendations in the second report of the biodiversity inquiry, nearly two years after the report was published.

8.10 One of the Committee's recommendations in its report into Australia's biological diversity was an increase in funding for the States Cooperative Assistance Program to \$4 million for several measures including the provision of assistance for specifically identified existing reserves to be upgraded to core protected area status.⁵ The cost of implementing a strategy for selecting and managing sufficient additions to the national park system to ensure that at least eighty per cent of the ecological communities in each bioregion would be represented in highly protected areas was estimated at \$200 million over six years, of which \$50 million would represent management costs. These are modest amounts considering the uniqueness of the opportunity to ensure the survival of many Australian species.

8.11 Effective management of protected areas and biodiversity reserves involves mainly labour intensive activities. Most of the potential jobs would be in rural and remote areas and could provide sustainable employment for persons completing their traineeships under the Commonwealth Government's labour market programs such as LEAP and REEP. There would also be opportunities for the employment of Aboriginal and Torres Strait Islander people. The \$50 million which the Committee recommended be allocated for expenditure on management could be expected to generate at least 1000 person-years of employment.

8.12 The Committee recommends:

- (50) that in consideration of the employment and conservation implications of several of the major recommendations in the second report of the Committee's previous inquiry into biodiversity in Australia, the Commonwealth Government urgently respond to the recommendations of that inquiry.

Endangered species protection, and feral animal and weed control

8.13 Predation and competition from feral animals is a major factor in the decline and extinction of many native animals. ANCA administers the Feral Pests Program which aims to reduce the impact of feral animal pests on native species and the natural environment, particularly in areas important for the recovery of endangered and vulnerable species. The budget for this program in 1993-94 was, however, only \$2 million. The Committee notes that, under the *Endangered Species Protection Act* 1992, recovery plans are required to be produced for endangered and vulnerable species.

⁵ House of Representatives Standing Committee on Environment, Recreation and the Arts, *Biodiversity: The Role of Protected Areas*, January 1993.

8.14 ANCA has suggested that there is considerable scope for expanding on-the-ground work with labour intensive projects, including:

- . a series of fenced predator-exclusion areas in national parks for the protection and reintroduction of endangered species. Six 2500 hectare sites could be fenced and predators excluded for an initial cost of about \$2.2 million, providing 50 person years of construction work and ongoing employment of six persons
- . integrated vertebrate pest control at sites important to the recovery of endangered species. Ongoing control at ten sites could be achieved for about \$1.3 million per annum providing 25 person years of work.⁶

8.15 The Committee agrees with ANCA that considerable scope exists for employment creation on such important tasks and considers that the present level of funding is seriously inadequate. This type of work could also usefully employ 'graduates' of LEAP and Jobskills trainees on a longer term basis.

8.16 It was announced in the Prime Minister's Statement on the Environment of 1992 that a further \$15 million spread over four years would be committed to the control of feral animals and weeds. If all of this additional funding were allocated to the Feral Pest Program, expenditure under that program would only increase to less than \$6 million per year. Within this funding commitment, specific allocations were made to control *Mimosa pigra* and cane toads.

8.17 Examples of successful programs are the Commonwealth's mimosa control program in Kakadu National Park and the Northern Territory Government's mimosa program in other parts of the top end. These programs generate substantial ongoing costs but have substantial benefits in protection of the environment and in creating employment. The Northern Territory Government identified the environmental importance of weed control programs:

Maintenance of conservation and tourism values requires effective control of all weeds. In some areas valuable pasture species are regarded as environmental weeds. They are less amenable to biological control agents and management programs are inherently labour intensive.⁷

8.18 The Northern Territory Government suggests that the Commonwealth Government's program for mimosa control on Aboriginal land be extended to non-Aboriginal lands to bring this major environmental problem under control and provide employment to several more people over the next few years.

8.19 Although responsibility for control of noxious weeds lies with the states, there could be scope for expanded Commonwealth involvement with the states to control, or preferably eradicate, particular weeds posing a national problem. Even with the

⁶ ANCA, *Submission* No. 87, p 5.

⁷ NT Government, *Submission* No. 102, p 9.

increased funding foreshadowed in the Environment Statement, the Commonwealth's contribution appears inadequate given the extent of the problem and the potential to create employment in rural areas.

8.20 The Committee recommends:

- (51)** that funding for the Feral Pests Program be increased to at least \$10 million per year and that priority be given to labour intensive projects.

Employment of Aboriginals and Torres Strait Islanders in protected area management

8.21 A number of individuals and organisations suggested that employment opportunities in park and nature reserve management should be provided to Aboriginal and Torres Strait Islander people. They include Ms Anne-Marie Tong of Brisbane, the Queensland Conservation Council and DEET.

8.22 ANCA, the largest employer of Aboriginal people in cultural resource management, administers the Contract Employment Program for Aboriginals in Natural and Cultural Resource Management. This is the largest funding program directed at Aboriginal involvement in land and marine management. Current funding is \$3.8 million per year but is only assured until 1994-95.

8.23 The increase in the level of involvement of Aboriginal and Torres Strait Islanders in the management of Australia's natural and cultural heritage is achieved through the funding of contract employment of Aboriginal and Torres Strait Islanders by Commonwealth, State and local government agencies. In 1992-93 about half the projects funded related to natural resource management, and included controlling the impact of feral animals and noxious weeds, rehabilitation and revegetation and environmental protection. The remainder were defined under cultural heritage management.

8.24 The Committee supports fully moves to increase the involvement and employment of Aboriginals and Torres Strait Islanders in land management, particularly in the rehabilitation of lands now moving back under the control of Aboriginal people.

8.25 The Committee recommends:

- (52)** that the Commonwealth Government continue to cooperate with traditional Aboriginal and Torres Strait owners in the restoration and maintenance of their lands by agreeing to continue the Contract Employment Program for Aboriginals in Natural and Cultural Resource Management, or another program with similar objectives, beyond 1994-95.

Ecotourism

8.26 Tourism is a highly significant worldwide industry, its dramatic growth in the last twenty years due to factors such as increased personal incomes and leisure time and improvements in transportation and communications. With tourism predicted to be one of the major industries of the next century, Australia is well placed near the fastest growing tourism region in the world, the Asia-Pacific. Ecotourism, or nature-based tourism, is a rapidly growing sector of the tourism industry. It has the potential both to contribute significantly to economic and employment growth as well as to act as a catalyst for encouraging ecological sustainability in the industry. Estimates put its growth rate at 30 per cent a year compared with 8-10 per cent for the regular tourist market.

8.27 Australia has an impressive combination of tourist attractions such as spectacular scenery, natural wonders, vast open spaces, a warm climate, beautiful beaches, unique wildlife, cleanliness and safety. If its industry is developed and promoted imaginatively, Australia could become a world leader in ecotourism.

8.28 Certain aspects of tourism can be energy intensive, involving disruption and sometimes destruction of natural habitats. However, with sensitive planning and good management, damage can be minimised and visitors enabled to enjoy and appreciate the beauty, fascination and peacefulness of Australia's superb natural environment.

8.29 Employment attributed directly or indirectly to tourism increased from 333 000 in 1981-82 to 447 000 in 1990-91. The ACF-ACTU Green Jobs Unit, in its Green Jobs in Industry Research Report, quoted an estimate by the Bureau of Industry Economics that tourism could be expected to generate up to 270 000 new jobs directly and indirectly during the 1990s.

8.30 Although projections of employment figures in ecotourism are difficult to make, partly because some activities overlap with other industries such as transport, it is realistic to assume that given the labour intensive nature of the industry and the exceptional rate of expansion anticipated, the prospects for the creation of a significant number of new jobs are excellent. Export earnings from the entire tourism industry were \$8.6 billion for the year 1992-1993, which was 10 per cent of total exports and 5.5 per cent of GDP. World Heritage areas of the Great Barrier Reef alone are estimated to contribute over \$1 billion to the Australian economy each year,⁸ much of this from the ecotourism industry. Australia currently has ten World Heritage areas and, although not all of these are as well known as the Great Barrier Reef, there is clearly a huge potential for domestic and international tourism in these areas to contribute significantly to the Australian economy.

⁸ Report issued by Commonwealth Environment Minister Senator John Faulkner at the conclusion of a Great Barrier Reef Ministerial Council meeting in July 1994.

8.31 The Green Jobs in Industry Research Report made the point that maximising the strong employment opportunities in ecotourism would depend on appropriate mechanisms being put in place to assist small businesses and to encourage large operators into the industry. The report emphasised the need for proper planning and management regimes to protect the resources on which the industry depends.

8.32 The Green Jobs Unit's survey of ecotourism operations revealed a young industry consisting predominantly of small-scale operations restricted by problems common to small businesses, such as under capitalisation and lack of appropriate business skills. It recommended that funds from the National Ecotourism Program be made available in 1994-95 to look at options for improving the viability of small ecotourism operators, including measures such as investment incentives, access to finance and the development of cooperative marketing opportunities.

8.33 Its other recommendations included a call for research to determine the size, distribution and value to the economy of ecotourism. A need for research into the profitable domestic and international markets for Australian ecotourism was also identified, along with the need for an accreditation scheme for the licensing of ecotourism operators. Accreditation was seen as a basis for the provision of detailed training needs assessment, cost-effective, on-the-job training for operators and recognition of varying levels of tour guide skills.

8.34 The Committee endorses all these recommendations. However it is concerned that action to encourage sustainable ecotourism projects should not be delayed by long drawn out assessments, consultancies and studies. While acknowledging the importance of these to the long term viability of the industry, the Committee believes that a window of opportunity exists at present for Australia's ecotourism industry to be a world leader and that action must be concurrent with further research.

Government initiatives in ecotourism

8.35 All levels of government in Australia have become involved in ecotourism. Most State governments have produced or are in the process of producing a strategy on ecotourism, and governments are involved in the marketing of ecotourism through state and territory tourism commissions and the Australian Tourist Commission. Local governments have a major role in the planning, development and management of ecotourism, particularly through their implementation of regulations such as local planning and building approval processes and their marketing of natural attractions.

8.36 In its submission to the inquiry, the Commonwealth Department of Tourism outlined four programs which are particularly relevant to the development of ecotourism. These are the National Ecotourism Program which includes the implementation of the National Ecotourism Strategy, the Regional Tourism Development Program, the Forest Ecotourism Program and the Sites of National Tourism Significance Program. The Regional Tourism Development Program is the largest program and will potentially have the greatest effect on employment both directly through the employment of people in implementing program initiatives and indirectly through the resulting increased level of tourism activity.

8.37 The rapid expansion of ecotourism has created a lag in information and understanding. Voluntary codes of practice exist in some areas, and the Australian Tourism Industry Association (ATIA) has guidelines for operators, but as yet there is no official accreditation scheme to check ill-informed and unscrupulous operators.

8.38 The Ecotourism Association of Australia, with membership drawn from industry, conservation groups, government and academics, has pushed for a system of accreditation. The almost universal call for a national system is typified in a submission to the Committee:

The industry must embrace accreditation (licensing based on qualifications) and ongoing in-service training much more ... The quality of the information passed to tourists greatly influences the quality of the experience for many and this ultimately affects the reputation and profitability of the industry. This is a major area where science and education are important to the tourism industry. Government needs to sponsor the regulation and facilitation of this.⁹

8.39 In a survey conducted by the Green Jobs Unit of 440 self-nominated ecotourism operators, 86 per cent of respondents supported a system of accreditation in ecotourism. To address this need, the Department of Tourism, through the National Ecotourism Program, advertised for a consultant to develop a system which could be applied across the range of Australian ecosystems and ecotourism operations. The consultancy is being managed by an industry led Steering Committee consisting of the Australian Tourism Industry Association (convenor), the Ecotourism Association of Australia, the Australian Conservation Foundation and the Commonwealth Department of Tourism as observer. The exhaustive terms of reference include a requirement on the consultant to prepare a five year business plan for the implementation of the system. Structured to be self-funding, the proposed scheme will be subject to public comment.

8.40 The Department has also prepared consultancy briefs for three other project areas, ecotourism education, energy and waste minimisation practices, and business development. The latter will target the skills operators need to improve their efficiency and viability, as well as cooperative marketing, purchasing and sharing of expertise. The education and business development consultants are due to report by mid 1995.

8.41 Marketing of ecotourism will be assisted by the Commonwealth Government backed Tourism Forecasting Council whose function is to provide statistics on all tourism sectors to investors. In its effort to market the Australian ecotourism industry overseas the Australian Tourist Commission is promoting a 'Discover the Great Australian Outdoors' campaign, two features of which are *The Natural Holiday Guide* which identifies ecotourism operators, and the staging of the Fourth World Congress on Adventure Travel and Ecotourism in Tasmania in November 1994. The Australian Tourist Commission hopes to compile a database available world wide which would allow visitors to book and pay in advance from their home countries.

⁹ CSIRO, Tropical Systems Research Centre, *Submission* No. 39, p 3.

8.42 Job creation has been identified as an important benefit of ecotourism. The stated aim of the Regional Tourism Development Program is to spread the economic benefits of tourism to rural and regional Australia. Eligibility for assistance under the program depends in part on a project's potential to deliver improvements in income and employment through multiplier effects. The Forest Ecotourism Program advises in its guidelines to applicants that proposals will be assessed against, among other factors, their prospects for economic and other benefits to the local and regional community. Given the urgency of the employment challenge it seems appropriate that in making grants, priority should be given to projects which are not only environmentally sustainable but which can also demonstrate employment creation prospects.

National Ecotourism Strategy

8.43 The National Ecotourism Strategy was released on 10 March 1994 after an extensive consultation process including discussions with government agencies, industry and conservation groups, workshops in all states and territories and a national call for submissions. The strategy aims to identify the major issues affecting ecotourism, to develop a national framework to guide governments, developers, operators and others, and to formulate policies and programs to assist interested parties. It complements work being undertaken by State and Territory governments, the industry and conservation groups.

8.44 The Commonwealth Government has allocated \$10 million over the next four years to implement the National Ecotourism Strategy. The first grants will be used mainly for infrastructure projects such as boardwalks, interpretive signs and displays, for studies on the impact of tourism on the environment and for research and planning. In a March 1994 news release the Minister for Tourism said that the funding would:

... be used to steer Australia towards an internationally competitive and domestically viable ecotourism industry, while making a major contribution to environmental conservation and management. Ecotourism will help spread the economic and employment benefits of tourism throughout regional Australia and help create jobs.

8.45 The strategy identifies the following major issues affecting the planning, development and management of ecotourism in Australia, suggesting objectives and actions to address each issue:

- . the need for minimal impact and ecologically sustainable approaches to tourism planning, development and management;
- . the need to simplify the processes used in the planning and regulation of ecotourism, to increase their effectiveness and integrate approaches across government boundaries and between agency jurisdictions;
- . the consideration of factors affecting the management of natural resources in meeting the challenge of growth in ecotourism;
- . the development of appropriate infrastructure;

- . the need for monitoring of impacts to assist in decision-making and the effective management of the resource;
- . addressing the challenges associated with marketing unique and often seasonal products, particularly in distant markets;
- . the need for appropriate industry standards and the possibility of establishing a national system of accreditation to ensure that services and products meet certain standards;
- . ecotourism education to assist in establishing industry standards and encouraging tourists and operators to adopt minimal impact practices;
- . opportunities for the involvement of Aboriginal and Torres Strait Islander people in ecotourism as land owners, resource managers and tourism operators;
- . the particular challenges affecting the viability of ecotourism enterprises;
- . equity considerations arising from competition for the use of natural resources and from the way in which they are managed.

8.46 The strategy document lists two pages of examples of accreditation schemes and environmental codes of practice, both national and international. Also included is a compilation of courses and units in ecotourism in institutions around Australia.

8.47 The National Ecotourism Strategy has already attracted international recognition and requests for further information. Domestically it has attracted considerable attention, with details of 27 regional ecotourism projects which recently received Commonwealth Government funding well reported in the national press.

8.48 In August 1994 the Committee visited Fraser Island and examined some of the tourism operations (see separate case study). During discussions local people expressed the fear that the principles of environmental protection and inter-generational equity could be taken too far, resulting in some areas being 'locked up' for future generations, with the result that the people of today would not be able to use them or appreciate them. The view was expressed that there is a place for other kinds of tourism, such as adventure tourism, alongside ecotourism, provided they can demonstrate sustainability.

8.49 Discussions also revealed a need for rationalisation of the processes required in the planning and regulation of ecotourism. For example, developers favour a 'one-stop' approval process to avoid the potential delays and conflicting advice involved in meeting requirements from several authorities. The view was expressed that a local coordinating body which valued community consultation and acknowledged the expertise and accumulated experience of local people should be established to deal with problems that are essentially local, such as reorganising a cumbersome fee collection system and checking on unlicensed tour operators.

8.50 The Committee found there was a widespread view that the Queensland Department of Environment and Heritage is under resourced, which severely limited its ability to develop and implement a comprehensive planning document, the Great Sandy Region Management Plan 1994-2010, particularly in terms of building appropriate infrastructure.

8.51 Many of the issues raised with the Committee during its visit to Fraser Island are being addressed in the National Ecotourism Strategy. The Committee's observations and discussions with local tourism operators reinforced its belief that the National Ecotourism Strategy is a very timely, relevant and hence valuable document which should provide an extremely sound basis for the development of the industry.

8.52 The Committee recommends:

- (53) that the Commonwealth Government work jointly with the State and Territory governments, and with the ecotourism industry, to establish quickly a national ecotourism accreditation scheme.

Other initiatives

8.53 The tourism industry has been quick to recognise the rapid growth of interest in ecotourism. Among industry initiatives to assist expansion of a potentially very profitable sector of the industry are conferences such as the EMIAA conference in Mackay in April 1994, *Tourism Ecodollars: Tourism sustainability and profitability*, which was based on the premise that '...world tourism does not have a future without sustainable environmental management strategies and technologies.' A conference held on Fraser Island in August 1994, Private Sector Involvement in Parks and Protected Areas, was organised jointly by the Royal Institute of Public Administration Australia (Queensland Division) and Queensland Tourism Industries Ltd. The US Adventure Travel Society will conduct the Fourth World Congress on Adventure Travel and Ecotourism in Hobart in November 1994, an event which is expected to attract 600 delegates from 60 countries.

8.54 There are various industry associations such as the ATIA and the Pacific Asia Travel Association which vigorously promote the industry. Other associations such as the Ecotourism Association of Australia, professional societies and conservation groups promote codes of practice and the development of standards and ethics.

8.55 One of only two ecotourism research centres in the world was opened in August 1993. The International Centre for Ecotourism Research, located at Griffith University's Gold Coast campus, is undertaking a number of long-term studies into subjects such as the economic contributions of ecotourism to conservation, the effects of different levels of tourist impact on ecosystems, tourism policy in World Heritage areas and environmental management systems used by airlines, hotel chains and resorts. The Centre which has an international advisory board, seeks funding from industry and government sources. It received a grant under the National Ecotourism Program 1993-94 for a project to monitor impacts of tourism at wilderness camp sites in Queensland, New South Wales and Tasmania.

8.56 The Committee acknowledges the importance of non-government initiatives which, if coordinated with and supported by government initiatives, could contribute to the development of Australia as a premier ecotourism destination. If the industry is properly managed (particularly if an effective national accreditation scheme is developed) and if the natural environment is properly protected, the ecotourism industry is set to become a significant employer in the small business sector of the Australian economy. It should also reinforce the imperative of protecting the environment.

Need for a working definition

8.57 Due to widespread misinterpretation of the term 'ecotourism', the Commonwealth Department of Tourism placed considerable emphasis in its National Ecotourism Strategy on developing an accurate, comprehensive definition of ecotourism which incorporated the four elements which it had identified as essential:

- . the natural environment;
- . ecological and cultural sustainability;
- . education and interpretation; and
- . provision of local and regional benefits.

8.58 The National Ecotourism Strategy has adopted the following two paragraph definition incorporating these elements:

Ecotourism is nature-based tourism that involves education and interpretation of the natural environment and is managed to be ecologically sustainable.

This definition recognises that 'natural environment' includes cultural components and that 'ecologically sustainable' involves an appropriate return to the local community and long-term conservation of the resource.

8.59 The strategy states that broad agreement on a definition would assist in the planning, development and management of Australia as an ecotourism destination, would define the product for the industry and the market, and establish a framework of ecological sustainability that could be adopted by other sectors of the tourism industry. The Committee considers that for these purposes this definition is appropriate and that its adoption nationwide should be encouraged. The definition should provide a useful basis for a national accreditation system.

8.60 The Green Jobs Unit adopted this definition of ecotourism, taking the view that the second paragraph on interpretation is a crucial component. It recommended that the Department initiate moves to gain broad acceptance of its two paragraph definition through a promotional campaign. The Committee supports this approach.

ECOTOURISM ON FRASER ISLAND - A CASE STUDY

As part of its inquiry the Committee visited Fraser Island, a World Heritage property, staying at the Kingfisher Bay Resort and Village which is a leading operator in the emerging Australian ecotourism industry. While on the island the Committee had discussions with the resort's Environmental Manager, regional officers of the Queensland Department of Environment and Heritage, and a number of other people involved in various aspects of the local tourism industry.

Fraser Island, the world's largest sand island, which had a history of logging and sandmining, was inscribed on the World Heritage List in December 1992. This was in recognition of the outstanding universal value of its ancient sand dune systems, its spectacular forests and freshwater lakes.

Management of the Fraser Island World Heritage Property must give due regard to Australia's obligations under the World Heritage Convention for the protection, conservation, presentation, rehabilitation and transmission to future generations of the property. Existing land users are not constrained, provided they do not threaten the natural or cultural values for which the property was listed. In its Great Sandy Region Management Plan 1994-2010, the Queensland Government outlines guidelines and actions necessary to achieve this objective:

- protection of the World Heritage values of Fraser Island by developing and implementing strong long-term legislative, regulatory and institutional arrangements and unified community support;
- conservation of values through increased understanding, active management and control of processes threatening the long-term integrity of the Fraser Island World Heritage Property and its capacity for ongoing evolution;
- presentation of the Fraser Island World Heritage Property and the World Heritage concept to local, national and international communities to create a greater understanding of and support for its outstanding universal values;
- rehabilitation of degraded areas of Fraser Island to a natural condition through the identification of degraded areas, removal of threatening processes and active rehabilitation of sites as necessary to re-establish natural conditions and processes; and
- transmission of the outstanding universal values of the Fraser Island World Heritage Property to future generations through the successful protection, conservation, rehabilitation and presentation of values.

After years of controversy, sandmining and logging have ceased. The Management Plan while acknowledging that commercial tourism is important to the economic base of the region, envisages only a very limited range of future, environmentally responsible tourist developments on the island. The main thrust of new commercial development is expected to occur in the near by Hervey Bay, Maryborough and Rainbow Beach areas. With the exception of small areas committed to residential and commercial areas and areas potentially made available to Aboriginal people, the whole island is proposed for gazettal as a national park under the *Nature Conservation Act 1992*.

Existing management of this World Heritage area is severely hampered by inadequate funding and staffing, with the consequence that the infrastructure necessary to support increased, environmentally sustainable tourism is substandard or lacking altogether.

The Kingfisher Bay Resort and Village resort complex opened in July 1992 and has won various awards including the Australian Tourism Award (Tourism Development category) in 1993. The approach taken by the resort operators is indicative of the scope and nature of activities involved in major ecotourism ventures. Early in its development the resort appointed a director of environmental management with specialised experience in protected area management. The resort management also plays an active role in the Ecotourism Association of Australia through financial sponsorship and the appointment to the Association's executive of its environmental director. The company has established a research grant to fund postgraduate studies into ecotourism on Fraser Island.

All buildings are designed to harmonise with the environment. They are constructed of timber, are energy efficient and are placed below the tree line between existing major trees. To enable landscaping with species native to the island, a large nursery was constructed on site. Waste management, which is a matter of considerable concern in the development of protected areas, was given particular attention. Solid waste is sorted, compacted and removed to the mainland, and sewage is treated with a three-stage biotechnological Enviroflow system.

The resort is one of the largest employers in the ecotourism industry, in employing about 250-300 people, most of whom are accommodated on the island in a staff village. It employs and trains full-time interpretive rangers with backgrounds in areas such as botany, marine biology and zoology who conduct ecotours relating to the island's natural and cultural history at the resort and around the island. It has published field guides for visitors and installed interpretive signs along walking tracks. A system of woodchip walking tracks and boardwalks used by the National Parks and Wildlife Service has been adopted to minimise visitor impact on the dunal system and vegetation. The production of an educational video on sand driving was sponsored and a four-wheel drive training circuit installed to inform visitors about driving on the island's unique sand road system as well as encouraging environmental ethics.

To maintain communications with local people and encourage input affecting future management decisions, the resort management established a Community Consultative Committee which meets regularly with representatives of key interest groups covering conservation, education, Aboriginal people, Fraser Island residents and others. The tour operations of the resort are currently inhibited by an outdated, restrictive licensing system. The resort management concurs with a frequently expressed opinion that expansion of ecotourism on Fraser Island is dependent on government and business investment in appropriate infrastructure. Measures such as the extension of boardwalk trails, control of beach and lakeside camping and construction of bypasses on the beach highway are required to protect the environment while attracting greater numbers of tourists.

A proposal has been made for an alternative light rail public transport service utilising a former logging tramway. Linking key central visitor destinations, a rail line would be narrower and have less impact than the existing road, providing a safer, more stable ride with value added experiences such as commentaries by guides. Carrying visitors by day and garbage and supplies by night, the system would reduce vehicular traffic considerably. With incentives to encourage its use by all resort and tour operators, a light rail system would be viable within a few years, and would encourage expansion of the low cost 'backpacker' market.

CHAPTER 9: A NATIONAL STRATEGY FOR THE ENVIRONMENT AND EMPLOYMENT

9.1 From the evidence presented to the Committee it is quite clear that a window of opportunity exists for Australia to develop and implement a range of environmental and economic policies that will create sustainable employment and at the same time protect and restore our environment.

9.2 As outlined in Chapter 4, the world market for the pollution control and waste management industry alone has been estimated to increase to a total of over \$400 billion per year by the year 2000. If Australia could capture only 2 per cent of this market, this would represent some \$8 billion of business annually which could provide sustainable employment for at least 150 000 persons. With Australia's proximity to the rapidly growing economies of Asia, we should be in a strong position to sell our technology and expertise in these particular markets.

9.3 Significant employment opportunities were also identified by the Committee in other elements of the environment industry, particularly in land management, and while the potential for job creation may not be as large as in the pollution control and waste management sectors, employment opportunities may also result from the more widespread use of less-polluting energy sources and from ecotourism. For example, the development of a national fuel ethanol industry would create in excess of 10 000 jobs.

The need for a national perspective and a coordination of effort

9.4 Close cooperation between the Commonwealth and State governments is desirable in the implementation of the various environment and employment strategies that have been developed in recent years. While these strategies are generally well developed in that they outline issues, objectives and actions, subsequent follow-up and implementation has been very slow. Examples given earlier in this report include the delay in establishing the National Environment Protection Council and the delay in commissioning the study on externalities in the energy sector. The consultative mechanisms between the Commonwealth and the States through Ministerial Councils responsible for environmental, minerals and energy matters such as ANZECC and ANZMEC are inherently cumbersome and progress on environmental issues appears to be painstakingly slow.

9.5 The Committee considers that because of the lack of effective progress to date, the Commonwealth Government should be prepared to proceed bilaterally with receptive states or alone, on the basis of its own constitutional powers, where effective cooperation is not readily achieved.

9.6 The Committee is also concerned about the lack of commitment of several Commonwealth departments to the inquiry's objectives of job creation and protection of the environment. While Commonwealth departments cooperated well with the Committee in making senior staff available to give evidence at public hearings, submissions to the Committee were generally uninspiring, long on background but short on initiatives and invariably forwarded very late. Submissions from DEST and AIDAB were notable exceptions. As raised earlier in this report, there is also considerable fragmentation of responsibilities for environmental matters and programs between departments and agencies. Most are too preoccupied with immediate concerns and objectives within their own portfolios to realise the opportunities to integrate their activities in a coordinated approach to the implementation of government policies.

9.7 The Committee considers that to motivate departments and instill a sense of urgency, it is necessary for the Commonwealth Government to reaffirm and maintain its commitment to environmental action by allocating a high priority to environmental measures, particularly those which will create significant employment.

9.8 While the industry will undoubtedly continue to grow under the existing institutional arrangements, it will be unable to realise its full potential unless the impediments identified in earlier chapters of this report can be eliminated. Several of these impediments can be attributed directly to governments and could be overcome by a coordinated national approach. This will require political will, clear direction from government, a firm commitment by officials and cooperation with industry.

Development of a national strategy

9.9 The Committee considers that the prospects for the growth of the environment industry are such that a pro-active approach by governments is warranted. Account must be taken, however, of the wide diversity of the industry when considered in its broadest terms and any national strategy will need to be multi-faceted. As the EMIAA commented:

... because of the diversity of environment management applications and priorities in different economic sectors, it is virtually impossible to draft a detailed development strategy for the industry which will see all parts moving in the same direction at the same time - environment management is simply too horizontally dispersed and is always going to be dependent on developments and trends in other sectors. ¹

9.10 Despite this difficulty, there is a need for a broad strategy that will coordinate, focus and enhance all the disparate programs. There are a number of institutional arrangements under which a national strategy could be developed and maintained. The use of existing Commonwealth/State consultative arrangements such as the ANZECC ministerial council is one option. By its very nature, however, consultation through the

¹ Cole Dr J (EMIAA), Background information provided to the Committee, Canberra, 15 November 1993, p 2.

ministerial council process is cumbersome. The delays in the establishment of the National Environment Protection Council (NEPC) offer little encouragement to the adoption of this particular option.

9.11 Several views on the need for some kind of combined industry/government body to facilitate the development of the industry were put to the Committee. One common view with which the Committee is in complete agreement is that any such body should not be merely another layer of bureaucracy.

9.12 The EMIAA suggested to the Committee that while commercial collaboration in export development was being well facilitated by EMIAA's export arm, the Australian Environment Management Export Corporation (AUSTEMEX), there was a need to develop similar domestically focussed industry/government collaborative mechanisms:

Given that 60 per cent of the work of the environment industry comes from the public sector, a strong case can be made for the establishment of industry development mechanisms fostering routine commercial collaboration within Australia and involving project identification and development ... There is an apparent need, for example, to facilitate more effective collaboration between public and private sectors, essentially at the State and local government levels where little account is taken of the industry and economic development considerations intrinsic in the installation, operation and maintenance of environment infrastructure.²

9.13 The Committee notes that at least one of the states has already formed a government/industry collaborative mechanism. The Queensland Department of Business, Industry and Regional Development established the Queensland Waste Management and Pollution Control Industry Task Force in 1991. Membership of the Task Force is drawn from key sectors of the environment management industry in Queensland and the Task Force has completed a Draft Strategic Plan for the state's environment management industry. A key target for the plan is to generate additional commercial activity within the industry in Queensland to the value of \$30 million per annum within five years. Other aims include the development of strategic networks to allow Queensland companies to participate in major environment projects overseas, the encouragement of import substitution and the development of regional waste management and recycling facilities.³

9.14 The South Australian Government recommended a role for the Commonwealth extending beyond coordination and consultation to the establishment of a statutory authority named the National Environmental Industry Development Corporation to support the development of environmental management industries in Australia. The proposed corporation would work closely with the EMIAA and Austrade and would:

... play a leading role in developing the environmental management industry through supporting research, technology licensing, establishing a venture capital facility, developing export potential and information dissemination.⁴

² Cole Dr J (EMIAA), Background information provided to the Committee, Canberra, 15 November 1993, p 6.

³ Queensland Government, *Submission* No 94, p 8.

⁴ South Australian Government, *Submission* No. 97, p ii.

9.15 The Committee also notes that the Industry Commission's inquiry in 1993 into Environmental Waste Management Equipment, Systems and Services examined the concept of a combined industry/government body to liaise with governments and coordinate certain industry activities. DITARD and DPIE had suggested that the Commission consider the establishment of an Environment Industries Council modelled to some extent on the Agri-Food Council. The Agri-Food Council is a combined government-industry body chaired jointly by the Commonwealth Ministers responsible for Industry and Agriculture with a high-level membership from industry, trade unions, the farming sector and research institutions. Working Groups address specific issues. The Commission expressed some reservations about the proposal and considered that widespread industry support should be demonstrated before any commitment was made to establish the Council. The Commission, nevertheless suggested a number of guidelines if a decision was made to establish the Council. DITARD and DPIE did not refer to their proposal for an Environment Industries Council in their submissions to the Committee.

9.16 The EMIAA was initially sceptical about the suggestion for an Environment Industries Council if it was to be just another government committee. Subsequently, the Association gave the proposal qualified support, emphasising that such a Council should focus on the environment industries and suggesting that the Council must be essentially an Environment Industry Council and not an Industry Environment Council.⁵

9.17 In evidence to the Committee, Dr John Cole of the EMIAA was lukewarm to the Environment Industries Council proposal:

My problem with setting up a formalised council which will attract bureaucratic resources is that it becomes a sponge for bureaucratic resources. I would much prefer to see the funding that can be made available to support industry used in industry development mechanisms akin to what we are doing in the export area.⁶

9.18 The Committee considers that in view of the qualified support from industry for the proposal to establish an Industry Environment Council, there is little to be gained at present by pursuing this proposal or the suggestion from the South Australian Government for the creation of a statutory body. There is, however, a need for some kind of high-level consultative body and there would be merit in extending the scope of the recently established Advisory Council on Environmental Employment Opportunities (ACEEO) to pursue the development of a national strategy for the environment industry as a whole. That Council, however, must avoid focussing its efforts on only one sector of the environment industry. This could be prevented by broadening the environment management industry representation on the Advisory Council. Its role in providing advice to the Commonwealth Government on priorities and strategic directions for environmental employment initiatives would make it particularly suited to the wider role of developing industry strategies.

⁵ EMIAA, Supplementary submission to Industry Commission, EWMESS inquiry, August 1993.

⁶ Evidence, Dr J Cole (EMIAA), Canberra, 15 November 1994, p 328.

9.19 The Committee strongly believes that to realise the full growth potential of the Australian environment industry, there is a need for the Commonwealth Government to assume a leadership role by developing a national strategy, identifying opportunities to be pursued and constraints to be overcome. The crucial issue is, however, the mechanism through which a strategy could be developed and rhetoric replaced by action. To succeed, it is essential that a national strategy be developed by a high-level body and that this body should have full support from the ministers responsible, be welcomed with enthusiasm by industry and have adequate staff and funding resources. An expanded ACEEO with a broader charter could be the means for the Commonwealth Government to develop a national, coordinated strategy for the environment industry.

9.20 One of the most critical factors that a national strategy will have to deal with is the need for a highly skilled and trained work force. The EMIAA has identified environment management and consultancy activities in the Asia-Pacific region as a major growth area. To take advantage of these opportunities, experienced professional, technical and administrative staff with a working knowledge of the local language and an appreciation of the local culture will be essential. The Institution of Engineers, Australia, advised the Committee of ongoing developments in environmental engineering:

One very exciting growth area in the engineering profession that is attracting new entrants of a significantly high calibre is the faculties of engineering now offering environmental engineering degrees. Shortly, there will be 11 universities graduating environmental engineering students. With an average of about 25 to 30 graduates a year from each one of these institutions, you can see that there will be 300 or so people coming into the work force who are specifically educated in the field of environmental engineering.⁷

9.21 The Canberra Institute of Technology advised that it was presently managing a major curriculum project for environmental and waste management technicians on behalf of the Australian Committee for Training Curriculum. This project includes identifying the key occupational task descriptions for technicians and field officers employed in the industry and identifying existing and future training resources and capacity in both institutional and industrial sectors.⁸

9.22 The Committee notes that the training and educational needs of the environment industry have been recognised by professional institutions and educational establishments. It is essential, however, that industry and the education sector collaborate closely to ensure that sufficient skilled personnel are available to realise the potential of the environment industry and that governments make the necessary resources available. The eventual returns could far outweigh the initial investment.

9.23 The Committee recognises that in the relatively short time of its existence, the EMIAA is proving effective in establishing networks for the environment management industry and in representing its interests to governments. To realise the opportunities for economic and employment growth, there is a clear need to support the EMIAA through the development of a national approach to the environment industry.

⁷ Evidence, Mr Timothy Macoun (Institution of Engineers, Australia), Canberra, 23 September 1993, pp 165-6.

⁸ Canberra Institute of Technology, *Submission* No. 70.

9.24 The Committee for Economic Development of Australia (CEDA) which examined key issues relating to Manufacturing Industry Policy in 1991 and 1992 supported governments taking a leading role in industry development. CEDA concluded that:

There is a pro-active and potentially powerful role governments can play in facilitating sectoral policies, where key parties in particular industries sit down together to concentrate on a set of spearhead industries. Such an approach, where the government, through an appropriate agency, plays a facilitating role in bringing key industry participants together for detailed discussions on an industry's future, should be encouraged.⁹

9.25 The Committee recommends:

- (54) that the scope of the Advisory Council on Environmental Employment Opportunities be extended to formulate a broad national strategy for the development of all sectors of the Australian environment industry, including education and training needs, and that additional and sufficient resources should be made available to the Council to undertake this task. Following the development of an industry strategy, the Council should consider the means by which the strategy can be implemented quickly.

John Langmore
Committee Chair

14 November 1994

⁹ CEDA, *A Perspective on Broad Directions for Manufacturing Industry Policy in Australia, Strategic Issues Forum*, July 1993.

APPENDIX A

INDEX OF SUBMISSIONS AND EXHIBITS

SUBMISSIONS

- 1 Mr Jim Bridge
- 2 Mr Bill Payne
- 3 Mr Max Mueller
- 4 Mr Emilis Prelgauskas
- 5 Australian Forest Growers
- 6 Brother Barry Lamb
- 7 Environmental Research and Information Pty Ltd
- 8 D'Oliveira Pty Ltd
- 9 Mr Kerry Bindon
- 10 Mr Harry Johnson
- 11 Lathlain Holdings Pty Ltd
- 12 The Werribee Group
- 13 Australian Electric Vehicle Association Inc
(Brisbane Branch)
- 14 MacFarlane Research Pty Ltd
- 15 Ms Anne-Marie Tong
- 16 Tasmanian Greens
- 17 Mr John Shiel
- 18 Dr John Dargavel
(Centre for Resource and Environmental Studies,
Australian National University)

- 19 Energy Saving Alternatives Pty Ltd
- 20 Gorton Timber Company Pty Ltd
- 21 Mr Alan Sann
- 22 Australian Electric Vehicle Association Inc (Brisbane Branch)
Supplementary Submission
- 23 State Projects
NSW Public Works Department
- 24 MR M S Common
(Centre for Resource and Environmental Studies,
Australian National University)
- 25 Anglican Social Responsibilities Commission (Western Australia)
- 26 Full Cycle Plastics Pty Ltd
- 27 South East Region Recycling Group
- 28 Solar Energy Industries Association of Australia Inc
- 29 Gympie & District Landcare Group Inc
- 30 Pacific Waste Management Pty Ltd
- 31 Permaculture Communities Association
- 32 Australian Maritime College
- 33 Friends of the Earth (Sydney)
- 34 Urban Bushland Management Ltd
- 35 Ms Katalin Erdelyi
- 36 Mr Noel Daley
- 37 North Coast Environment Council Inc
- 38 Mr Jack Read
- 39 Mr R W Braithwaite
CSIRO
Division of Wildlife and Ecology Program
Tropical Ecosystems Research Centre

- 40 Council of the Shire of Warringah
- 41 Mr Steve O'Grady
- 42 Australian Resource Industries Pty Ltd
- 43 Australian Fertilizer Manufacturers' Committee Inc
- 44 Agricultural & Veterinary Chemicals Association of Australia Ltd
- 45 Mordialloc/St Kilda Bottle Depot
- 46 Mareeba Shire Council
- 47 Queensland Conservation Council
- 48 City of Brunswick
- 49 Australian Maritime Safety Authority
- 50 Local Government Association of Queensland Inc
- 51 Windana Research
- 52 The Greenhouse Village Project
- 53 Venom Supplies
- 54 Greening Australia Ltd
- 55 Australian Chemical Industry Council
- 56 Waste Contractors and Recyclers Association of NSW
- 57 Kinhill Engineers Pty Ltd
- 58 National Association of Forest Industries Ltd
- 59 Nambucca Valley Conservation Association Inc
- 60 Recyclers Association of Victoria Inc
- 61 Australian Recycling Technologies Pty Ltd
- 62 Permaculture Association of WA (Inc)
- 63 Australian Mining Industry Council
- 64 Ms Margaret Howe

- 65 Environment Institute of Australia
- 66 GreenTech Australia
- 67 Community Land Care Information Centre, Bendigo
- 68 Plastic Recyclers (Qld) Pty Ltd
- 69 Institution of Engineers Australia
- 70 School of Applied Science
Canberra Institute of Technology
- 71 Mr Bob Charles, MP
- 72 Dr Gary Scott
- 73 Senator Dee Margetts
- 74 AcrossTech
- 75 Australian and New Zealand Solar Energy Society
- 76 The Greens (WA)
- 77 Department of Employment, Education and Training
- 78 National Association for Sustainable Agriculture Australia
Appropriate Technology for Community and Environment
Working Australians for Sustainable Agriculture, Jobs and Homes
(Joint submission)
- 79 Mid-Mountains Forum
- 80 Department of Tourism
- 81 Sydney Natural Resources Management Group
- 82 Australian Water & Wastewater Association Inc
- 83 New South Wales Government
- 84 CSIRO
- 85 Department of the Environment, Sport and Territories
- 86 Standards Australia
- 87 Australian Nature Conservation Agency

- 88 Australian Chamber of Commerce and Industry
- 89 Australian Solid Fuel and Wood Heating Association
- 90 Chamber of Manufactures of NSW
- 91 Australian Chamber of Manufactures
- 92 New South Wales Coal Association
- 93 Greenpeace
- 94 Queensland Government
- 95 Australian Lot Feeders' Association
- 96 Department of Industry, Technology and Regional Development
- 97 South Australian Government
- 98 Ms Kate Crowley
- 99 Brisbane City Council
- 100 Council of the City of Willoughby
- 101 Department of Primary Industries and Energy
- 102 Northern Territory Government
- 103 Australian Paper Ltd
- 104 Australian International Development Assistance Bureau
- 105 Department of the Treasury
- 106 Professor N Gunningham
(Australian Centre for Environmental Law
Australian National University)
- 107 Confidential
- 108 Energy Research and Development Corporation
- 109 Mr Garry Donnell
- 110 Ms Glenda John

EXHIBITS

Exhibit No. 1:

Document presented by Ms Kerrie Milburn-Clark, Australian Paper Ltd, Melbourne, 9 March 1994:

'Country of Origin Labelling'

Exhibit No. 2:

Documents presented by Mr Frank Phillips, Australian Chemical Industry Council, Melbourne, 9 March 1994:

'Australian Chemical Industry, 1992 Survey of Workplace Injuries'

'Australian Chemical Industry, Health Safety & Environment Committee, Annual Waste Survey 1992'.

'Australian Chemical Industry, Transport & Storage Committee, Annual Survey of Transport Incidents 1992'.

'Responsible Care - A Public Commitment'.

Exhibit No. 3:

Document presented by Mr Ric Sinclair, National Association of Forest Industries, Canberra, 19 April 1994:

'A prospectus approach to the development of the Forest Products Industries'.

Exhibit No. 4:

Presented by Dr Russell Reeves, APACE Research Ltd, Canberra, 1 September 1994:

'Issues relating to the development of ethanol as an alternative fuel for motor vehicles'.

APPENDIX B

LIST OF WITNESSES AT PUBLIC HEARINGS

Sydney, Wednesday 22 September 1993

Australian Water and Wastewater Association

Mr Christopher Davis
Executive Director

Environment Institute of Australia

Mr Brett Odgers
President, ACT Division

Mr Warwick Giblin
National Vice-President

Mr Eric Anderson
ACT Councillor, National Council

New South Wales Government

Mr Paul Forward
Director, Corporate Planning
Sydney Water Board

Dr Gulseren Izmir
Director, Economic Evaluation and Reporting
New South Wales Environment Protection Authority

Mr William Train
Director, Operations Policy and Licensing
New South Wales Environment Protection Authority

Pacific Waste Management Pty Ltd

Mr Warwick Giblin
Environmental Manager, Pacific Region

Mr Robert O'Hara
Government and Corporate Affairs Manager

Warringah Council

**Mr Ritchie Venn
Waste Manager**

**Mr Anthony Foy
Waste and Recycling Projects Officer**

Waste Contractors and Recyclers Association of New South Wales

**Mr Walter Forbes
Executive Committee Member**

**Mr Charles Johns
Recycling Executive Officer**

**Mr Anthony Johnston
Executive Member**

Canberra, Tuesday 23 September 1993

Australian Chamber of Commerce and Industry

**Mr John Martin
Executive Director**

**Mr Steven Shepherd
Director of Policy and Research
Victorian Employers Chamber of Commerce and Industry**

**Mr Ian Booth
Consultant**

Department of the Environment, Sport and Territories

**Ms Joanne Di Sano
First Assistant Secretary
Environmental and Conservation Policy Division**

**Ms Kathryn Kelly
Acting Director
Environmental Economics and International Projects Section**

**Mr Gene McGlynn
Assistant Director
Environmental Economics and International Projects Section**

Mr John Whitelaw
Acting Executive Director
Commonwealth Environment Protection Agency

Mr Paul Pollard
Director
Legal and Economic Section
Commonwealth Environment Protection Agency

Department of Industry, Technology and Regional Development

Mr Robert McKeon
Acting First Assistant Secretary
Science and Industry Policy

Mr Brian O'Gallagher
Assistant Manager
Environment Industries

Mr Stephen Trengove-Jones
Assistant Manager
Sustainable Development Section

Institution of Engineers Australia

Mr Timothy Macoun
Deputy Chairman
National Committee on Environmental Engineering

Mr David Hood
Director
Engineering

Standards Association of Australia

Mr John Henry
Group Manager
Environment and Safety

Brisbane, Tuesday 12 October 1993

Kingfisher Centre

Mr Harry Johnson
Recycling Coordinator

Plastics Recyclers (Qld) Pty Ltd

Mr Yinon Trieger
Managing Director

Queensland Conservation Council

Ms Nichola Hungerford
Coordinator

Mr Brian Clark
Australian Conservation Foundation

Ms Narelle Douglas

Queensland Government

Mr John Gilmour
Executive Director
Environment Division, Department of Environment and Heritage

Mr William Dixon
Manager
Work and Labour Market Programs Unit
Department of Environment and Heritage

Mr Warren Muller
Manager
Waste Minimisation
Department of Environment and Heritage

Canberra, Thursday 28 October 1993

Australian Lot Feeders Association

Mr Robin Coombs
Executive Director

Mr Richard Noble
Councillor

Canberra, 15 November 1993

Environment Management Industry Association of Australia

Dr John Cole
Chief Executive Officer

Mr Robert Charles, MP
Member for La Trobe

Senator Dee Margetts
Senator for Western Australia

Melbourne, Wednesday 9 March 1994

Australian Chamber of Manufactures

Mr William Pridmore
Manager
Environment and Technical Services

Mr David Atkinson
Environmental Services Manager
ACI Glass Packaging Technology

Dr Edward Jones
Hoechst Australia Ltd

Mrs Anita Roper
National Manager
Strategy and Industry Policy

Dr Richard Strauch
Environmental Affairs Specialist
ICI Australian Operations Pty Ltd

Australian Chemical Industry Council

Mr Frank Phillips
Chief Executive Officer

Ms Dahle Suggett
Committee Member

Australian Paper Ltd

Ms Kerrie Milburn-Clark
General Manager, Government Relations
Amcor Paper

Mr Anthony Nott
National Recycling Manager

City of Brunswick

Councillor Glenyys Romanes
Mayor

Councillor Mike Hill

Mr Roger Lamb
Director, Energy Management

Ms Angela Hill
Conservation Officer

Recyclers Association of Victoria

Mr David Bourke
President

Mr Daniel Power

Solar Energy Industries Association of Australia

Mr Raymond Prowse
Executive Officer

Canberra, Tuesday 19 April 1994

Australian International Development Assistance Bureau

Mr David Barber
Acting Assistant Director General
South East Asia Branch

Mr Murray Proctor
Acting Deputy Director General
Pacific and International Programs Division

Ms Deborah Stokes
Acting Deputy Director General
Corporate Development and Support Division

Mr Robert Mann
Director
Development Banks Section

Mr Ross Muir
Director
Business Cooperation Section

Ms Noreen Redhead
Acting Director
Environment, Agriculture and Physical Infrastructure

Australian Trade Commission

Mr John Lightfoot
General Manager
Projects and Engineering

Mr Damien Ryan
National Manager
Environment Industries

Mr Christopher Lang
Manager
Parliamentary Relations

Department of Employment, Education and Training

Mr Ian Campbell
First Assistant Secretary
Employment Programs Delivery Division

Dr Trish Mercer
Assistant Secretary
Workskills Branch
Employment Programs Delivery Division

Mr Christopher Coleman
Director
Policy and Analysis Section
Higher Education Division

Mr Gregory Connolly
Director
Economic Conditions and Labour Market Forecasting Section
Economic Analysis Branch

Ms Virginia Greville
Acting Director
Industry and Enterprise Strategies Section
Industry Programs Branch

Department of Primary Industries and Energy

Mr Ross Walker
Assistant Secretary
Community and Regional Landcare Policy Branch

Mr Michael Hitchens
Assistant Secretary
Primary Industries and Environment Branch

Mr Brian Ramsay
Director
Rural Industry Policy Section
Rural Division

Mr Ian Walker
Manager
Renewable Energy and Environment Section
Energy Environment Branch

Department of the Treasury

Mr David Borthwick
Deputy Secretary (Financial and Structural)

Mr Terrence O'Brien
Assistant Secretary
Indirect Taxation and Quantitative Analysis Branch
Taxation Policy Division

Mr Robert Sturgiss
Assistant Director
Primary Industries and Environment Section
Structural Policy Division

Greening Australia

Ms Winsome McCaughey
Chief Executive

Mr Anthony Woodhill
Manager
Corridors of Green Program

National Association of Forest Industries

Mr Ric Sinclair
Assistant Director
Economic and Resource Policy

Canberra, Thursday 2 June 1994

Department of Primary Industries and Energy

Ms Wendy Fisher
Assistant Secretary
Energy Environment Branch

Mr Michael Hitchens
Assistant Secretary
Primary Industries and Environment Branch

Mr Peter Webb
Assistant Secretary
Energy Programs Branch

Department of Primary Industries and Energy

Mr Ian Walker
Manager
Renewable Energy and Environment Section,
Energy Environment Branch

Mr Tony Weir
Adviser
Resource Industries Policy Branch

Canberra, Thursday 1 September 1994

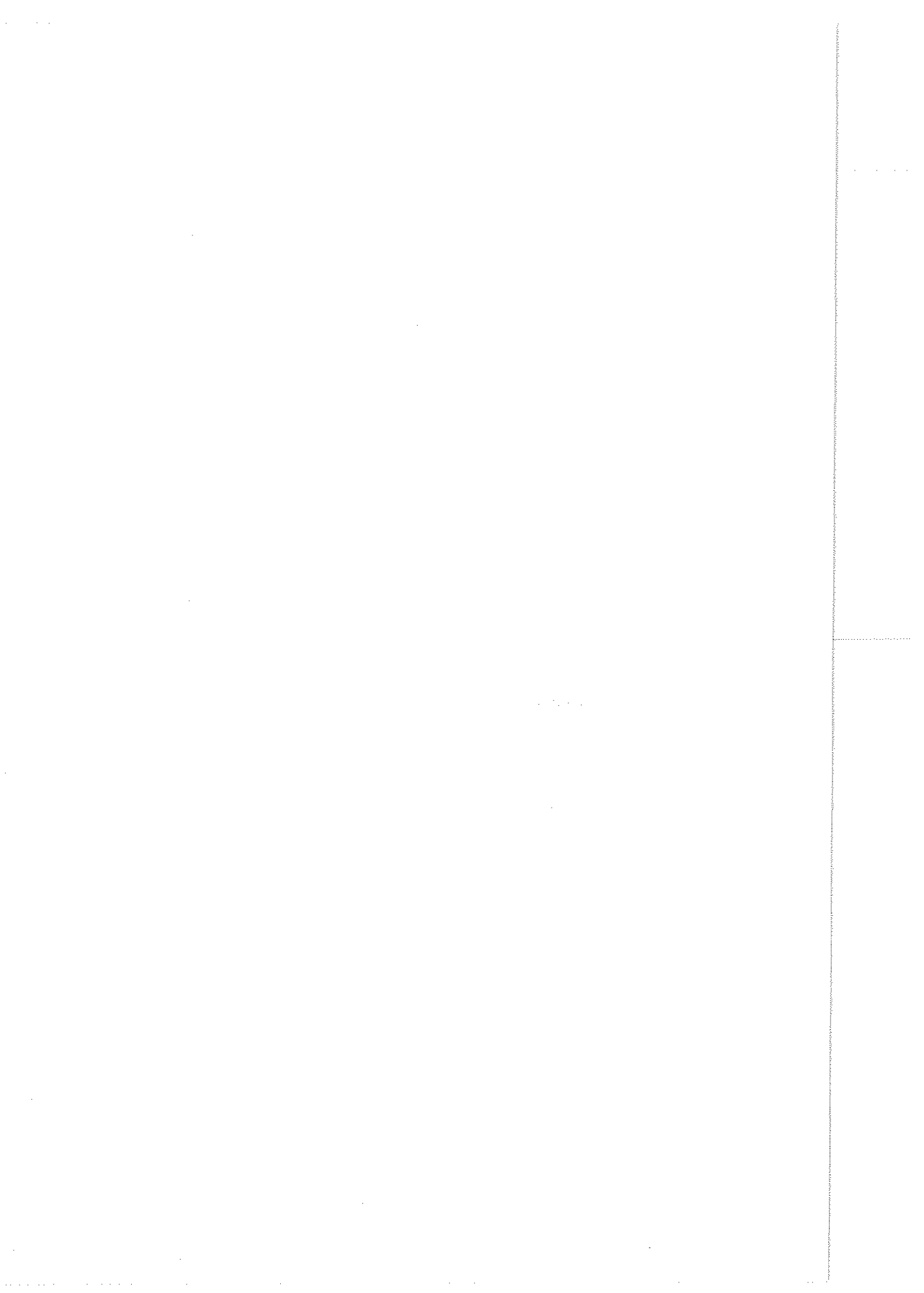
APACE Research Ltd

Dr Russell Reeves
Managing Director and Chief Chemist

Mr Ernest Lom
Chief Engineer
APACE Research Ltd

Mr Alan Cummine
Consultant

Mr Bob Gordon
Consultant



APPENDIX C

THE AUSTRALIA INSTITUTE

**TAXATION OF GREENHOUSE GAS EMISSIONS AND
EMPLOYMENT**

Report to the House of Representatives Standing Committee on Environment, Recreation and
the Arts Inquiry into Environmental Policies Which Stimulate Employment Growth

**THE VIEWS EXPRESSED IN THIS REPORT
DO NOT NECESSARILY REPRESENT THOSE
OF THE COMMITTEE OR ANY OF ITS
MEMBERS**

Michael Common
Centre for Resource and Environmental Studies

Clive Hamilton
The Australia Institute

August 1994

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References

Appendix I Greenhouse Gases, Climate Change and Policy Responses

Appendix II Australian Economic Models for Carbon Tax Analysis

Summary and Overview

1. The introduction of carbon taxation could contribute significantly to meeting Australia's international obligations to reduce greenhouse gas emissions. It would do so by encouraging switching to less carbon-intensive fuels and by encouraging the development and use of renewable energy technologies. Measures to reduce carbon emissions would have additional environmental benefits. In the absence of similar action by major greenhouse gas emitting countries, Australia can have little effect on global carbon dioxide concentrations.
2. Carbon taxation has the potential to raise substantial amounts of government revenue. The way in which the revenue is used is a major factor in determining the economic implications of carbon taxation, including the impact on economic growth rates and employment. The economic impact of carbon taxation in Australia also depends on whether other countries introduce carbon taxation.
3. A carbon tax would increase the relative price of energy as an input to production. If other influences are unchanged, this would bring about some substitution of labour for energy in production, with the prospect of reducing unemployment. The change in the demand for labour depends on the change in its relative price and the change in the level of output. The effect of carbon taxation on output in the economy depends on, among other things, the way the tax revenue is spent as well as on the level and nature of greenhouse abatement activities in other countries.
4. One way of using the revenue from a carbon tax would be to reduce the level of payroll tax, which is often said to discourage employment. There are other ways of using carbon tax revenues that could have the effect of reducing unemployment. The appeal of a tax package embodying a carbon tax and use of the revenue to reduce labour costs is that it encourages the greater use of a resource that is abundant and whose employment has positive social impacts, and discourages the use of a resource that is scarce and whose use has negative environmental impacts.
5. We conclude, on the basis of both qualitative analysis and the results from quantitative modelling, that there is a *prima facie* case for the introduction of carbon taxation in Australia. The modelling studies reviewed in this report suggest that if the carbon tax revenue were used to reduce payroll taxes, there would be a net increase in employment.
6. Carbon taxation and its employment effects are worthy of intensive further examination. The issues that require particular examination include the effects of carbon taxation on economic growth and employment, the revenue position of the States, the precise form of a carbon tax, the equity effects, and the impact on technological development. Our recommendation is that the Committee urge the Government to commission a 12-month study of the desirability of introducing carbon taxation in Australia drawing on both overseas experience and analysis of the issue in Australia.

1. Background

1.1 *Climate change: the enhanced greenhouse effect*

The global climate change problem is often referred to as the 'greenhouse effect'. This usage is in some ways unfortunate because the greenhouse effect is a natural phenomenon. While the climate change problem is a matter of uncertainty and some controversy, the greenhouse effect is neither uncertain nor controversial. Nobody disputes that the earth is warmer than would otherwise be the case by virtue of the presence in its atmosphere of greenhouse gases. Nor is there any dispute over the proposition that in recent history, human activity has been a cause of increasing concentrations of greenhouse gases in the atmosphere. The proposition that in the absence of policy action these concentrations will continue to increase in the foreseeable future is also relatively uncontroversial. It is when we get to considering the implications of, and appropriate responses to, an enhanced greenhouse effect that matters get controversial. Every facet of the enhanced greenhouse effect is attended by major uncertainty.

The greenhouse gases differ in the rates at which molecules absorb and re-radiate heat and thus in their warming effect. However, in comparing the warming effects of the gases, account needs also to be taken of the quantities in the atmosphere. The relative contributions of greenhouse gases to 'global warming potential' also depend on atmospheric lifetimes, and hence on the time horizon adopted. However, whatever the time horizon adopted, carbon dioxide is much the most important of the gases in terms of warming potential. Anthropogenic emissions account for some 5 per cent of the releases of carbon dioxide into the atmosphere, and of these some 70 per cent arise in fossil fuel combustion. Biomass combustion is not a net source if the biomass is harvested on a sustainable yield basis, as the growing vegetation then fixes carbon in amount equal to that released by combustion. However, sustainable yield harvesting is not general, and deforestation contributes to increasing carbon dioxide concentrations.

It is generally agreed that the atmospheric concentrations of the greenhouse gases have been increasing in the recent past]. In the case of carbon dioxide, whereas at the start of the industrial revolution the concentration was 275 parts per million by volume, it is now around 350, an increase of 27 per cent. For methane, the concentration is understood to have doubled from the mid-nineteenth century to the present. It is widely agreed that these increases are anthropogenic in origin. It is also widely agreed that on current trends in human activity rates these concentrations will continue to increase into the future. Majority scientific opinion envisages that, if nothing is done to alter current trends, the consequence will be global climate change.

IPCC assessments represent the position of the majority of the scientific community in regard to climate change prospects. According to the 1992 IPCC report, the best available estimate of the rate of change of global mean surface temperature over the next century is 0.3°C per decade (range 0.2 to 0.5°C per decade) (Houghton *et al.* 1992, p. 17). By the standards of the last one million years, the Earth appears currently to be a relatively warm phase. It appears that a rate of change of 0.3°C per decade would be higher than the earth has experienced in the last 10,000 years, and high by longer historical standards. It is the rate of change that most concerns many scientists. Systems in the biosphere can adapt to change, but

it takes time. The fear is that many systems would be unable to adapt fast enough to cope with 0.3°C per decade, so that the prospect is one of collapsing natural systems, and of an enhanced rate of species extinction, threatening the life support services of the natural environment. It is the general understanding that a warmer world would also be one where other climatic parameters would be different. Warming would increase with latitude, so that the latitudinal temperature gradient would become less steep. This would affect air movements and precipitation. It is expected that with higher temperatures there would be more frequent extreme events such as storms, and more variability over time in precipitation. The area of the globe where tropical storms occur would expand to the north and the south.

Most debate focuses on policies intended to slow the rate of increase in the atmospheric concentration of carbon dioxide. The key characteristic of such policies is that their effectiveness depends upon international agreement and cooperation. Whatever one nation does to reduce emissions or enhance sinks will have little effect on global atmospheric concentrations, and therefore on climate change prospects, unless at least the majority of other nations take similar action.

The US is the largest national contributor to global carbon dioxide emissions. Its per capita emissions are more than 20 times as large as India's, and more than twice those for the EC. It accounts for approximately a quarter of total world emissions. From one perspective this is a very large share. However, it means that even the US acting alone to cut emissions would have a limited impact on total emissions, and hence concentrations. Nations differ in the efficiency with which they turn fossil fuel combustion, and hence carbon dioxide emissions, into national income (see Appendix Table I.3). The USSR emitted more than twice as much carbon dioxide per dollar of national income as the EC and Japan, and the US 40 per cent more.

The industrial countries should perhaps be more inclined to act since they are better able to afford the costs involved. But they argue that if they act alone the impact on the enhanced greenhouse effect could be limited, as trade and investment effects would see developing countries increasing their emissions as a result. This refers to the industrial nations collectively. If they are considered separately, then any one considering action to reduce emissions faces the prospect of reduced competitiveness in international trade. Whatever the true extent of this problem in any particular case, industrial interests will argue that loss of competitiveness is a serious problem.

Deciding what needs to be done about emissions to stabilise concentrations is complex since there are several greenhouse gases. In addition, results are uncertain due to ignorance about the relevant biospheric processes, especially in regard to the operation of sinks. To give some sense of the magnitude of the changes to current trends that would be required for the stabilisation of the concentration of greenhouse gases, we report the results of one calculation (Kelly in Leggett 1990). Stabilisation of the concentration at current levels by the middle of the next century would involve:

- the complete phase out of CFCs by 1995;
- the halting of deforestation by 2000, and reforestation by 2020 such as to absorb 6000

million metric tons of carbon. Translating this absorption capacity into forest area depends upon a number of assumptions. The upper limit on the estimated increase in the world forest area required for 2000 to 2020 is 5 per cent;

- the reduction, by 2020, of carbon dioxide emissions from fossil fuel combustion to 30 per cent of the current level; and
- the reduction, by 2020, of the annual rate of increase in methane and nitrous oxide concentrations to 25 per cent of the current rate.

It should be noted that it is not claimed that this scenario would prevent climate change but that it would stabilise greenhouse gas concentrations at their current level. The scientific consensus reviewed above implies that achieving this could still result in some climate change.

1.2 Australia's position and international obligations

Australia contributes a relatively small proportion of total world carbon dioxide emissions, but Australians rank very high in per capita emissions. Measurements of national carbon dioxide emissions vary across sources due to the differing conversion factors and accounting conventions used. There is most agreement where attention is confined to the gross emissions arising in fossil fuel combustion. Measures using this basis are shown in Table 1.1. In 1987 Australians were the third highest emitters of carbon in the world; these rankings have changed little since 1987. Whereas Australia accounts for less than 0.3% of world population, it accounts for more than 1% of carbon dioxide emissions. Table 1.1 also shows that countries differ in emissions per unit of national income, reflecting differences in the overall efficiency with which fossil fuel is used to produce final output. The developing nations are, in this respect, inefficient relative to the industrialised nations. Among the latter, Australia is relatively inefficient. As shown in Table 1.1, it releases more carbon dioxide per unit national income than: USA, Canada, UK, Japan, Italy, France.

The standard assumption in economics is that the costs of abating the emission of pollutants increase with the level of abatement. That is, for a given emission type from a given production activity, sources with high levels of emission will find it cheaper to reduce emissions by a given percentage amount than sources with low emissions levels. While nations differ in their production activities, standard economics suggests that compared to many other industrialised nations, Australia should find carbon dioxide emissions abatement relatively cheap. Japan is widely cited as an example of a country that undertook a successful fossil fuel conservation program following the oil price shocks of the 1970s and 1980s. This is reflected in the data shown in Table 1.1. The expectation would be that, having already moved some way, Japan would find it more expensive to cut its carbon dioxide emissions by, say, 20 per cent than Australia would.

Table 1.1 Fossil Fuel Based Carbon Emissions for Selected Countries, 1987

	Emissions per capita ^a	Emissions per \$ of GNP ^b	Emissions as percentage of world total
USA	5.03	276	21.9
Canada	4.24	247	1.9
Australia	4.00	320	1.1
Soviet Union	3.68	436	18.5
Saudi Arabia	3.60	565	0.8
Poland	3.38	492	2.3
UK	2.73	224	2.8
Japan	2.12	156	4.5
Italy	1.78	147	1.8
France	1.70	133	1.7
S. Korea	1.14	374	0.8
Mexico	0.96	609	1.4
China	0.56	2024	10.7
Egypt	0.41	801	0.4
Brazil	0.38	170	0.9
India	0.19	655	2.7
Indonesia	0.16	403	0.5
Nigeria	0.09	359	0.2
Zaire	0.03	183	0.01
World Average	1.08	327	

Source: Flavin (1990)

Notes: a. tons/year of carbon b. grams of carbon
 To convert carbon units to carbon dioxide units, multiply by 44/12.

While this kind of data suggests that Australia could reduce its per capita emissions relatively cheaply, it also indicates that, in regard to prospective global warming, the effectiveness of doing so on a unilateral basis would be very limited. A 50 per cent cut in Australian emissions would reduce total world emissions by about 0.5 per cent, assuming no increased emissions elsewhere.

This no doubt influenced the deliberations leading to the adoption, in October 1990, by the Commonwealth Government of an 'interim planning' target for reducing Australian greenhouse gas emissions which was conditional on similar abatement action by major greenhouse gas producing countries. The target adopted was the stabilisation of greenhouse gas emissions (not covered by the Montreal Protocol on Ozone Depleting Substances) at 1988 levels by the year 2000, and a reduction in those emissions by 20 per cent by 2005. The commitment to this target was subject to the caveat, additional to that noted above, that it involved no net adverse economic impacts for Australia. The question of the costs and benefits to Australia of action to meet the target was referred to the Industry Commission which was unable to determine whether, given similar action by other nations, the target did, or did not, imply net costs to Australia (Industry Commission 1991). It appears that this interim planning target has never formally been abandoned.

In 1992 Australia signed the Global Convention on Climate Change, the stated objective of which is the achievement of:

stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

Having now been ratified by the required number of nations, the convention is binding on its signatories. As an industrial nation, Australia undertook to take steps to limit its greenhouse gas emissions with the aim of returning them to 1990 levels, within an unspecified time frame. It is also now committed to the provision at international fora of information on its emissions, and on the steps that it is taking to mitigate climate change. The Convention was signed by 150 nations, including all OECD members.

It is, in fact, questionable whether Australia now has in place any policies which can be expected to directly achieve a significant downward impact on the historical trend growth of its greenhouse gas emissions. Alternative policy instruments for influencing carbon dioxide emissions are briefly discussed in Section 2 below, which is mainly concerned with carbon taxation. Quantitative estimates of the effectiveness of carbon taxation in Australia are reported in Section 6.

1.3 Unemployment

Unemployment is now perhaps the major policy problem in most industrial economies. Prior to the 1930s the dominant view was that unemployment arose because the wage rate did not

move to clear the labour market. Given an inflexible wage rate, the supply of labour exceeded the demand. The unemployment problem was to be solved by removing the impediments to wage rate flexibility, and full employment was the level of employment that corresponded to equilibrium in the labour market.

The dominant view after the second World War was that full employment should be understood as a situation where (aside from workers in transition between jobs) the whole labour force was in work and it was accepted that the government should manage the economy so as to maintain full employment. This was to be done by the use of fiscal and monetary policy to control the total demand for commodities, and hence the demand for labour. Over the period to the early 1970s, experience with this approach was mixed. While unemployment at the levels experienced in the inter-war years was avoided, there was persistent inflation, albeit at rates low in terms of later experience. In the 1980s the dominant view shifted, and the idea of short-term fine tuning of the economy was abandoned in favour of fixing monetary and fiscal policy over the medium term so as to eliminate inflation. With no inflationary problems and a stable policy setting, it was argued, the prospects for economic growth would be improved, and growth would create the jobs that would solve the unemployment problem.

The idea here is that economic growth shifts the labour demand function progressively to the right. With a stable supply function for labour, this means increasing employment and a rising wage rate. The experience of most industrial economies in the last decade has called this view into question. Generally, notwithstanding economic growth, the unemployment problem has not been solved. In many industrial economies there has emerged a particular problem of increasing long-term unemployment, especially among unskilled males. Why has economic growth not solved the unemployment problem? Some would argue that the problem is only that growth has not been fast enough, and that the appropriate response is simply to increase growth rates. However, in many industrial economies it is increasingly recognised that feasible rates of economic growth are unlikely to do much to solve the problem in the foreseeable future, especially the problem of long-term unemployment.

Few commentators are now prepared to argue that economic growth alone can be seen as the solution to a widely acknowledged long term unemployment problem. Additional responses are increasingly canvassed. A useful summary appeared in an editorial article, "Jobless Europe", in *The Economist*, June 26th 1993. It gives a figure of 17 millions for unemployment in the European Community, and includes a graph giving the forecast level for 1994 as, approximately, 20 millions. The ideas listed here are those described in the article as "good". The article rejects the stimulation of aggregate demand - a "dash for growth" -- as an appropriate response. It does not do this on environmental grounds. The basis for rejection of this option is the view that the problem is "structural" and therefore not amenable to solution by merely expanding the level of output. The good ideas, according to *The Economist* are:

- a. Reductions in the welfare benefits available to the unemployed, making the alternative to employment less attractive. This would, it is argued, have the effect of increasing the supply of labour, so that more labour is offered at any wage rate level.

- b. The abolition of minimum wage legislation. The argument here is that such legislation prevents the wage rate moving, downwards, so as to equate the demand and supply for labour.
- c. The provision of retraining, job-search and re-location assistance for unemployed workers. Such measures, would be intended to improve the operation of the labour market, making it achieve a market clearing equilibrium with less frictional unemployment.
- d. The subsidisation of employment. Money formerly spent on unemployment benefits would instead be used to make payments to firms taking on additional workers.
- e. The abolition or reduction of forms of taxation, such as payroll taxes or compulsory employer insurance contributions, which add to the cost of employing labour.
- f. The repeal of employment protection legislation, which, it is argued, effectively increases the costs of using labour.

Four of these measures -- b, d, e, and f -- are designed to reduce the cost of employing labour relative to other inputs into production. The measures listed do not include Keynesian remedies involving demand expansion funded by deficit financing or increased taxes on the employed. A carbon tax will also affect the relative costs of inputs -- raising the costs of fossil fuels and reducing the relative costs of labour. Whereas measures of types c, d and e would require additional government expenditure or reduced revenues, carbon taxation would raise revenue. The revenue generated by the carbon tax could be used to reduce the relative (and absolute) cost of labour, such as by reductions in payroll tax or subsidies to employment. The actual impact on the level of unemployment of any such measure will depend in part on other changes in the labour market, including the participation rate. The appeal of a tax change package embodying a carbon tax and use of the revenue to reduce labour costs is that it encourages the greater use of a resource that is abundant and whose employment has positive social impacts, and discourages the use of a resource that is scarce and whose use has negative environmental impacts.

Some of the policy proposals listed above have been taken up in the Government's recent White Paper on employment, *Working Nation*. The Government's strategy places heavy emphasis on providing subsidies to employment along with greater spending on training programs for long-term unemployed people. However, even under optimistic growth assumptions it is expected that unemployment will remain at 5 per cent at the end of the decade. While Australia has traditionally been thought of as a resource-rich country and should therefore export resource-intensive products, the growth of unemployment and the growing environmental problems arising from increasing throughput of natural resources suggest that a shift in the economic structure towards more labour-intensive, especially skilled labour-intensive, production and export may be desirable.

2. The Nature of a Carbon Tax

Barker (in Carraro and Siniscalco 1993) describes the carbon tax proposal as radical and on a par with that for income tax in Britain in the eighteenth century. Barker states that the proposal is 'worthy of extended and detailed study' as:

At first sight it has all the hallmarks of a good tax: it tackles an accepted economic problem, helping to bring the private costs of emitting CO₂ into line with social costs of global warming; its revenues can be expected to be elastic with respect to income, because energy demand tends to rise with income and it is not easy to substitute away from fossil fuels to alternative energy sources in energy supply; if the tax is implemented in a similar manner to taxes on hydrocarbons, it should be simple and cheap to administer; and on the basis of some of the studies published, its side effects on equity and growth are likely to be small or negligible as long as fiscal neutrality is observed and special provisions made for low income groups. Indeed, the carbon tax could become one of the main pillars of fiscal systems throughout the world in the 21st century, if necessary replacing income tax, VAT or import duties (or all three forms of tax) and improving social welfare.

In this section of the report we consider the efficacy of carbon taxation in reducing carbon emissions, and other possible instruments for doing this. We then consider its revenue raising potential, the nature of the tax base, the incidence of the tax across commodities, and some administrative matters. Effects on equity and growth are dealt with in Section 4 below, and some modelling results for Australia in Section 6.

2.1 *Carbon taxation and the enhanced greenhouse effect*

Given a policy objective of reducing carbon dioxide emissions, there are several classes of policy instrument available. The major distinction is between instruments that operate by directly altering the economic incentives that emitters face, and those that either involve specifying permitted levels of emissions -- 'regulatory control' measures -- or changing the information available to emitters, or the social climate in which they operate. Historically, governments seeking to reduce pollution have generally preferred the latter classes of policy instrument to the use of economic incentives, notwithstanding the advocacy of price incentives by economists. In recent years there has been increasing governmental interest in using price incentives for environmental protection in many countries, including Australia (see James 1993).

The main forms of price incentive instrument are emissions taxation, subsidisation of emissions abatement and tradable emissions permits. In some circumstances, the taxation of inputs to production is equivalent to emissions taxation. This equivalence holds in the case of carbon dioxide. As discussed in the remainder of this section, the operative proposal is that the fossil fuels be taxed at rates reflecting their carbon content. The remarks in this sub-section concerning carbon dioxide emissions taxation are applicable to such fossil fuel taxation.

The relative merits of the alternative forms of price incentive instrument depend, first, upon

whether or not there is a quantified target for emissions abatement. If there is, then tradable permits are preferred to taxes and subsidies, in that they can be relied upon to realise the target, assuming permit compliance by emitters. The total quantity of permits issued is fixed as the total amount of desired emissions, and the price of the permits adjusts according to emitters' costs of abatement. The rate of tax or subsidy could be set so as to realise the desired emissions adjustment, if the rate were set in full knowledge of all emitters' costs of abatement. However, this knowledge is not in fact available, so that there is no assurance that the tax/subsidy rate adopted will result in the emissions abatement target being achieved. In this case, the tax or subsidy rate is fixed and the quantity of emissions adjusts.

As Australia does not currently have a program of quantified emissions reduction targets, the 'dependability' advantage of tradable permits over taxes and subsidies is not decisive. As discussed below, while the precise effect on emissions of a given rate of tax or subsidy is unknown, it can be presumed that any rate would move the total emissions level in the desired downward direction. According to the standard analysis, all of the economic incentive instruments have the property that whatever emissions reduction they bring about is achieved at the smallest possible cost to society as a whole. Regulation involves higher costs for any given reduction in total emissions. The least-cost property of taxation and subsidisation depends upon all emission sources facing the same tax or subsidy rate. That is, 'uniform' taxation and subsidisation are least-cost.

While in principle uniform taxation of emissions and uniform subsidisation of emissions abatement both have the least-cost property, subsidisation is not recommended by economists. The major reason is that whereas taxation generates revenue, subsidisation involves expenditure. Tradable emissions permits are not generally seen as revenue raising, since it is usually envisaged that they would initially be issued free by government. They could, however, be sold initially. The revenue implications would then depend upon, among other things, the lifetime of the permits. Shorter lifetimes would mean more frequent revenue raising rounds, but the efficiency of the permit market would be reduced. In the carbon dioxide context, a further consideration working against tradable permits and in favour of taxation is ease, and hence costs, of administration. This is discussed in Section 2.3 below.

2.2 Fossil fuel demand and carbon taxation

As discussed in Section 1.1, carbon dioxide emissions arise predominantly from fossil fuel combustion. Carbon taxation would raise the price of fossil fuels to users, reducing their use. The proposition that higher fuel prices reduce fuel consumption is confirmed by historical experience, as, for example, in the industrial economies following the oil price shocks of 1973/4 and 1979. The relationship between price increase and consumption reduction is captured in the price elasticity of demand. For energy, the price elasticity of demand is low compared with that for many other commodities, but it is not zero. It varies across industries and households, and across economies. For any particular sector of any particular economy it is not known with any precision. Further, its numerical value would be expected to vary with the time horizon under consideration. This is because the price elasticity depends upon the possibilities for substitution in production and consumption as between energy and other inputs. Over a period of months, these would be very limited and an observed price elasticity

would be expected to be close to zero, as there is little time to change production methods and consumption habits. Over a period of two or three years, given a permanent increase in the price of energy, habits would change and substitutions would be made in production within the inherited technological structure. However, the inherited technological structure would set limits to substitution. Over decades, a permanent change in relative prices would be expected to induce changes in the design of equipment, and substitution possibilities would be expanded, resulting in a higher observed price elasticity.

The higher the price elasticity of demand for fossil fuels, the greater the carbon dioxide emissions reduction arising for a given rate of tax. Because of this, a higher price elasticity means less revenue from the carbon tax. Table 2.1 gives some illustrative results for Australia on the relationship between the rate of carbon taxation and the revenue generated, assuming that the price elasticity of demand for energy is zero, that is, the imposition of the tax does not reduce fossil fuel combustion. Table 2.2 shows how total Australian carbon dioxide emissions and carbon tax revenue vary with the price elasticity of fossil fuel demand, for a tax rate of \$20 per tonne of carbon dioxide. These figures are based on broad brush calculations, but give some sense of the magnitudes involved. Results from more detailed models of the Australian economy and its use of fossil fuels are discussed in Section 6 below. The tax rate of \$20 per tonne is used here as that is approximately the rate that the Industry Commission calculated as required in Australia to meet the interim planning target, for carbon dioxide, adopted in 1990 (see Industry Commission 1991, and Section 6.2 below).

Table 2.1 Carbon dioxide tax rates and revenues

Tax rate \$ per tonne CO ₂	% Increase fuel price	Tax revenue \$billions	% of total tax revenue ^a	% of direct tax revenue ^a
5	9.4	1.5	1.4	2.5
10	18.8	3.0	2.8	5.0
20	37.6	6.0	5.7	9.9
40	75.1	12.0	11.3	19.8
60	112.7	18.0	17.0	29.7

a. Total (federal plus state) government revenue and total direct tax revenue from ABS (1992) Tables 54 and 55.

Source: Common 1995

Table 2.2 Price elasticity, emissions reduction and tax revenue from a \$20 carbon tax

Price elasticity	% Reduction emissions and fuel use	Revenue \$billions
0	0	6.0
0.1	3.7	5.8
0.2	7.5	5.6
0.4	15.0	5.1
0.6	22.4	4.7
0.8	29.9	4.2
1.0	37.4	3.8
1.2	44.9	3.3
1.4	52.4	2.9

Source: Common 1995

2.3 *The carbon tax base*

Carbon dioxide taxation proposals actually involve the taxation of fossil fuels used for combustion. Emissions arising in combustion can be targeted by taxing an input to the combustion process. This is because the carbon content of the fossil fuels, released by combustion, is known. This possibility for the indirect taxation of carbon dioxide emissions is very convenient. With emissions taxation generally, the monitoring of emissions so as to compute the tax liability is often difficult and expensive. In the case of carbon dioxide emissions from fossil fuel combustion, the fuel use is much more easily and cheaply monitored than the emissions, but is a measure of emissions.

It is sometimes suggested that taxing fossil fuels according to their carbon content in order to reduce carbon dioxide emissions suffers from the problem that it does not generate incentives to reduce emissions per unit fuel burnt. Thus, for example, it is technically possible to install in the smokestacks of electricity generation plants equipment which traps carbon dioxide. Taxing the fuel input rather than the carbon dioxide emissions would not create incentives to install such equipment. This does not really militate against using the fuel as the tax base for the purposes of addressing the enhanced greenhouse effect problem. First, the technology involved has not yet been made available, and would clearly be expensive to install and operate. Estimates suggest that it would imply that the price of electricity would increase by a factor of at least three. Second, the result of operating the stack scrubbing equipment would be the generation of sludge waste, which itself would require disposal in such manner as to make atmospheric release impossible. Third, if the technology and appropriate disposal means were available, rebates on tax liability could be offered where it was installed. Fourth, the technology is currently seen as feasible only for large stationary emissions sources, such as power stations. Fifth, as discussed below, there are reasons additional to the enhanced greenhouse effect for fossil fuel taxation to be considered.

The fossil fuels actually differ in their carbon contents, so that for carbon taxation the rate of tax per energy unit of fuel would differ across the fuels. Different sources quote slightly different carbon contents for the fossil fuels (see, for example, Table G.4 in Industry Commission 1991), but the following ratios, by energy content, are reasonably consistent across sources. If the carbon content of natural gas is set at 1, then the relativities are: petroleum products 1.3; black coal 1.9; brown coal 2.1. By energy unit, the carbon tax rates across the fossil fuels would stand in these ratios, and generate incentives for substitution from coal into petroleum products and especially natural gas.

The tax on fossil fuels could be collected from domestic producers and importers, or from domestic purchasers. There are arguments in favour of both. The choice of the former would greatly reduce the number of tax points, thus simplifying administration and reducing collection costs. On the other hand, this choice would mean that fuel exports would be taxed. However, exemption from, or rebate of, carbon taxation would be relative simple, and consistent with the purpose of reducing domestic fossil fuel combustion and carbon dioxide emissions. Collecting the tax from domestic purchasers of fossil fuels would automatically build in the exemption for fuel exports. Whichever point of collection were used, the carbon tax would affect the costs of goods produced in Australia for export. Any scheme intended to avoid this impact would be complicated and expensive to administer. It would also have the effect, for a given tax rate, of reducing revenue and the impact on fossil fuel use and carbon dioxide emissions.

The fact that the carbon contents of the fossil fuels differ gives rise to greater problems for a tradeable permits system of control than it does for carbon taxation. Permits could relate to emissions, in which case emissions would need to be monitored. An attempt to reduce these monitoring costs by relating the permits to fossil fuel production or use would either require different non-tradeable permits for the different fuels, or that different permits tradeable at conversion rates reflecting carbon contents. In the latter case, for example, one unit of permit to produce or use natural gas would be equivalent to 0.77 of oil permit, 0.53 of black coal permit, 0.48 of brown coal permit. The use of such equivalencies would complicate administration and monitoring. Permits which related only to a particular fossil fuel would avoid such problems, but would reduce the efficiency with which the permit system as a whole operated. The tradable permit scheme would not then achieve the carbon emissions reduction at least cost.

2.4 *The commodity incidence of carbon taxation*

Energy is used directly or indirectly in the production of all goods and services. Indirect use is often overlooked, but can be very important. It arises because the non-energy inputs used in production are themselves produced using energy. Thus, for example, a car manufacturing plant uses energy indirectly when it purchases steel, chemicals, transport services etc. Financial services use energy not only directly to heat the office space and run electrical equipment, but also indirectly when using paper: energy was used in the manufacture of the electrical equipment.

It follows that carbon taxation would increase the price of all goods and services in

proportions depending on the direct and indirect use of energy in their production. This is illustrated for Australian production in Table 2.3. The calculations assume that producers pass forward the full tax cost at every stage of production, and do not allow for any substitutions in production following the introduction of the tax. Note that the price of the output of the agriculture forestry and fishing sector, for example, increases by more than the output of, for example, the miscellaneous manufacturing sector. This counter-intuitive result arises because agricultural production is a large indirect user of energy, as, for example, in its use of fertilisers. The actual price increases shown in Table 2.3 depend upon the tax rate imposed. However, given the assumptions stated, the relative sizes of the increases would be the same across all carbon tax rates.

Table 2.3. Commodity price increases due to a carbon dioxide tax at \$20 per tonne

Commodity produced by	Price increase (%)
Agriculture, Forestry, Fishing	1.77
Mining	1.69
Meat and Milk Products	1.77
Other Food Products	1.46
Beverages and Tobacco	0.84
Textiles, Clothing, Footwear	0.95
Wood, Wood Products, Furniture	1.31
Paper, Printing, Publishing	1.12
Chemicals	1.56
Petroleum and Coal Products	9.97
Non-metallic Mineral Products	1.89
Basic Metal Products	9.00
Fabricated Metal Products	2.76
Transport Equipment	0.82
Other Machinery and Equipment	0.71
Miscellaneous Manufacturing	0.89
Electricity	31.33
Gas	21.41
Water	1.34
Construction	1.60
Wholesale and Retail	10.14
Transport and Communications	2.28
Finance and Business Services	1.21
Residential Property	0.42
Public Administration	1.73
Community Services	0.93
Recreational and Personal Services	1.62

Source: Common and Salma (1992)

Given that carbon taxation affects the prices of all commodities, it acts like an expenditure tax where the tax rate per commodity reflects carbon intensity. Given the objective of reducing carbon dioxide emissions, this rate variation by commodity is desirable. The carbon tax is impossible to escape entirely, other than by not buying any goods and services produced using marketed inputs. An individual's carbon tax payment varies with total expenditure, and the pattern of expenditure such that if it is more carbon intensive payment is higher.

2.5 Existing fossil fuel taxation in Australia

Australia, like most industrial economies, already has in place a variety of taxes on fossil fuels. If a carbon tax were introduced in Australia, should it be additional to or in place of existing taxes on transport fuels? It is sometimes argued that transport fuel taxes are levied as a way of charging for road use and for covering some of the costs of congestion. In recent years State and federal Governments have imposed taxes specifically aimed at raising revenue to fund new road works. In that case it is appropriate that carbon taxes be superimposed on existing taxes (Newbery 1992). If carbon taxes replace existing fuel taxes then the tax rate overall will need to be higher in order to achieve the same carbon reduction outcome.

The federal system of government in Australia complicates matters somewhat, as taxes and charges bearing on fossil fuel production and consumption are levied by both the Commonwealth governments and State governments. The existing rates of taxation, taken together, across fossil fuels do not reflect their carbon contents. The situation is reviewed in the Industry Commission report on the costs and benefits of greenhouse gas abatement (Industry Commission 1991, Volume 2, section B). In addition to the differing jurisdictions and fuels involved, the situation is complicated by the fact that some existing taxes are levied on an ad valorem basis, while others are specific, i.e. are fixed as a rate per physical unit as with the carbon tax discussed here.

These complications mean that some care is needed in translating a carbon tax as usually discussed in the literature into a price increase for a particular fuel in a particular area. This translation also depends on whether it is assumed that the carbon tax is additional to, or instead of, any pre-existing fossil fuel taxation. In the modelling literature for Australia, discussed in Section 6 below, it is usually assumed that the carbon tax rate considered, or computed as necessary to achieve a given abatement target, is additional to pre-existing taxation. Where this is the case, the proportional increase in the price paid by purchasers resulting from the introduction of carbon taxation will be less than the proportion of the producer's price that it represents. Thus, for example, the Industry Commission report estimated that a tax of \$21.75 per tonne of carbon dioxide would be necessary to reduce emissions by 44 per cent. This is stated as equivalent to an increase in the well head price of crude oil of 78 per cent (Industry Commission 1991 p 186), and an increase in the average price to households for petroleum products of 21 per cent (Table 9.2, p 189). The ultimate effect on tax-inclusive prices as revealed by such modelling studies reflects not only the effects of pre-existing taxes, but also changes in supply and demand conditions consequent upon the changes in the prices facing purchasers.

The existence of both the Commonwealth and the State governments with taxation powers

may be of relevance for the form to be taken for the introduction of carbon taxation in Australia. If carbon taxation levied on fossil fuels is taken to be an excise, then it can only be levied by the Commonwealth government. State governments may impose environmental damage charges and emission charges, but not excises. It is not apparently unambiguous as to whether a carbon tax would be an excise or not: see Industry Commission (1991, Appendix B) and Buckley (1991). This may be pertinent if the revenue from carbon taxation is to be dedicated to reducing payroll taxation, which is levied and collected by State governments. If carbon taxation is an excise, the option of having State governments levy and collect it so as to directly finance payroll tax reductions would appear not to be open. It would be necessary for the Commonwealth government to collect the carbon tax and pass the revenue to State governments for the purpose of reducing their payroll taxes. This may, in any case, be desirable, as carbon taxation will only be an efficient instrument for reducing emissions in Australia if levied at a uniform rate throughout Australia. If carbon taxation were levied at different States at different rates, some States might hope to secure an advantage, but the outcome for Australia as a whole would be un-necessarily costly.

3. Experience with Carbon Taxation

Experience with carbon taxation is limited and confined mostly to Scandinavia, although most countries tax fossil fuels. However, it is under serious consideration in a number of other countries, notably the European Community. This section, drawing especially on Bertram *et al.* (1993), reviews the experience of the Scandinavian countries and Europe. In the USA, President Clinton has proposed a 'BTU tax' levied according to the thermal heat content of energy sources. It is motivated principally by budgetary concerns. Imposition of energy and carbon taxes generally has a major impact on the structure of national taxation.

Finland

In January 1990, Finland introduced a generalised energy tax (called a 'carbon-related' tax on fossil fuels) at the very low rate of US\$6.5/tonne of carbon. It has since been raised to US\$13/tonne, still a low level. The tax now adds 12 per cent to the price of coal and 4.5 per cent to the price of natural gas. In the case of transport fuels, which were already highly taxed, the introduction of the energy tax added less than 1 per cent to the price of petrol and 1.3 per cent to the price of diesel.

The energy tax was part of a broader set of environmental taxes. With the increase in the rate to US\$13/tonne of carbon, Finland also introduced a new excise tax on electricity. The OECD observed that this package of measures was similar to the energy-carbon tax proposal being considered by the European Commission.

Norway

Norway introduced a carbon tax in 1991, but rates were not based purely on carbon content. Gasoline and natural gas were originally taxed at double the rate of other petroleum products and a number of major industries were exempted or had their rates reduced, including coal

used in metallurgical industries, pulp and paper and refinery consumption. These have sharply reduced the effectiveness of the tax. The nominal carbon tax rate in Norway is high at US\$205/tonne but the effective tax rate (after accounting for all of the exemptions and special rates) is only US\$74/tonne.

Sweden

Sweden also introduced a carbon tax in 1991 as part of a broad reform of the tax regime on petroleum products. Previously, all energy products had been exempted from VAT, levied at the rate of 25 per cent. They were made subject to VAT as part of the reform package. As is common, consumption of coal and oil for non-energy purposes (such as metallurgy and petrochemicals production) was exempted from the carbon tax, as were international marine and air transport. The carbon tax makes up around one third of total energy taxation. Energy-intensive industries have been largely exempted from carbon taxes. The nominal tax rate is US\$200/tonne of carbon but exemptions reduce this to an effective rate of US\$120/tonne.

Denmark

Denmark introduced a carbon tax in 1992 as part of a strategy to reduce energy consumption and carbon emissions. Large enterprises pay only half of the rate imposed on households and small enterprises. However, petrol and natural gas have been exempted from the tax so as not to increase the burden on households unduly. Refineries and international air and marine transport are exempt and energy-intensive industries are largely exempt. The nominal tax rate is set at US\$57/tonne but exemptions reduce this to an effective rate of only US\$25/tonne.

All electricity deliveries to final users are subject to the carbon tax, but subsidies are paid for generation from renewable sources, cogeneration and natural gas. The carbon tax makes up about 20 per cent of total energy taxation.

European Community

A package of measures is being considered centering on a combined energy-carbon tax phased in over a number of years (see DRI 1992). A tax on carbon content alone is not favoured because of its distortionary effects; it is therefore proposed that the tax be linked 50 per cent to the energy content and 50 per cent to the carbon content of fuels. The principal objective is to stabilise carbon dioxide emissions by the year 2000 at their 1990 level. The minimum rate for countries would be equivalent to around US\$80/tonne of carbon. It is also proposed to introduce annual vehicle taxes scaled to the sizes of vehicles. The package includes a range of measures to encourage energy conservation and fuel switching, including tax incentives for investment in energy-saving equipment.

The tax would be applied to all sources of energy except small-scale renewables. Energy-intensive industries would be exempted (or enjoy a reduced tax rate) if their international competitiveness were affected. These would probably include steel, chemicals, non-ferrous metals, cement, glass and pulp and paper.

The new tax system would be revenue neutral with revenue redistributed in the form of tax reductions on personal, corporate and property income. It is expected that the new tax would increase the prices of energy-intensive sectors and reduce the prices of services. It is expected to be only mildly regressive.

4. Economic and Environmental Implications of Carbon Taxation

This section discusses the environmental and economic consequences of introducing carbon taxation. The effects are due to three forms of substitution arising from the changed relative purchase prices that would follow the introduction of carbon taxation. These are:

1. substitutions of less carbon-intensive for more carbon-intensive fossil fuels, eg. of natural gas for coal;
2. substitutions of 'alternative' energy sources for fossil fuels, eg. of solar or nuclear fission for coal in electricity generation; and
3. substitutions of other inputs to production, and consumption, for energy, eg. of labour for energy in production and of warm clothing for energy in consumption.

4.1 Environmental benefits

All three types of substitution would work to reduce carbon dioxide emissions. The extent of the reduction would depend on the size of the tax imposed, and on the magnitudes of the substitution possibilities as reflected in the price elasticities of demand. Table 2.2 gave some indication of the association between the price elasticity of demand for the fossil fuels taken together and the reduction in emissions, for a given rate of taxation. It was noted in Section 1 that if Australia were to act alone in imposing carbon taxation, even a substantial reduction in Australian emissions would have a very small effect on total global emissions. The direct climate change benefits to Australia arising from unilateral Australian action would be close to zero.

However, fossil fuel combustion is the origin of several other atmospheric pollutants. In addition to carbon dioxide, these include emissions of: sulphur oxides, nitrous oxide, carbon monoxide, particulates, and hydrocarbons (see, for example, Fisher and Smith 1982). Generally, the problems associated with each of these are more localised than is the case with carbon dioxide, and unilateral action by Australia would give rise to environmental benefits in Australia. Sulphur oxide emissions arise mainly from coal combustion, and cause respiratory illness, affect plant growth, and are involved in the corrosion of buildings and other structures. Sulphur dioxide is involved in the processes giving rise to acid rain. Nitrogen oxides arise mainly in the use of petrol in motor vehicles and natural gas combustion and are a cause of respiratory illnesses. Nitrogen oxides and unburnt hydrocarbon vapours are involved in the production of photochemical smog. Carbon monoxide is toxic; it arises mainly from the use of petrol in motor vehicles. Some of the

partially oxidised hydrocarbon combustion products released in fossil fuel combustion are considered to be carcinogenic. Particulates are a cause of respiratory illness in humans. They influence precipitation and also reduce incident solar radiation. By reducing fossil fuel combustion, carbon taxation would reduce all of these atmospheric emissions.

Energy use is required for the movement and transformation of matter on any significant scale. To a first approximation, it can be taken that reducing energy use per unit of economic activity reduces environmental impact per unit of economic activity. To the extent that it induced substitutions of the third kind (eg. labour for energy), carbon taxation would work to reduce the energy intensity of economic activity, and hence its generalised environmental impact. Of course, reducing the energy intensity of total economic activity would not mean that all of the environmentally damaging impacts of economic activity decreased. Some particular impacts could well be increased as a consequence of carbon taxation, as discussed below in regard to energy supply. Carbon taxation is not a general solution to environmental problems.

Increased fossil fuels prices would make alternative sources of energy more attractive. There would be incentives for the substitution of other energy sources for the fossil fuels, as well as incentives for energy conservation. In the longer term it is conceivable that total energy use would increase. However, so long as fossil fuel combustion is reduced, there would be less carbon dioxide emissions, and less of the other emissions discussed above.

4.2 *Environmental costs*

Since alternative energy sources involve environmental impacts, there will be some environmental costs associated with their substitution for fossil fuel combustion. Nuclear fission, for example, has a number of widely recognised problems associated with it. Hydroelectric facilities frequently damage environmentally sensitive areas. Biomass combustion releases carbon dioxide, but to the extent that biomass is used on a sustainable basis, with new vegetation replacing that burned, there is in effect a closed carbon cycle, with the new vegetation absorbing atmospheric carbon dioxide. Biomass combustion does, however, involve other atmospheric emissions. Harvesting biomass for combustion may involve further environmental damage, such as soil erosion. The remaining alternative energy sources -- solar, wind, waves, tides, geothermal -- generally involve only local environmental impacts.

Two arguments have been advanced to the effect that unilateral action on national carbon dioxide emissions could increase global emissions. The first concerns world fossil fuel prices. To the extent that a nation's usage of a fossil fuel is a significant proportion of total world consumption, a reduction in its use due to the introduction of a carbon tax would reduce the world price of the fuel. This could lead to an increase in overseas use greater than the reduction in domestic use, and hence an increase in global carbon emissions. In the case of Australia, the share of world consumption of the fossil fuels is too small to be likely to lead to this sort of 'carbon leakage'. Even for the USA, it has been estimated that the leakage arising from unilateral carbon taxation would be small or non-existent.

The second argument concerns the shifting offshore of carbon intensive production activities, such as aluminium smelting using fossil fuel based electricity. According to this argument, if Australia adopted carbon taxation, such activities might well move to countries where a unit of electricity delivered would be responsible for a larger quantity of carbon dioxide emissions than was the case in Australia prior to the introduction of carbon taxation. In some particular cases there may be some basis for this argument. It should, however, be noted that many of the economic activities responsible for fossil fuel combustion cannot move offshore. Transportation and electricity generation for residential use are examples.

4.3 Economic benefits

For a fixed level of output and in the absence of technological change, changing the relative prices of inputs to production would be expected to induce substitutions as between inputs to production. Carbon taxation would make fossil fuels, and energy, more expensive in relation to capital and labour inputs. While there is some disagreement in the literature as to whether capital and energy are substitutable, it is generally agreed that labour and energy are substitutable. Thus, even in the absence of technological change, it would be expected that carbon taxation would induce some substitution of labour for energy in production, which would, other things equal, mean an increase in the demand for labour and a reduction in unemployment.

The fossil fuels are non-renewable resources, which have uses other than combustion, including use as inputs into petrochemicals and fertilisers. Two points arise in relation to carbon taxation. First, reducing fossil fuel combustion now would make more available for use in the future, whether for combustion or other uses. As regards combustion, there is no necessary contradiction in wanting to reduce current use and increase future use. The future could be a very long time, so that increased total future use would be consistent with lower future rates of use per period of time. Second, as regards the non-combustion uses of fossil fuels, they are the basis for the material inputs to a number of production processes, in the chemicals industry especially. To the extent that carbon taxation reduced the use of fossil fuels for combustion, it would increase the quantities available for these other uses, now and in the future. If Australia were to act unilaterally in introducing carbon taxation, the extent to which these benefits would accrue in respect of its fossil fuel reserves would depend, among other things, upon the form of the tax. A consumption based tax with fossil fuel exports exempted would reduce these benefits as compared with a production based tax, since overseas demand would be unaffected.

While unilateral action on carbon dioxide emissions is generally seen as reducing a nation's international competitiveness, there is an argument to the effect that in the long run it could improve it. According to this argument, the enhanced greenhouse effect and the international agreement discussed in Section 1.2 mean that eventually all nations will act on carbon dioxide emissions. A nation that acts early will secure competitive advantages by virtue of having made early technological innovations. For this argument to hold, it is necessary that carbon taxation induce technological change as well as substitutions within the existing technology. While this matter has received little systematic empirical

investigation, it is plausible that technological innovation is driven, at least in part, by expected relative input prices. The examples of Germany and Japan are often cited in this context. It is claimed that the domestic introduction of tight environmental standards resulted in technological innovations (see Cairncross 1992, for example). These subsequently led to enhanced export performance as foreign consumers' tastes moved in favour of environmentally friendly products and production methods, and other nations moved legislatively on environmental protection. The relevance of this to the case of control of carbon dioxide emissions, and to Australian circumstances, remains to be properly examined.

4.4 *Economic costs*

In economic analysis, the standard assumption is that there is technical efficiency in production, i.e. that no inputs are used unnecessarily. It is also assumed that the operators of productive enterprises select input combinations so as to minimise the total costs of production at given input prices. Such behaviour is necessary for profit maximisation. It is these assumptions that give rise to the proposition that following a change in relative input prices, where it is technically feasible, cheaper inputs will be substituted for more expensive ones, for a given level of output. This is the origin of the idea that labour will be substituted for energy following an introduction of carbon taxation which increases the price of energy.

The assumptions also imply that carbon taxation will reduce average output per worker, in the absence of increased inputs of capital or technological change. This follows directly from the constant level of output together with the higher level of employment. Depending on the substitution possibilities assumed, output may actually fall as a result of an increased energy price, as may the rate of return on capital. Where the economy is open to foreign trade and finance, and where the introduction of carbon taxation is unilateral, these adverse effects may be enhanced. These effects follow from the direct impact of carbon taxation on input prices, and take no account of the uses to which the revenue is put.

Economists would thus presume that carbon taxation, or indeed any action to abate carbon dioxide emissions, would reduce the average material standard of living. Given the standard assumptions about substitution possibilities, they would assume that such costs would increase with the level of abatement, as discussed in Section 1.2 above. These presumptions are sometimes challenged, and it is claimed that fossil fuel use and carbon dioxide emissions can be reduced at no cost. Equivalently, the claim is that there currently exist cost-effective opportunities for energy conservation that are not being taken up (see, for example, Greene 1990). Economists refer to such opportunities as 'free lunches' or 'no regrets' measures, and deny that they generally exist. The matter turns on the assumption that there is no use of unnecessary inputs in production. Where this assumption does not hold, free lunches may exist. In this circumstance, holding output constant in the face of reduced energy input does not require increases in other inputs. Equivalently, in this circumstance, the effect of carbon taxation is not to induce either input substitution or output reduction, but to induce the reduction of waste in energy use. As an empirical question, the existence of free energy conservation is a matter of continuing disagreement requiring much more empirical work. It should be noted that to the extent that free energy conservation exists, reduced energy

use would not mean more employment.

The impact of carbon taxation would, in any case, differ across production sectors and households. As regards production sectors, for some, such as coal mining, there would be a direct contractionary effect consequent upon the reduced demand for its output. For these sectors, a carbon tax on fossil fuel consumption would have less of an impact than a carbon tax on fossil fuel production as fuel exports would be unaffected. The effects of a unilateral carbon tax would be greater on these sectors than the effect of a multilateral tax, because with a unilateral tax there are opportunities for purchasers to buy from other producers. In fossil fuel producing sectors, the direct output effects on employment would be working in the opposite direction to the substitution of labour for energy and employment would contract.

As regards households, it is generally understood that higher prices for energy are regressive in impact, i.e. they hurt the poor more than the rich. Table 4.1 provides some evidence on this for Australia, in relation to carbon taxation. The results arise by using the commodity price increases shown in Table 2.3 together with household expenditure data to generate Consumer Price Index (CPI) impacts by decile in the distribution of household incomes. It is assumed that expenditure patterns are not affected by the changed relative prices faced by households, i.e. that there is no substitution in consumption following the introduction of carbon taxation. To the extent that households did make substitutions, shifting away from the relatively more expensive commodities, the impacts shown in Table 4.1 would be reduced everywhere. The ratio of the highest CPI increase shown to the lowest is 1.14. That is, whereas the worst affected households, those in the second lowest decile, experience a 2.995 per cent increase in their cost of living, the least affected, in the highest decile, experience a 2.621 per cent increase. The absolute magnitudes of these CPI increases depend upon the tax rate, but the comparative sizes of impacts are independent of the tax rate, given the assumptions of the analysis. This suggests that the regressive impact of a carbon tax are not as great as may at first be thought.

Table 4.1 Australian CPI increases by decile for tax of \$20 per tonne CO₂ (per cent)

<i>Decile</i>	<i>Accounting for all commodity price increases</i>	<i>Three fuel commodity price increases only</i>
Lowest	2.885	1.534
Second	2.995(h)	1.657(h)
Third	2.974	1.604
Fourth	2.850	1.444
Fifth	2.876	1.452
Sixth	2.774	1.353
Seventh	2.804	1.313
Eighth	2.774	1.278
Ninth	2.666	1.164
Highest	2.621(l)	1.097(l)
<i>All households</i>	2.785	1.311
h/l	1.14	1.51

Source: Common and Salma (1992)

4.5 *Weighing costs and benefits*

In terms of both the economy and the environment, the introduction of carbon taxation in Australia would have both desirable and undesirable implications. Taking a view on the desirability of carbon taxation requires weighing the costs against the benefits, which is easier if they can be quantified. In regard to economic costs and benefits some relevant modelling results are considered in Section 6 below. It is made clear there that economic outcomes are strongly dependent on the way that the revenue arising from carbon taxation is used by government. As indicated above, carbon taxation has the potential to raise substantial revenue. The alternative uses of carbon tax revenue considered in Section 6 are the reduction of payroll taxation and the reduction of the government's budget deficit. These are not the only possible uses. Payroll taxation reduction is considered because of the potential to reinforce the employment-creating effects of carbon taxation. Similar effects could arise, perhaps more strongly, if the revenue were used to increase selected government expenditures, while holding the deficit constant. Deficit reduction is seen as of interest primarily for its implications for interest rates, and hence economic activity levels and employment. Again, similar effects could be sought by using the revenue to reduce income tax rates or eliminating the taxation of income earned from interest on savings.

The economic costs associated with carbon taxation identified in this section are two -- the potential for reduced material living standards and increased inequality. The latter cost does not appear to be as great as is often suggested, when the effects on all commodities of

higher energy prices, rather than just fuels, are taken into account (as in Table 4.1). The regressive impact could be reduced by the appropriate use of the revenue generated by the carbon tax. In addition, the regressive impact would be offset to some extent by any positive employment effects arising from the tax and use of the revenue. It could be more directly addressed by using the carbon tax revenue to modify the distributional impact of the tax-welfare system. No work on this appears to have been done in Australia. However, Table 4.2 gives some results arising from work in the UK. In this work carbon tax-induced commodity price increases were simulated, and used with household expenditure data as input to a model of how the tax-welfare system affects households (see also Symons *et al.* 1994). The results shown in Table 4.2 are for two approximately revenue neutral options, which substantially reduce carbon dioxide emissions and improve the lot of households in the two lowest deciles. The two options are as follows:

Option 1: CO₂ tax at 11p per kg with revenue used to cut VAT and petroleum excise and to increase welfare benefits.

Option 2: CO₂ tax at 12p per kg and smaller petroleum excise cut with larger increase in welfare benefits.

Table 4.2 UK household welfare changes by decile for alternative tax/transfer packages (per cent)

	<i>Option 1</i>	<i>Option 2</i>
Lowest	+39	+38
Second	+13	+14
Third	- 2	0
Fourth	- 5	- 3
Fifth	- 7	- 7
Sixth	- 7	- 7
Seventh	- 7	- 7
Eighth	- 7	- 7
Ninth	- 7	- 7
Highest	- 5	- 6
<i>% CO₂ Reduction</i>	-16.6	-17.8
<i>% Revenue Change</i>	- 0.7	- 1.4

Source: Symons *et al.* (1991).

5. Impediments to the Introduction of a Carbon Tax

There are several impediments to the introduction of carbon taxation in Australia. A full investigation of these impediments and possible solutions to them is beyond the scope of this report, but the principal ones are described briefly below.

1. If the revenues from carbon taxation were used to replace payroll taxes, this could exacerbate the fiscal imbalance between the Commonwealth and the States since the States collect payroll taxes. A mechanism to compensate the States for the loss of payroll tax revenue may need to be developed. Alternatively, it may be feasible for the States to collect carbon taxes, although it would be most important that the taxes were levied at the same rate in each State.
2. The introduction of a carbon tax may affect investors' impressions of the taxation environment in Australia. The introduction of a new taxation package would need to take account of its impact on investor confidence.
3. A carbon tax will disadvantage some sectors of the economy and benefit others. It is likely that plans to introduce such a tax would be met with strong opposition from industry lobbies. There would be adjustment costs arising from the shift in the structure of the economy with the introduction of a carbon tax. Small firms, which currently are not subject to payroll tax, may be disadvantaged by a package that replaced payroll taxes with a carbon tax. These may require special measures to ease the transition.
4. Carbon taxation may have a negative impact on equity and measures may be required to offset it. The recent dispute over differential taxes on leaded petrol was driven by concerns over its impact on equity.
5. Media treatment of a carbon tax may focus on the potential costs to the economy without recognising the environmental benefits. This was the case with the Industry Commission's greenhouse inquiry report. The media incorrectly reported that the Commission had recommended against Australian participation in an international greenhouse agreement and failed to report that the Commission had quantified only the costs and not the benefits of greenhouse gas abatement measures (see Common 1993). By tying carbon taxation to employment-creating tax or spending changes, media reporting and public perceptions are likely to be more favourable.

6. Modelling Results for a Carbon Tax in Australia

Section 4 of this report discussed, in general and qualitative terms, the economic and environmental consequences that would be expected to follow from the introduction of carbon taxation. Quantification of the effects is clearly desirable. This section discusses some Australian modelling results pertaining to the economic consequences, particularly in relation to the costs arising from carbon taxation, and employment implications. The omission of quantified environmental benefits here, comparable with economic costs and benefits, reflects the current state of economic modelling.

The type of model generally regarded as most suitable for considering the economic implications of carbon taxation is an applied general equilibrium model, an AGE (sometimes alternatively referred to as a computable general equilibrium model, or CGE). This section of the report begins with a brief overview of the nature of such models. Sections 6.2, 6.3 and 6.4 report some results for Australia obtained from such models. Discussion of some technical aspects of these models, and their use, will be found in Appendix II. Section 6.5 concludes with a discussion of the modelling results considered, and the implications for the terms of reference for this report.

6.1 Using models to simulate the effects of a carbon tax

As already indicated, the introduction of carbon taxation would have some impact on all aspects of economic activity, but the impact would vary across individuals and across industries. Informative economic modelling, therefore, needs to cover the whole economy, and to distinguish different sectors of the economy. It also needs to be able to trace the consequences of the interdependencies between sectors of the economy. These involve both direct links such as the trading of inputs and outputs as between producing sectors, and the indirect links arising as the result of competition for limited quantities of inputs, such as capital and labour. AGE models capture both sorts of interdependency.

While models of this type differ in detail, they share certain common features:

- they represent the production side of the economy as a number of inter-related sectors, organised around markets. Markets are made to clear, that is, model solutions arise by equating supplies with demands via movements in relative prices;
- they allow firms and households to respond to changed relative prices by making substitutions in production and consumption. The qualitative behaviour of firms and households comes from economic theory in which both firms and households are modelled as constrained optimisers;
- the numerical output from the models is generally very sensitive to variations in what is assumed quantitatively about the substitution possibilities facing firms and households, or equivalently to price elasticities. The assumptions actually made about these elasticities are generally recognised as being only crude approximations;
- they generally do not include any representation of economy-environment interconnections. It follows that the environmental impacts of variations in the level and composition of economic activity are not modelled. Equally, the economic impacts of variations in the state of the natural environment are not modelled;
- they involve the assumption that there is no technical inefficiency anywhere in the economy. All production is taking place on the frontier of the relevant production set, and there are no wasted inputs. Free lunches, that is, costless reductions in input usage (see Section 4.4), are thus excluded by assumption;

- the technology within which substitutions in production occur is fixed, and changing relative prices are not permitted to induce technological change; and
- they do not distinguish households according to their position in the income distribution scale. The household side of the economy is basically treated as a single entity with representative tastes, expenditure pattern, and substitution possibilities. Hence they cannot address the questions of inequality generated by carbon taxation and of accompanying measures to offset it.

AGE models should not be interpreted as predictive. They are not generally seen as forecasting models. Rather, they are seen as tools for the analysis of alternative policies. They are intended to give broad quantitative insights into 'what if' questions in regard to some policy option, taking account of a variety of impacts, some possibly working in opposite directions. Where there are several policy impacts with differing directions, quantification is necessary even for qualitative determination of the overall impact. Thus, for example, if carbon taxation reduces output and hence the demand for labour, and simultaneously changes relative input prices so as to increase the demand for labour, it is necessary to know the sizes of the two effects in order to know whether, overall, the demand for labour increases or decreases.

6.2 *Global modelling of carbon taxation*

We saw in Section 3 that actual experience with carbon taxation is rather limited worldwide. To date, views on its merits, and those of alternative instruments for the abatement of carbon dioxide emissions, are based mainly on qualitative analysis and quantitative modelling studies. Analysis is discussed principally in Section 4. Below we review some quantitative modelling work, including two such exercises conducted especially for this report, which focuses on Australia. Here we briefly review modelling work which addresses the abatement of carbon dioxide emissions at the global level, and work from the perspective of other national or regional economies.

A survey of models of the world economy (Winter, in Anderson and Blackhurst 1992) used to simulate the economic consequences of international action to abate carbon dioxide emissions finds that:

estimates centre on a global loss of GDP of around 2 to 4 per cent in order to reduce emissions by about 40 to 60 per cent relative to what they would otherwise be.

These models show that the total global cost and the distribution of that total across nations varies according to the policy instrument used. Thus, if all nations reduce emissions by equal percentage amounts, regulatory measures are shown to involve higher global costs than both uniform international taxation and a system of internationally tradable emissions permits. For tradable permits, the distribution of costs depends upon the initial allocation of permits between nations. If, for example, these are initially allocated so that a nation's share of the total is equal to its share of world population, the distribution of costs, after permit trading, favours large poor nations (see, for example, the work using the OECD model reported in

Burniaux *et al.* 1992).

The Australian Bureau of Agricultural and Resource Economics (ABARE) is developing a model for analysis of greenhouse and other issues. Known as MEGABARE, it is a multi-country, multi-commodity model which can provide numerical estimates of the impact of greenhouse response policies on trade and industry structure both in Australia and in other modelled countries or regions. The model can also help to identify those greenhouse response strategies that will be least-cost. MEGABARE is discussed in Appendix II. Its results to date are of limited relevance to this report as they analyse only multilateral measures to reduce greenhouse gas emissions.

A large number of modelling exercises have looked at unilateral action by a nation or grouping of nations, such as the OECD. The results vary widely according to:

- the economic circumstances of the nation or group, especially in relation to energy supply systems and international trading links;
- the type of model used, and its numerical specification;
- the policy instrument considered, and in the case of taxation the use made of the revenue; and
- the composition of the group, where relevant.

Generally, but not always, action to abate carbon dioxide emissions is found to involve reductions in output measured as national income. The reasons for this are discussed in the context of Australian modelling exercises reported below. The proposed European Community carbon tax has been the subject of investigation from a number of national perspectives, as well as that of the EC as a whole, using several different models. A number of these studies are reported in Carraro and Siniscalco 1993. The results are very mixed in detail, depending on the economy studied and the modelling approach employed. Generally, it is found that carbon taxation is effective in inducing emissions abatement, that it is costly in output terms, and that there are benefits from international cooperation.

6.3 *The Industry Commission report*

Following the Commonwealth's adoption in October 1990 of the interim planning target discussed in Section 1.2 above, the Industry Commission was asked, in December 1990, to report on 'the costs and benefits for Australian industry of an international consensus in favour of a stabilisation of emissions of greenhouse gases not controlled by the Montreal Protocol on Ozone Depleting Substances, based on 1988 levels, by the year 2000 and a reduction in those emissions by 20 per cent by the year 2005'. The Industry Commission's final report was submitted in November 1991.

To address this question, the Industry Commission developed a new applied general equilibrium model of the world economy, known as WEDGE. This model represented the world economy as comprising nine regional economies, one of which was Australia. It was

used to simulate the implications of a global cut in carbon dioxide emissions of 40 per cent, achieved by each regional economy introducing carbon tax at the rate required to cut its own emissions by 40 per cent. Such uniform reductions across economies would not be the most cost-effective way of achieving a global emissions reduction target (see Section 6.2 above). A global target of a 40 per cent cut was considered as corresponding to the 'Toronto target' (see Section 1.2 above) for the world as a whole, given the anticipated growth of global emissions in the absence of policy through to 2005. The WEDGE model was still under development as the Industry Commission inquiry took place, so that the results reported differed as between the draft and final reports.

In the final report the carbon tax rate required for Australia was US\$34/tonne of carbon dioxide in 1988 prices, with a cost of a 1.5 per cent reduction in national income (measured as net domestic product). The tax rate required was lower for Australia than for the other regional economies for which results were reported; the rate for the European Community was US\$102/tonne, for the USA US\$ 38/tonne, for Japan US\$59/tonne and for ASEAN US\$91 (Industry Commission 1991, Volume 1, Table 5.8).. This is consistent with the idea of the tax rate depending increasing marginal abatement costs and Australia's relatively high emissions per capita and per unit income (see Section 1.2 above). However, the income cost for Australia was the highest reported, presumably reflecting the relative impact of trade effects. The revenues arising from carbon taxation were used to reduce income taxation so as to keep the ratio of government debt to national income constant. In the simulations, employment was held constant.

The WEDGE model was also used by the Industry Commission to consider the implications for Australia of emissions reductions of 40 per cent by the EC and the OECD alone. In the latter case one simulation assumed that Australia cut emissions with its fellow OECD members, while the other had Australia taking no action. The income cost to Australia was just 0.05 per cent higher in the former case, illustrating the significance of foreign trade effects.

The WEDGE model was developed quickly by the Industry Commission and was not a fully tested representation of the world economy. While a useful guide on some issues, its results should be regarded as requiring substantiation.

In addition to its analysis using WEDGE, the Industry Commission used a specially adapted version of the ORANI model of the Australian economy to investigate the effects of a unilateral reduction of carbon dioxide emissions by Australia. This model, ORANI-Greenhouse, provides more sectoral detail than WEDGE. The model was used to find the tax rate necessary to reduce emissions by 44 per cent. This target was used on the grounds that it was the level necessary to reduce emissions from the level they would have been in 2005 in the absence of policy to the level corresponding to 80 per cent of the 1988 actual level. The anticipated growth of emissions to 2005 was taken from ABARE projections. The carbon tax base was domestic fossil fuel use for combustion, with the revenue generated being used to reduce direct taxation. In these ORANI simulations real wage rates and employment were allowed to vary. This configuration of the model was taken to reflect a long-run response to the imposition of carbon taxation, allowing the time necessary for the economy to fully adjust to the new situation. The costs incurred in the adjustment

process were not modelled.

The tax rate required was found to be A\$22/tonne of carbon in 1988 prices, with a revenue generated of A\$4.7 billion. The national income cost (in terms of gross domestic product) was a reduction of 2.1 per cent. Employment fell by 0.5 per cent. The smaller percentage reduction in employment compared to output is consistent with the substitution of labour for other inputs, especially energy, to production.

6.4 ORANI-E simulations

R. A. McDougall of the Centre of Policy Studies at Monash University carried out four simulations for this report, using a version of ORANI which models payroll taxation. The version is known as ORANI-E (ORANI model variants are discussed in Appendix II). Some of the results are reported in Tables 6.1, 6.2 and 6.3, where the different simulations are identified as S1, S2, S3 and S4. In all simulations carbon taxation is introduced unilaterally as a tax on domestic sales of fossil fuels for combustion; the tax is collected from both fossil fuel producers and importers. The main input features of these simulations are as follows:

S1: Carbon taxation raises revenue of \$A2 billion in 1992/93 prices, which is used to reduce payroll taxation by the same amount. The carbon tax rate is \$7.40 per tonne of carbon dioxide. Real wage rates are fixed.

S2: Carbon taxation is levied at the same rate and used in the same way as in S1. Money wage rates, instead of real wage rates, are fixed.

S3: Carbon taxation is levied at the same rate as in S1, with the revenue used to reduce the government deficit instead of payroll tax. Money wage rates are fixed.

S4: Carbon taxation is levied at a rate sufficient to raise revenue of A\$6.3 billions in 1992/93 prices, which is enough to eliminate payroll taxation completely. The carbon tax rate is \$23 per tonne of carbon dioxide. Money wage rates are fixed.

The model captures variations in payroll tax rates across industries and occupations. When payroll taxation is varied, it is by an equal proportional amount everywhere. Thus, a 30 per cent reduction in payroll taxation would reduce a 5 per cent rate to 3.5 per cent and a 2 per cent rate to 1.4 per cent.

For the simulations reported here, the ORANI model was configured so as allow only short run adjustments to carbon taxation. Table 6.1 gives the results for some macro variables. In the three simulations where the carbon tax revenue is used to reduce payroll taxation, national income (measured as gross domestic product) and employment increase, while the CPI falls. In each of these cases the employment increase is greater than the income increase, reflecting the substitution of labour for other inputs to production. This is driven by the change in the relative price of energy and labour as inputs to production. The relative price falls due to both carbon taxation and the reduction in payroll taxation. Only

the former effect is operative in S3 in which carbon tax revenues are used to reduce the budget deficit. Here both income and employment fall, with a smaller reduction in the latter.

In all of the simulations, carbon dioxide emissions and fossil fuel combustion are reduced. It should also be noted that in S4 (in which carbon taxes are set high enough to eliminate payroll tax), notwithstanding that the rate of carbon taxation is some three times that in the other simulations, income and employment increase. In this simulation the rate of carbon taxation is similar to that in the Industry Commission ORANI results reported above, but the income and employment changes are positive here and negative there. This indicates the importance of considering the use to which the carbon tax revenue is put, which is also made clear by the comparison of the results for S2 and S3 in Table 6.1. Comparing S1 with S2 shows the effect of holding either the real or the money wage rate fixed in a simulation. If money wages are fixed, the reduction in the CPI, driven by the reduction in payroll tax, means that the real wage rate increases, reducing the employment impact.

Table 6.1 Effects of Carbon Taxation on Selected Macro Variables using ORANI-E (percentage changes)

	S1	S2	S3	S4
GDP	0.15	0.07	-0.09	0.20
CPI	-0.47	-0.18	0.42	-0.57
Budget balance*	0.03	-0.02	0.31	-0.14
Employment	0.33	0.21	-0.04	0.69
Carbon dioxide emissions	-4.6	-3.9	-4.7	-11.7

* As percentage of GDP

Table 6.2 shows the effects on activity levels across broadly defined sectors of the Australian economy. For most sectors the pattern of these results across the simulations mirrors the macro changes in national income and employment. However, in the Metal products, Gas electricity and water, and Construction sectors activity falls in all simulations. The Gas, electricity and water sector is the worst affected in all simulations, reflecting its role as the major sectoral source of carbon dioxide emissions. Activity in the Chemicals and petroleum products sector falls in all simulations except S1.

Table 6.3 gives results for changes in employment by broadly defined occupational groups. In S1, S2 and S3 employment increases in all occupational groups, with the largest increases in the last two sectors, Plant and Machine Operators and Labourers. These

sectors include some of the lowest paid workers, and are where long-term unemployment is especially concentrated, and this suggests that the tax package may be progressive in its impact. In S3 the small overall reduction in employment involves small increases in three of the eight groups.

Table 6.2 Effects of Carbon Taxation on Activity in Broadly Defined Sectors using ORANI-E (percentage changes)

	S1	S2	S3	S4
Agriculture, forestry etc	0.37	0.14	-0.18	0.45
Mining	0.32	0.08	-0.59	0.41
Food products	0.50	0.266	-0.18	0.84
Textiles, clothing and footwear	0.61	0.40	-0.12	1.29
Wood and paper products	0.19	0.10	-0.11	0.33
Chemicals and petroleum products	0.13	-0.02	-0.42	-0.03
Non-metallic mineral products	0.06	0.00	-0.15	0.02
Metal products	-0.33	-0.52	-1.04	-1.56
Transport equipment	0.77	0.50	-0.24	1.60
Other machinery and equipment	0.26	0.14	-0.19	0.45
Other manufacturing	0.43	0.24	-0.24	0.78
Electricity, gas and water	-1.11	-1.16	-1.37	-3.69
Construction	-0.07	-0.07	-0.08	-0.22
Transport and communication	0.10	0.05	-0.08	0.16
Other services	0.05	0.02	0.04	0.07

Table 6.3 Effects of Carbon Taxation on Employment by Broad Occupational Group using ORANI-E (percentage changes)

	S1	S2	S3	S4
Managers and administrators	0.38	0.22	-0.02	0.73
Professionals	0.16	0.09	-0.03	0.28
Para-professionals	0.24	0.15	0.03	0.50
Tradespersons	0.28	0.16	-0.12	0.54
Clerks	0.33	0.24	0.02	0.79
Sales and personal service	0.30	0.23	0.05	0.73
Plant and machine operators	0.53	0.34	-0.12	1.12
Labourers	0.47	0.30	-0.04	0.98

6.5 *G-Cubed simulations*

Professor Warwick McKibben, of the Research School of Pacific and Asian Studies at the Australian National University, carried out a simulation for this report using the G-Cubed model. This model differs from ORANI in several ways, two of which warrant discussion here. Appendix II provides a brief description of the main features of G-Cubed.

First, whereas ORANI is a static model, G-Cubed is dynamic. A static model such as ORANI addresses the question: if carbon taxation is introduced, what will the state of the economy be in comparison to the pre-carbon tax state after all of the adjustment effects allowed in the model have worked themselves out. Dynamic models, such as G-Cubed, generate explicit paths for variables over time. They show the working of the processes by which adjustments occur in the model. Thus they incorporate assumptions about how forward-looking expectations are formed, and can simulate the effects of the gradual phasing in of policies such as a carbon tax, including situations where the tax is put into effect some time after its announcement. In the G-Cubed simulation discussed here, the carbon tax was introduced without pre-announcement at a rate held constant over time, in order to facilitate comparison with the results discussed above.

Second, whereas ORANI is a model of the Australian economy, G-Cubed is a model of the world economy. In the version used for the results reported here, Australia is one of the regional economies distinguished. This version of G-Cubed is still in the development stage, and the results should be regarded as preliminary. They are reported to illustrate the potential of dynamic general equilibrium models, and for comparison with the results considered above. The internationalisation of the model has benefits and costs. The benefits are the explicit treatment of trade flows and capital movements. The costs are a less detailed treatment of the economy of primary interest, in this case Australia. At its current state of development, G-Cubed cannot represent payroll taxation in the Australian economy.

For the results shown in Table 6.4, a unilateral carbon tax is introduced in Australia at the rate of A\$7 (at current prices) per tonne of carbon dioxide (equivalent to a tax of \$25/tonne of carbon). Both domestic producers and importers of fossil fuels are taxed. This is approximately the rate used in the ORANI-E simulations S1, S2 and S3 above. The tax is announced and implemented in 1994. The revenue generated by the tax is used to reduce the government deficit, corresponding to scenario S3 of ORANI-E above. In 1994 the reduction in the deficit is 0.73 per cent of GDP. The simulation produced annual results out to 2050. In that year the deficit is 1.15 per cent of GDP below what it would have been in the absence of carbon taxation. The results in Table 6.4 show the percentage differences from the values the variables would have taken in the year shown in the absence of carbon taxation. Thus, in 2014 national income, as gross domestic product, is 0.13 per cent lower than in the baseline simulation in which there are no policy changes.

Table 6.4 Effects of Carbon Taxation on Selected Macro Variables using G-Cubed (percentage changes)

	1994	2004	2014	2024
GDP	-1.25	-0.62	-0.13	0.01
CPI	0.29	-0.03	0.00	0.00
Employment	-0.66	0.00	0.08	0.04
Carbon dioxide emissions	-16.45	-15.92	-16.02	-14.31

In this simulation, as in S3 of ORANI-E, the initial reduction in employment is smaller than the reduction in national income. As compared with S3, both of the initial effects here are larger. This may be taken to reflect trade and capital movements, as well as the different structure of substitution as between energy and other inputs to production, as well as different parameter values. Over time, the reductions in national income and employment are eliminated. By 2014 there is a positive employment effect arising from carbon taxation.

By 2024 the effect on national income is also positive. These effects persist through to 2050. The long-term positive impact of the carbon tax on output and employment in Australia in G-Cubed is probably due to substitution of labour for energy, an effect offset in the initial years by trade and income effects. The reductions in carbon dioxide emissions under G-Cubed are considerably larger than in the ORANI-E simulations reported above.

6.6 Discussion

The various results considered here all show carbon taxation working to reduce carbon dioxide emissions. This is a goal to which Australia has committed itself. The use of fossil fuels is also reduced, implying that there are some additional environmental benefits. In all of the results, there is some substitution of labour for energy in production. In some simulations, the net effect on employment is negative, due to the negative output effect being greater than the positive price induced substitution effect. The effects on output and employment depend crucially on how the revenue from the tax is used. The outcome also depends upon:

- whether the model allows complete long run adjustments or incomplete short run adjustments;
- the way that the model treats international economic linkages;
- and, the structure and parameterisation of the model.

The results reported for G-Cubed represent in some ways a 'worst-case scenario' for the impact of a carbon tax on output and employment. This is because, as the ORANI results suggest, it is likely that using carbon tax revenues to reduce payroll taxes rather than reducing the budget deficit would increase output and employment. The G-Cubed model has a detailed specification of capital markets so that the impact of capital flows due to the tax can be captured. With this effect it is still the case that the carbon tax (with revenue used to reduce the deficit) does not have a large impact on the economy, and indeed capital flows back into the economy after some years in response to changes in other factors induced by the carbon tax change.

While modelling exercises of this kind are necessary inputs to proper consideration of the merits of carbon taxation and the uses to which the revenue is put, it is clear that no single model can produce definitive results. The ORANI model provides more detailed sectoral information on Australian impacts, while the G-Cubed model captures more trade-related impacts. Both models are under continuous development. The results reported here suggest that, considering the environmental benefits, the output and employment effects and Australia's international obligations, there is a *prima facie* case for introducing carbon taxation. However, it needs to be kept in mind that the model results considered here are preliminary in nature. Further work is warranted. The results also indicate that this should not be dependent on a single AGE type model. AGE modelling would also need to be supplemented by empirical studies of matters that cannot be addressed adequately by them, such as the existence of technical inefficiencies and the determinants of technological

change.

The overall perspective on modelling exercises of the type exemplified by ORANI and G-cubed has been put very well by Barker (in Carraro and Siniscalco 1993). Barker notes that the central question addressed by such models is whether a cut in energy inputs would be associated with a cut in outputs, and that the structure of the models would lead one to expect an affirmative answer. He then notes the following problems with the modelling approach involved:

First, as has often been pointed out, energy is a small input compared to labour or capital in the production function, therefore any parameters particularly at the macro level are going to be difficult to measure. Second, the assumption of smoothly changing supply schedules seems quite inappropriate for energy supply..... Third, if a distorting tax on labour is reduced by the recycling of carbon tax revenues, then it is possible that output might be increased. Fourth, technical progress, innovation, education and the acquisition of new skills are central to the long-term outcome for growth and the level of real output; all of these factors are usually grossly oversimplified in the production function, appearing as fixed time trends, if they appear at all. Fifth, surely it should not be assumed that industry is at the efficiency frontier: the tax might help shift production towards that frontier.

7. Conclusions and Recommendations

The purpose of this report has been to identify and outline the issues associated with the introduction of greenhouse gas emissions taxation in Australia. For reasons detailed above, we have taken 'greenhouse gas emissions taxation' to mean taxes levied on fossil fuels at rates reflecting their carbon content, and we subsequently refer to 'carbon taxation' here. Our principal conclusions are as follows.

1. Carbon taxation has the potential to reduce Australian carbon dioxide emissions and fossil fuel use. If Australia were to act alone to cut carbon dioxide emissions, the benefits in terms of reduced global climatic change will be small. On the other hand, Australia has already entered into an international agreement to act to limit its greenhouse gas emissions, and a number of other nations have introduced or appear to be moving towards the introduction of carbon taxation. In addition, reduced fossil fuel use in Australia would provide other environmental benefits accruing in Australia. It could also extend the lifetimes of Australian fossil fuel reserves.
2. A tax based on fossil fuel consumption or production would be simple and cheap to administer. Given that energy is an input into the production of all goods and services, carbon taxes are in many ways similar to a general sales tax. The main difference is that its incidence varies across commodities according to their carbon content.
3. As energy and labour are generally substitutes as inputs into production, carbon taxation would increase the relative costs of energy compared to labour and that would tend to reduce

unemployment. In addition, unemployment could be further reduced depending on how revenues from carbon taxes are spent. For example, revenue from carbon taxes could be used to reduce payroll taxes, to reduce the budget deficit, to reduce company taxes or be spent on public infrastructure.

4. Based on the evidence reviewed in this report, there is a *prima facie* case that the substitution of a carbon tax for payroll taxes would have net economic benefits for Australia and would make a significant contribution to meeting Australia's commitment to limiting greenhouse gas emissions. However, the evidence is not conclusive and there remain some significant gaps in our understanding of the impacts of the proposed shift in the tax system. In addition, further analysis may reveal that using carbon tax revenue to reduce payroll tax may not be the best way to reduce unemployment.

5. The introduction of carbon taxation would benefit some groups and damage others. Although the introduction of a carbon tax would not be as regressive as is often thought, the full incidence of benefits and costs will depend upon the way the revenues arising from the tax are used. These equity considerations require further investigation.

6. The analysis which supports the conclusion that carbon taxation would unduly affect business costs generally assumes that production methods are currently such that there is no technical inefficiency, and that carbon taxation would leave unaffected the future course of technological change in Australia. To the extent that these assumptions are incorrect, that conclusion would need revision. If there are inefficiencies and carbon taxation encourages technological developments that reduce dependence on fossil fuels, then the impact of a carbon tax on business costs would be less severe.

7. Carbon taxation would involve benefits and costs, some of which cannot easily be compared numerically. The answer to the question of whether carbon taxation would involve net benefits for Australia therefore depends in part upon the weights attached to the different environmental and economic effects. This is a matter properly left to political decision makers. However, the answer also depends on the sizes of the various effects of carbon taxation and the way in which the revenue generated by the tax is spent. Quantification of the various effects is subject to numerous caveats and uncertainties, and in some cases is effectively impossible. The principal areas of doubt and the issues that need further development are the following:

- whether an agreement can be reached with State and Territory Governments over a fair and efficient system of collecting and distributing carbon tax revenues;
- the precise form a carbon tax would take, including its relationship with existing taxes on fossil fuels;
- the impact on employment and other macroeconomic aggregates of the tax and the disbursement of the revenue generated by the tax. This would include an assessment of the responsiveness of employers' demand for labour to the fall in labour costs due to changes in payroll and other taxes;

- the feasibility of designing a carbon tax package, including revenue disbursement, that minimises the equity costs involved;
- the likely technological changes, especially in the longer term, induced by increased fossil fuel prices and the benefits to Australia of those technological changes;
- the development of a program for introducing the tax changes that would satisfy investors that Australia remains a desirable place in which to invest.

8. The evidence and arguments canvassed in this paper indicate that carbon taxation is worthy of serious consideration by the Commonwealth Government. We recommend that the Committee urge the Government to commission further work on carbon taxation as a high priority. The work should focus on the areas mentioned under point 7 and would require extensive use of economic modelling work. It should be possible within a period of twelve months from the initiation of such work to provide the information on which a decision on the introduction of carbon taxation, and the use of the revenues generated, could be based.

9. Although the detailed specification of the 12-month study of the issues would need to be decided by the Committee, it is recommended that the study include the following elements:

- it should use at least two economy-wide models to analyse the effects of a carbon tax and compare the results;
- it should receive detailed inputs from Commonwealth and State Treasuries as to the administrative implications of introducing a carbon tax and using the revenue for the reduction of payroll tax;
- it should focus on the likely short-term and long-term effects of a carbon tax on technological change in a range of affected industries. The last-mentioned task is generally beyond the scope of economic models and will require some detailed case studies by persons familiar with industrial technologies;
- it should undertake modelling work on the impact of tax packages on household incomes so as to determine their equity effects; and
- it should learn as much as possible from experience overseas with carbon and similar taxes.

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Appendix I

Greenhouse Gases, Climate Change and Policy Responses

The basic physics of the greenhouse effect are straightforward. Most of the solar energy reaching the earth is absorbed at its surface, warming it. The earth's surface emits infra-red radiation, some of which is then absorbed and re-emitted by the greenhouse gases in the atmosphere. This re-radiation is in all directions. Some is downwards back to the earth's surface, where it causes further warming. The presence in the atmosphere of greenhouse gases means that less heat is lost to space than would otherwise be the case. It is generally accepted that the mean surface temperature of the earth is 33^oC higher than it would otherwise be, due to the greenhouse gases in the atmosphere.

The greenhouse gases in the atmosphere are not the only influence on global temperature and climate. The solar flux itself varies over time. Changes in the earth's orbit around the sun alter the impact of any given flux rate. Particulate matter in the atmosphere also absorbs and reflects radiation, and affects cloud formation.

The principal greenhouse gases are water vapour, carbon dioxide, methane, nitrous oxide, and the chloroflourocarbons (CFCs). Water vapour is by far the most important greenhouse gas by volume; its atmospheric concentration is 3000 parts per million by volume (ppmv). The atmospheric lifetime of water vapour is short, of the order of one week or 0.02 years. Water vapour as cloud cover has a dual role in the global climate system, in that as well as acting as a greenhouse gas, it can also have a cooling effect by reducing the solar radiation reaching the surface. The net role of cloud cover in the enhanced green house effect is uncertain, and disputed. While the sources of water vapour in the atmosphere are mainly non-anthropogenic, human activity affects the quantity and type of cloud formation in a variety of ways.

Discussion of the properties of the various greenhouse gases generally focuses on those for which anthropogenic emission sources are important. Henceforth we will use the term greenhouse gases to exclude water vapour. Table I.1 shows how the major greenhouse gases vary in terms of atmospheric lifetime (average in relation to a molecule), atmospheric concentration (all the greenhouse gases taken together comprise less than 0.1 per cent of the atmosphere), and current anthropogenic emissions rates. By volume and emissions rate, carbon dioxide is the major greenhouse gas.

Table I.1 Greenhouse Gas Comparisons

	Atmospheric Lifetime ^a	Concentration 1989 ppmv ^b	Current Emissions Anthropogenic ^c
Carbon dioxide	120	350	26000
Methane	10	1.7	300
Nitrous oxide	150	0.31	6
CFC-11	75	0.000025	0.3
CFC-12	110	0.000045	0.4

Source: Houghton *et al.* (1990)

The greenhouse gases differ in the rates at which a molecule absorbs and re-radiates, and hence in warming effect. However, in comparing the warming effects of the gases, account needs also to be taken of the quantities in the atmosphere. The relative contributions to 'global warming potential', shown in Table II.2, also depend on atmospheric lifetimes, and hence on the time horizon adopted. This last point is sometimes overlooked in commentary. To emphasise it, in Table II.2 contributions are shown for three different time horizons. However, it is clear that whatever the time horizon adopted, carbon dioxide is much the most important of the gases in terms of warming potential. The results in Table 2 are based on a number of estimates and assumptions, attended by varying degrees of uncertainty. However, the dominant role of carbon dioxide is not sensitive to these uncertainties.

Table II.2 Proportional contributions to potential global warming (per cent)

	20 years	100 years	500 years
Carbon dioxide	51	68	81
Methane	37	17	8
Nitrous oxide	3	5	4
CFC-11	3	5	4
CFC-12	6	7	6
Total	100	100	100

a units are years

b ppmv - parts per million by volume

c units are Megatonnes per annum

Source: Houghton *et al.* (1990)

IPCC assessments represent the position of the majority of the scientific community in regard to climate change prospects. According to the 1992 IPCC report, the best available estimate of the rate of change of global mean surface temperature over the next century is 0.3°C per decade (range 0.2 to 0.5°C per decade) (Houghton *et al.* 1992, p17). Over a one hundred year time horizon, the sea level increase generally envisaged is primarily on account of thermal expansion of the water in the ocean, and some melting of glacial ice: significant melting of the polar ice sheets is not generally foreseen within such a time horizon. As of 1990, the IPCC's best estimate of the rate of sea level increase was 6 millimetres per annum, so that by the end of the next century the level would have risen 65 centimetres (Houghton *et al.* 1990). In 1992 the IPCC put the rate of sea level change due solely to thermal expansion in the range 2 to 4 millimetres per annum (Houghton *et al.* 1992). The effects of sea level rise are: recession of shorelines, inundation of existing coastal areas, loss of wetlands, increased salt water intrusion in estuaries, and increased salt water intrusion of coastal fresh water aquifers.

Not all climate scientists endorse the IPCC position, though the majority of those regarded as experts in the relevant areas of specialisation appear to do so. There are some who take the view that the IPCC is overstating the prospects for climate change, this arising by virtue of the fact that the models of the climate system used do not properly account for features which would work to reduce temperature change. The IPCC report acknowledges problems with the models, particularly in respect of the effects of aerosols and cloud formation. The possibility that there are negative feedback processes in the actual climate system which are not represented properly in the models must be kept in mind. The possibility of positive feedbacks, which would work to speed up climate change, in the actual global system also exists. There are, for example, very large quantities of methane trapped beneath the surface in tundra regions by low temperatures. Sufficient warming could release this methane into the atmosphere, accelerating global warming. This is generally regarded as extremely unlikely within the next 100 years.

Is there any actual evidence, as opposed to model simulations, of climatic change due to anthropogenic releases of greenhouse gases? The trend in concentrations has been upward for some two hundred years, so that some take the view that if the climate models properly represent the global climate system, we should already be seeing climate change. According to the 1992 IPCC report: "global mean surface air temperature has increased by 0.3 to 0.6°C over the last 100 years". Not everybody accepts this, arguing that the observations on which it is based are biased upwards. However, leaving this aside there remain problems in accepting this record as positive evidence for the operation of an enhanced greenhouse effect. The IPCC 1992 report notes that:

the size of this warming is broadly consistent with predictions of climate models, but it is also of the same magnitude as natural climate variability. Thus the observed increase could be largely due to this natural variability; alternatively this variability and other human factors could have offset a still larger human-induced greenhouse warming. the unequivocal detection of the enhanced greenhouse effect from observations is not likely for a decade or more.

The first point to be made about the impacts of climate change is the obvious one that their extent will depend upon the extent of climate change. Though obvious, this point is

important, since it follows from it that impact assessment is necessarily subject to the uncertainty attending the assessment of climate change itself. Impact obviously has to be assessed at a local level, in the light of local circumstances. The extent of uncertainty about regional climate change is much greater than it is about the global average. However, even if the climate change to occur in a given region were known with certainty, the extent of consequent impacts would remain uncertain. We simply do not know enough about the way natural and human systems function in relation to climate variation, and variability, to forecast impacts for given climate change with any confidence.

It is useful to distinguish three types of policy response:

- **Prevention policies**, intended to slow or halt the rate of increase in atmospheric concentrations of greenhouse gases;
- **Mitigation policies**, intended to offset or ameliorate the climatic effects of increased concentrations of greenhouse gases; and
- **Adaptation policies**, intended to facilitate human adjustment to the impacts of climatic change consequent upon increased greenhouse gas concentrations.

These are not mutually exclusive classes of policy response. Illustrative examples of each type of response, in relation to carbon dioxide, are:

- **Reductions in the use of fossil fuels.** Switching as between different fossil fuels with different carbon contents. Removal of carbon dioxide from power plant smokestacks, its sequestration as carbon, and disposal in such manner that there is no leakage to the atmosphere. Switching from fossil fuel combustion to biomass combustion, with the biomass harvested on a sustainable basis. Reforestation, with the timber eventually harvested to be used so as to prevent carbon dioxide release to the atmosphere, such as by encasement in plastic.
- **Release particulates into the atmosphere.** Release into the atmosphere gases that offset the effects of the greenhouse gases. Promote cloud formation. Steer hurricanes and tornadoes away from populated areas.
- **Facilitate outward migration from adversely affected areas.** Compensate those who are adversely affected. Build defences against rising sea levels. Stop new development in low lying coastal areas. Change agricultural practices, use different plant and animal varieties. Research new plant and animal varieties.

Most attention focuses on prevention policies in relation to carbon dioxide. The key characteristic of preventative policies is that, unlike policies from the other two classes, their effectiveness depends upon international agreement and cooperation. Whatever one nation does to reduce emissions or enhance sinks will have little effect on global atmospheric concentrations, and therefore on climate change prospects, unless at least the majority of other nations take similar action. To appreciate the ineffectiveness of unilateral policy action, and the different circumstances of nations as relevant to participation in an international agreement

to reduce fossil fuel combustion based carbon dioxide emissions, it is useful to consider some data. Table I.3 gives data on carbon dioxide emissions, per capita incomes and population sizes for five nations plus the European Community, the EC. The emissions data refers to those arising in fossil fuel combustion. These six economies account for over 70 per cent of the total of world emissions.

Table I.3 Emissions, income and population: selected nations 1988

	CO2 per capita (t)	CO2 per unit GDP (t/\$1000)	GDP per capita ^c (\$1000)	Popula- tion (millions)	Total CO2 (mt)	Share of world total (%)
US	21.39	1.09	19.59	248.2	5310	23.7
USSR	13.01	1.50	8.66	288.7	3756	16.7
EC	8.47	0.61	13.89	325.0	2753	12.3
Japan	8.68	0.58	14.96	123.2	1069	4.8
China	2.37	7.54	3.12	1112.3	2638	11.8
India	0.84	3.03	0.28	833.4	699	3.1

Source: Industry Commission 1991

The US is the largest national contributor to carbon dioxide emissions. Its per capita emissions are more than 20 times as large as India's, and more than twice those for the EC. It accounts for approximately a quarter of total world emissions. From one perspective this is a very large share. However, it means that even the US acting alone to cut emissions would have a limited impact on total emissions, and hence concentrations. This is even more the case than Table 3 suggests, since over the next 50 years it is reasonably certain that the US share of the total will substantially decline, as the developing countries increase their use of fossil fuels with economic growth. The current per capita fossil fuel and carbon dioxide emissions in countries such as India and China are low by the standards of the industrial countries. If, as they plan to do, they follow the development path previously experienced in the industrial world, these per capita levels will grow substantially. Countries such as India and China currently do not see their national interest as involving the abandoning the pursuit of economic growth in the interest of slowing prospective global warming. This perception depends, in part, on the uncertainties attending the enhanced greenhouse effect.

Table I.3 shows that nations differ in the efficiency with which they turn fossil fuel combustion, and hence carbon dioxide emissions, into national income. The USSR emitted more than twice as much carbon dioxide per dollar of national income as the EC and Japan, and the US 40 per cent more. This suggests that there is in the US considerable scope for greater efficiency in energy use, and reduced emissions per unit income. In India and China, emissions per unit income are much higher than in the industrial nations. However, given the low income levels and the technologies employed, the scope for increased efficiency in energy use in such countries is seen as relatively limited for the foreseeable future. At the stage of development that they are at, significant reductions in energy, i.e. fossil fuel, use would be

seen as prohibitively costly in terms of material living standard improvements foregone.

In terms of the incentives for participation in collective action to reduce carbon dioxide emissions, the situation is broadly as follows. The bulk of future growth in emissions is expected to occur in developing countries. They see curtailing that growth as impairing their prospects for improving now the material living standards of their citizens. Problems associated with global warming are in the future, and anyway uncertain. The industrial countries could be more inclined to act, they are better able to afford the costs involved, but see that if they alone act the impact on the enhanced greenhouse effect could be limited, as the developing countries to some extent replace, as it were, their foregone emissions. This refers to the industrial nations collectively. If they are considered separately, then any one considering action to reduce emissions faces the prospect of reduced competitiveness in international trade. Whatever the true extent of this problem in any particular case, industrial interests will argue that it is a serious problem.

Appendix II

Australian Economic Models for Carbon Tax Analysis

This appendix does not give an exhaustive account of the Australian AGE models considered. It is intended to draw attention to some of the features of the models, and their use, that need to be kept in mind when considering results generated by them, and in thinking about future modelling work on carbon taxation and employment.

II.1 *The Orani model*

The Orani model has been in existence for almost 20 years now, and has been extensively used for policy analysis. It is, in fact, potentially misleading to refer to 'the' ORANI model. There are a number of versions of the model, and each version may be used in different ways. Also, versions of the model used in particular applications may differ according to the historical dating of the data base used for calibration, the values imposed for some parameters, and special features introduced for the particular application. In all versions, ORANI has more variables than equations. Hence, it cannot be solved for the levels of all the variables which appear in it. Some variable levels have to be set prior to solving the model for the levels of the remaining variables, which solutions are conditional on the levels set for the other variables. The choice of which variable levels to set prior to solving the model, and the levels assigned, is the 'closure' of the model. If ORANI results are to be properly appreciated, it is essential to be clear about: the model version; the data base and parameterisation; the closure.

In a particular application, the closure is selected so as to focus on the policy issues under consideration, and so as to put the model into what is taken to be either a short or a long run mode. In both respects, closure is in very large degree a matter of judgement. As noted in section 6 of this report, ORANI is a static model. This means that the terms 'short run' and 'long run' as used by ORANI modellers do not refer to numbers of actual years. Rather, in a 'short run' closure the levels of a number of variables are held constant, with the intention of simulating incomplete adjustment to the simulated shock to the economy. ORANI modellers would regard a short run closure as being relevant to policy analysis within a time horizon of two years, while a long run closure is taken to be relevant to a time horizon of five to 10 years.

The usual features of a short run ORANI closure are (Industry Assistance Commission 1987):

- the capital stocks available to each industrial sector are fixed;
- domestic consumption expenditures, in real terms, by households are fixed, as are government expenditures, and investment expenditure;
- employment is determined by the demand for labour;

- the real wage is fixed;
- the nominal exchange rate is fixed; and
- the balance of trade varies, so as to match, given fixed domestic expenditure, total expenditure with domestic production.

The modifications for long run closure vary with the application, but typically involve allowing capital stocks and the real wage to vary.

The basic ORANI model is a multi-sectoral model of the Australian economy. The technologies for production in each sector are fixed, though there is some scope for substitutions, driven by changing relative prices, as between inputs of the primary factors, which are labour, capital and land. The exact number of industry sectors distinguished varies as between versions and applications, but is usually of the order of 110 sectors. Usually, the household sector is treated as a single entity, and the representation of the economic activity of government is lacking in detail. Imports and domestic production are substitutes in production and consumption. Overseas demand, treated as a composite across foreign economies, for Australian production is price sensitive, but there is no representation of the effect of variations in the levels of income in foreign economies on demand for Australian exports.

For the Industry Commission inquiry, Commission staff developed an ORANI variant known as ORANI-Greenhouse. This was a development of the version known as FH-ORANI, in which the government budget is modelled in more detail than in standard ORANI. A long run version of this model allows for the possibility of capital moving offshore, if rates of return to capital in Australia fall below rates elsewhere. The further developments incorporated into ORANI-Greenhouse were principally:

- tying emissions of carbon dioxide and methane to production and consumption activities
- introducing possibilities for substitution as between energy sources in production of the energy composite
- introducing possibilities for substitution as between the energy composite and capital and labour in production
- introducing possibilities for substitution as between modes in transportation

The closure adopted for the Industry Commission's use of ORANI-Greenhouse was intended to reflect long run adjustment. Particularly, capital stocks in industrial sectors are allowed to adjust, and there is real wage flexibility.

McDougall (1993) reports some ORANI results for carbon taxation. The Centre of Policy Studies at Monash University has developed another version of ORANI to analyse greenhouse issues. Known as ORANI-E, it is a comparative static variant of Monash ORANI. ORANI-E has some similar features to ORANI-Greenhouse. It includes emission accounting, a carbon tax mechanism and substitution possibilities (inter-fuel and energy-capital substitutions and

substitutions among different modes of transport). The key difference between ORANI-Greenhouse and ORANI-E is that the latter has an additional level of disaggregation in the crucial electricity sector. In addition to splitting electricity generation from electricity transmission and distribution, ORANI-E contains six electricity sectors differentiated by technology -- steam turbine, gas turbine, combined cycle, hydroelectricity, other fuel burning (mainly internal combustion) and other non-renewables. It is intended to undertake further work on energy consumption in the household sector.

This new feature of ORANI-E is a critical feature for analysing greenhouse issues because of the inadequacies of allowing only for substitution among fuels. In principle, the ORANI-E structure allows for the selection in the solution process of technologies that are not yet commercially viable, but this quickly becomes difficult as the number of technologies increases. A more natural way of modelling choice between many emerging technologies is through the use of a linear programming approach rather than a general equilibrium approach. If one wants to examine both economy-wide effects and technological choice then one needs to combine general equilibrium and linear programming models. This is currently being undertaken by the Centre of Policy Studies under contract to DEST by combining ORANI with ABARE's MENSA model, a linear programming model of the energy sector (see Section IV.5). The procedure is for ORANI first to determine total demand for electricity. With this information MENSA finds the minimum cost combination of fuels and technologies and the capital investment required, and this is fed back into ORANI which in turn revises its estimate of total electricity demand. The models are solved iteratively. A trial version on this topic is expected at the end of 1994.

ORANI-E (like most versions of ORANI) does not have a financial sector, although work is underway to integrate MONASH with the Murphy model. MONASH will have a great deal more detail on the Australian economy than the G-Cubed model (discussed below), principally because G-Cubed is a multi-country model.

In McDougall (1993) the revenue from carbon taxation is used to reduce the rate of income taxation so that a constraint on the size of the government's budget deficit is satisfied. The rate of carbon tax used is A\$10. This is of similar magnitude to the rate of \$A7 used in the McDougall simulations reported in Section 6 above. In McDougall (1993) the reported impact on GDP is a reduction of 0.48 per cent, and on carbon dioxide emissions a reduction of 17 per cent: employment is held constant. In Table 6.1, for S3, where the carbon tax revenue is used to reduce the government deficit, GDP falls by 0.09 per cent and carbon dioxide emissions by 4.0 per cent. This comparison shows the care that must be used in considering such modelling results. The differences reflect not only the tax rates and the use of the revenue, but also the closure employed.

The simulation results reported in Section 6 are from the same ORANI-E model, but it is used in short run closure mode, with wage rates fixed and employment allowed to vary, while industry sector stocks of capital are held fixed.

II.2 *The G-Cubed model*

This AGE model was originally developed by McKibben and Wilcoxon for the United States Environmental Protection Agency: see McKibben and Wilcoxon (1993a) and McKibben and Wilcoxon (1993b). Variants of the model are currently under development in Australia by McKibben and associates at the ANU. The important basic features common to all variants are:

- The world economy is represented as several regional economies, linked by flows of trade and finance. Capital is assumed to be internationally mobile as between regional economies belonging to the OECD, implying long run equality of rates of return.
- Each economy is represented as comprising a household sector, a government sector, a financial sector, and several production sectors.
- The model is dynamic, simulating the behaviour of the world economy over time as the result of interactions between sectors and economies.
- An intertemporal budget constraint holds for each sector in each economy. This means that any debt incurred must eventually be repaid. No sector can borrow, or lend, for ever.
- There are substitution possibilities in production and consumption, given by standard assumptions about production and utility functions. Household and producer reactions to changing circumstances reflect a mix of intertemporal optimising behaviour and ad hoc behaviour reflecting, for example, the impact of liquidity constraints. The proportions in which these two types of behaviour affect reactions is variable within the model structure and determined by calibration in an application. Households and producers have rational expectations, i.e. they have perfect foresight.
- There are adjustment costs involved in re-allocating capital between sectors. Sectors may require sector specific resources as inputs to production, such as coal reserves for coal mining. Limits to the availability of such resources can be set. Sectors may also require permits for emissions.
- Labour is mobile between sectors within a regional economy, but immobile as between regions. Within a regional economy employment is, in the short run, determined by the demand for labour. In the long run, the wage rate adjusts and the labour market clears, so that employment is determined by the supply of labour.
- Government expenditure is constant in real terms. It is financed by taxation and borrowing, in a mix determined by the performance of tax revenues and the intertemporal budget constraint.
- Policy analysis is conducted by comparing the variable trajectories arising in a base case simulation with those arising from a simulation in which some shock is applied to the model, such as the imposition of carbon taxation in one or more of the regional economies. In base case simulations, the world economy converges on an equilibrium growth path given by the rates of growth for populations and productivities.

The variant of G-Cubed used to produce the results reported in section six here distinguishes the following regional economies: United States, Japan, Australia, Rest of OECD, Oil Exporting Developing Countries, Eastern Europe and the former Soviet Union, Other Developing Economies

In each economy the following production sectors are represented:

Energy Sectors

- Electric Utilities
- Gas Utilities
- Petroleum Refining
- Coal Mining
- Crude Oil and Gas Extraction

Non-Energy Sectors

- Mining
- Agriculture Fishing and Hunting
- Forestry/Wood Products
- Durable Manufacturing
- Non-Durable manufacturing
- Transportation
- Services

Parameterisation of the model involves a mixture of econometric estimation and calibration. This variant is at an early stage of development, and parameterisation of the regional economy structures relies heavily on US data, with some regional adjustment. The results should be regarded as preliminary.

II.3 MEGABARE

MEGABARE is a global general equilibrium model designed to analyse greenhouse issues. Stimulated by the WEDGE model of the Industry Commission, it has been developed by ABARE by building on the GTAP (Global Trade Analysis Project) model now operated from Purdue University in the USA. GTAP in turn grew out of work at the Industry Commission on a multi-country model and data base known as SALTER. MEGABARE is thus a multi-country, multi-commodity model which can provide numerical estimates of the impact of greenhouse response policies on trade and industry structure both in Australia and in other modelled countries or regions. The model can also help to identify those greenhouse response strategies that will be least-cost.

The current version of MEGABARE has 21 countries or regions, with emphasis on Australia's trading partners, and 37 sectors following the standard industrial classification. It is expected that future versions will incorporate more countries and sectors. First results from the model are now available. The benefit of a global model like MEGABARE is that it can both take

account of the effects of Australian policy changes on our trading partners (and the feedback effects on us) and estimate the impact on Australia of policy changes in other countries. For example, if the European Union introduced a carbon tax there would be a range of effects on our trading position. This facility will be especially useful in the greenhouse policy context because much of the debate will revolve around the issue of unilateral versus multilateral action.

The MEGABARE model has recently been used to compare the impacts of an 20 per cent reduction in carbon emissions in each of several countries (reductions brought about by a carbon tax) with a system of international tradable emissions quotas designed to achieve the same overall reduction in emissions (Hanslow *et al.* 1994). The model was used to analyse a two policies: a carbon tax designed to reduce global emissions by 20 per cent in OECD countries and Eastern Europe (known as Annex 1 countries), and a tradable quota scheme designed to achieve an equivalent reduction in emissions globally. The results indicate that Australia would need to impose a carbon tax of US\$636/tonne of carbon to achieve a 20 per cent fall in emissions, and this would be accompanied by a decline in real GDP of almost 1 per cent. The tax would need to be higher in Japan (US\$739) but would be much lower in the USA (US\$219) and the European Union (US\$261). These results reflect the limited ability to substitution away from fossil fuels, especially in electricity generation, and our heavy reliance on primary metal processing industries.

Under the tradable quota scheme, OECD countries like Australia trade in emissions quotas among themselves and with non-OECD countries. Under this system, Australia could make its contribution to the 20 per cent reduction in emissions at a cost to real GDP of only 0.06 per cent, and would reduce its own emissions by just 1.7 per cent. Most of the emission reductions occur in China. However, the ABARE paper does not discuss the administrative feasibility of a tradable quota scheme.