Australian Government
Productivity Commission

Waste Management

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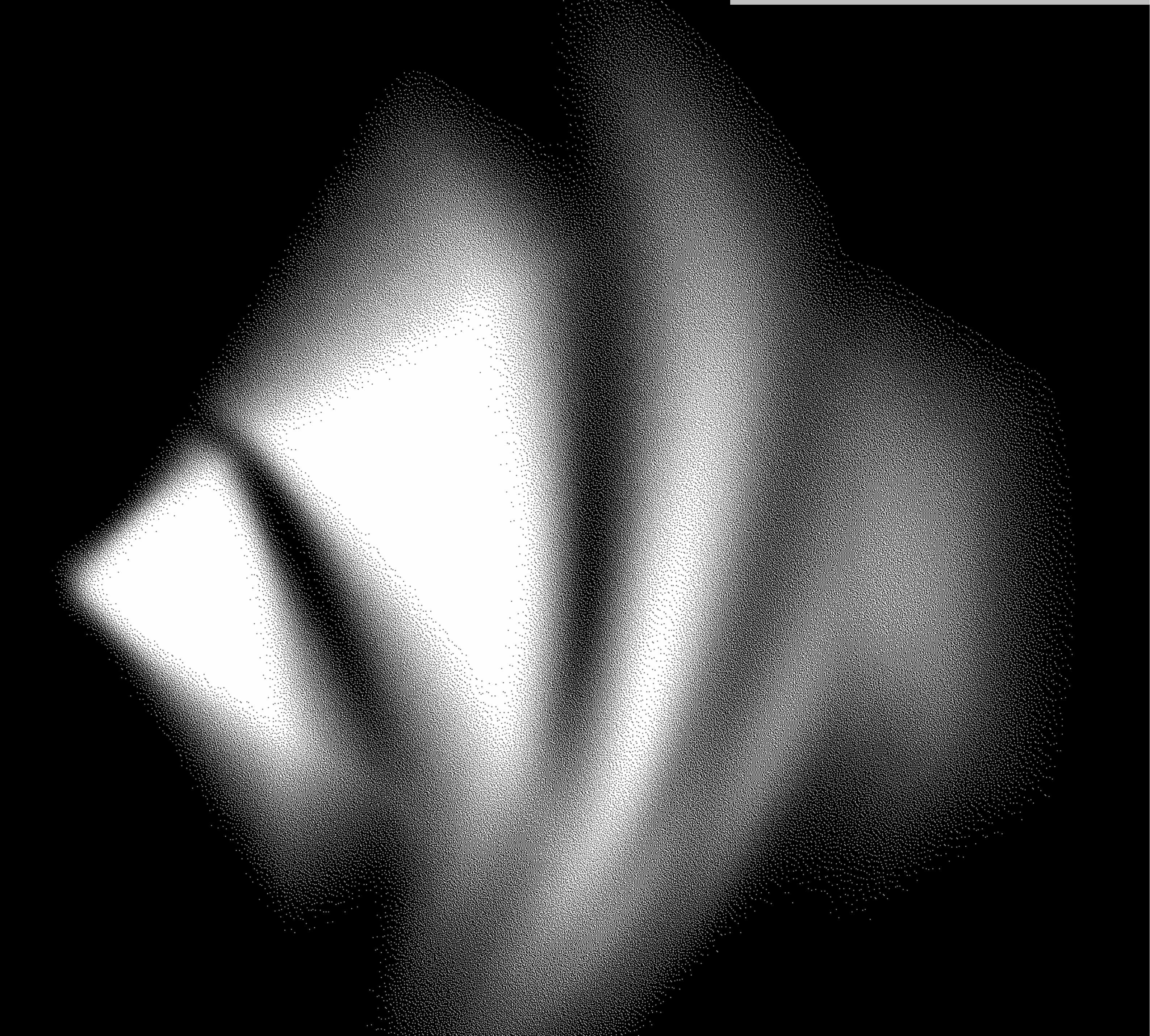

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Publications Inquiries:
Media and Publications
Productivity Commission
Locked Bag 2 Collins Street East
Melbourne VIC 8003

Tel: (03) 9653 2244
Fax: (03) 9653 2303
Email: maps@pc.gov.au

General Inquiries:
Tel: (03) 9653 2100 or (02) 6240 3200

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The Productivity Commission

The Productivity Commission, an independent agency, is the Australian Government's principal review and advisory body on microeconomic policy and regulation. It conducts public inquiries and research into a broad range of economic and social issues affecting the welfare of Australians.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by consideration for the wellbeing of the community as a whole.

Information on the Productivity Commission, its publications and its current work program can be found on the World Wide Web at www.pc.gov.au or by contacting Media and Publications on (03) 9653 2244.

Terms of reference

WASTE GENERATION AND RESOURCE EFFICIENCY IN AUSTRALIA

Productivity Commission Act 1998

I, PETER COSTELLO, Treasurer, pursuant to Parts 2 and 3 of the *Productivity Commission Act 1998*, hereby refer waste generation and resource efficiency in Australia to the Commission for inquiry and report within twelve months of receipt of this reference. The Commission is to hold hearings for the purpose of the inquiry.

Background

Australians generate solid waste at a high rate compared with most other OECD countries. Technologies and processes to avoid, reduce and recover waste are generally not used as extensively in Australia as in some other OECD countries. Non-optimal levels of waste represent lost value and opportunities, while imposing undesirable economic and environmental costs on society. The objective of this inquiry is to identify policies that will enable Australia to address market failures and externalities associated with the generation and disposal of waste, including opportunities for resource use efficiency and recovery throughout the product life-cycle (from raw material extraction and processing, to product design, manufacture, use and end of life management).

The inquiry will cover resources associated with solid waste, including: municipal waste (eg household collections, electrical and consumer items,) commercial and industrial waste, and, construction and demolition wastes. It will not cover wastes that exhibit hazardous characteristics and pose an immediate and unacceptable risk of harm to human beings or the environment.

Scope of the Inquiry

In undertaking this inquiry, the Commission is to examine ways in which, and make recommendations on how, resource efficiencies can be optimised to improve economic, environmental and social outcomes. This will include an assessment of opportunities throughout the product life cycle to prevent and/or minimise waste generation by promoting resource recovery and resource efficiency.

The Commission is to examine and report on current and potential resource efficiency in Australia, having particular regard to:

1. The economic, environmental and social benefits and costs of optimal approaches for resource recovery and efficiency and waste management, taking into account different waste streams and waste related activities;
2. Institutional, regulatory and other factors which impede optimal resource efficiency and recovery, and optimal approaches to waste management, including barriers to the development of markets for recovered resources;
3. The adequacy of current data on material flows, and relevant economic activity, and how data might be more efficiently collected and used to progress optimal approaches for waste management and resource efficiency and recovery;
4. The impact of international trade and trade agreements on the level and disposal of waste in Australia; and
5. Strategies that could be adopted by government and industry to encourage optimal resource efficiency and recovery.

The Commission is also requested to report on: the effectiveness of performance indicators to measure efficiency of resource recovery practices; the effect of government and commercial procurement practices on optimal resource recovery; and the impacts of government support to production and recovery industries.

In undertaking the inquiry, the Commission is to advertise nationally inviting submissions, hold public hearings, consult with relevant Australian Government, State and Territory agencies, local government and other key interest groups and affected parties.

The Commission is to provide both a draft and a final report. The Government will consider the Commission's recommendations and its response will be announced as soon as possible after the receipt of the Commission's report.

PETER COSTELLO

20 October 2005

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Abbreviations and explanations

Abbreviations

ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
ACCI	Australian Chamber of Commerce and Industry
ACOR	Australian Council of Recyclers
ADAA	Ash Development Association of Australia
ADF	Advance disposal fee
AEBN	Australian Environment Business Network
AEEMA	Australian Electrical and Electronic Manufacturers' Association
AELA	Australian Environmental Labelling Association
AFGC	Australian Food and Grocery Council
AGO	Australian Greenhouse Office
AIG	Australian Industry Group
AIIA	Australian Information Industry Association
ALGA	Australian Local Government Association
ANRA	Australian National Retailers Association
ANZECC	Australia and New Zealand Environment and Conservation Council
ARA	Australian Retailers Association
ATIG	Australian Tyre Importers' Group
AWD	Australian Waste Database
AWT	Alternative waste technology

BCA	Business Council of Australia
BIEC	Beverage Industry Environment Council
BRSD	Business Roundtable on Sustainable Development
CDL	Container deposit legislation
CEC	Commission of the European Communities
CESA	Consumer Electronic Suppliers Association
C&D	Construction and demolition
C&I	Commercial and industrial
COAG	Council of Australian Governments
CRT	Cathode-ray tube
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry (Australian Government)
DAIS	Department of Administrative and Information Services (South Australia)
DEC	Department of Environment and Conservation (New South Wales)
DEFRA	Department for Environment, Food and Rural Affairs (United Kingdom)
DEH	Department of the Environment and Heritage (Australian Government)
DEST	Department of the Environment, Sport and Territories (Australian Government)
DITR	Department of Industry, Tourism and Resources (Australian Government)
DOFA	Department of Finance and Administration (Australian Government)
DPIWE	Department of Primary Industries, Water and Environment (Tasmania)
DSD	Duales System Deutschland
DSE	Department of Sustainability and Environment (Victoria)

DUAP	Department of Urban Affairs and Planning (New South Wales)
DWLBC	Department of Water, Land and Biodiversity Conservation (SA)
EPA NSW	Environment Protection Authority, New South Wales
EPA NT	Environment Protection Agency, Northern Territory
EPA Queensland	Environmental Protection Agency, Queensland
EPA SA	Environment Protection Authority, South Australia
EPA Victoria	Environment Protection Authority, Victoria
EPHC	Environment Protection and Heritage Council
EPR	Extended producer responsibility
EU	European Union
FCAI	Federal Chamber of Automotive Industries
FSANZ	Food Standards Australian and New Zealand
HDPE	High density polyethylene
HIA	Housing Industry Association
IC	Industry Commission
KPI	Key performance indicator
LCA	Life cycle assessment
LDPE	Low density polyethylene
MBA	Master Builders Australia
MBT	Mechanical biological treatment
MGB	Mobile garbage bin
MRF	Material recovery facility
MSW	Municipal solid waste
MWAC	Municipal Waste Advisory Council (Western Australia)
NARGA	National Association of Retail Grocers of Australia
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NIMBY	Not in my backyard
NIOSH	National Institute for Occupational Safety and Health

NKRS	National Kerbside Recycling Strategy
NPC	National Packaging Covenant
NPCC	National Packaging Covenant Council
NPCIA	National Packaging Covenant Industry Association
NPI	National Pollutant Inventory
NSESD	National Strategy for Ecologically Sustainable Development
NSW DLG	NSW Department of Local Government
NWMRS	National Waste Minimisation and Recycling Strategy
OECD	Organisation for Economic Cooperation and Development
OH&S	Occupational Health and Safety
ORR	Office of Regulation Review
PACIA	Plastics and Chemicals Industry Association
PAEC	Public Accounts and Estimates Committee (Victoria)
PC	Productivity Commission
PCA	Packaging Council of Australia
PET	Polyethylene terephthalate
PNEB	Publishers National Environment Bureau
PRO	Producer responsibility organisation
PS	Product stewardship
PSA	Product Stewardship Australia
PSO	Product Stewardship for Oil
PVC	Polyvinyl chloride
RIS	Regulation impact statement
UR-3R	Urban Resource – Reduction, Recovery and Recycling
WCRA	Waste Contractors and Recyclers Association of New South Wales
WMAA	Waste Management Association of Australia
WMAA NTCOR	Waste Management Association of Australia, National Technical Committee for Organics Recycling
WMB	Waste Management Board (Western Australia)
WSN	Waste Services New South Wales

WTO	World Trade Organisation
WWF	Worldwide Fund for Nature (also known as World Wildlife Fund)

Explanations

Billion	The convention used for a billion is a thousand million (10^9).
Findings	*Findings in the body of the report are paragraphs highlighted using italics, as this is.*
Recommendations	***Recommendations in the body of the report are highlighted using bold italics, as this is.***

Glossary

Alternative waste technology (AWT)	Any technology that is applied to mixed waste other than traditional methods such as disposal to landfill. AWT facilities typically recover some dry recyclables and treat organic waste by fermentation or other process.
Aquifer	A body of permeable rock that is capable of storing quantities of water.
Biogas	A combustible gas derived from the anaerobic decomposition of biological material.
Comingled recyclables	A mix of different types of recyclables that are separated from mixed waste and placed in a single container for collection.
Composting	Biological decomposition of solid organic materials by micro organisms.
Disposal	Any method of dealing with waste that permanently removes it from human contact. This includes landfilling and thermal treatment.
Dry recyclables	Recyclables other than food waste, organic waste from gardens and other wet material. Includes plastics, metal, glass and paper.
Extended producer responsibility (EPR)	An environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle. There are two related features of EPR policy: (1) the shifting of responsibility (physically and/or economically; fully or partially) upstream toward the producer and away from municipalities; and (2) to provide incentives to producers to incorporate environmental considerations in the design of their products.

Final cover	The final layer of material used to cover a landfill site after it has ceased receiving waste.
Fly ash	Fine airborne particulates carried out of an incinerator, boiler, or furnace in the flue gas after the combustion of solid fuel, for example coal, and expelled as noncombustible airborne emissions or captured by some means before it reaches the mouth of the chimney.
Gasification	Exposing waste to temperatures over 800 degrees Celsius in an oxygen-restricted environment. The waste breaks down to gases that are used as a fuel source.
Groundwater	Water naturally stored underground in aquifers, or that flows through and saturates soil and rock, supplying springs and wells.
Illegal disposal	Littering or illegal dumping.
Illegal dumping	Deliberate dumping of waste in an illegal manner. Usually involves relatively large quantities of waste (compared to litter).
Incineration	A treatment technology involving destruction of waste by controlled burning at high temperatures.
Landfill	A designated area (usually a pit) into which solid waste is placed for permanent burial.
Landfill liner	Impermeable layers of heavy plastic, clay and/or gravel that protect against groundwater contamination through downward or lateral escape of leachate.
Leachate	Liquid that has passed through solid waste, and may have become contaminated with metallic, organic and inorganic compounds and toxins.
Litter	Waste that is improperly disposed of outside of the regular disposal system.
Materials recovery facility	Facility that separates mixed dry recyclables into individual materials to be made available for further processing.

Product stewardship	An approach which recognises shared responsibility for the environmental impacts of a product throughout its full life cycle, including end of life management, and seeks to reduce adverse impacts and internalise unavoidable costs within the product price, through action at the point(s) in the supply chain where this can be most effectively and efficiently achieved.
Putrescrible waste	Waste that readily decomposes. Includes food waste and organic waste from gardens.
Pyrolysis	Exposing waste to temperatures over 800 degrees Celsius in the absence of oxygen. The waste breaks down to gases that are used as a fuel source.
Recycling	The recovery of used products and their use as raw materials in the manufacture of new products, which may or may not be similar to the original.
Resource efficiency	Value added per unit of resource input.
Resource recovery	The process of extracting a material or energy from a waste stream. It includes reuse (using the product for the same or different purpose without further manufacture), recycling and the recovery of energy from waste.
Shredder floc	Mainly non-metallic material that is left over from the metal shredding process that is applied to end-of-life vehicles, white goods and some appliances.
Virgin materials	Any basic materials for industrial processing that have not been previously used.
Waste	Anything that is no longer privately valued by its owner for use or sale and which is, or will be, discarded.
Waste management	Management of the collection, recovery and disposal of wastes, including options for waste reduction.

OVERVIEW

Key points

- State and territory waste management policies contain some inappropriate and inconsistent objectives. These have led to some jurisdictions adopting unrealistic, and potentially very costly, waste minimisation targets.
- These policies are giving rise to some unsound interventions including:
  - using landfill levies to achieve waste diversion targets and raise revenue;
  - subsidising waste recovery options, such as alternative waste technologies, that are costly and have questionable environmental benefits; and
  - introducing mandatory product stewardship or extended producer responsibility schemes, where disposal problems have not been adequately demonstrated.
- Waste management policy should be refocused on the environmental and social impacts of waste collection and disposal, and supported by more rigorous cost–benefit analysis, if it is to best serve the community.
- As a general rule, policy makers should not use waste management policies to address upstream environmental impacts. Where warranted, these are much more effectively and efficiently addressed using direct policy instruments, and often already are.
- Directly addressing relevant market failures and distortions throughout product life cycles will assist markets to achieve the right balance between waste avoidance, resource recovery and disposal.
- Regulation of disposal has improved considerably in recent years, and where complied with, appears to have been very effective. However, compliance with landfill regulations could be improved considerably.
- Waste disposal fees should be based on the full social, environmental and financial costs involved. For landfills, this will require:
  - tightening regulatory compliance so that landfill gate fees include the costs of the regulatory measures needed to address disposal externalities; but
  - abolishing landfill levies (taxes) as these are not based on legitimate costs.
- Basic forms of pay-as-you-throw pricing for kerbside waste and recycling services, should be more widely adopted, with information on the actual costs for these services better communicated to households.
- In most large urban centres, for reasons of scale and planning (as with sewage and electricity), managing waste disposal is no longer best handled by local governments.
- The Australian Government should play a leadership role in facilitating (relevant) reforms, and where appropriate, developing sound, nationally consistent waste management policies.

Overview

The amount of waste we generate, and its actual or potential impacts on the environment, have long been matters of concern to governments and the community generally. In recent times, increasing emphasis has been given to resource recovery — including reusing, recycling and extracting energy from waste. Ambitious targets are being set, and more advanced (but more costly) approaches to recovering waste are being promoted.

Against this backdrop, the Australian Government asked the Productivity Commission to undertake an inquiry into waste generation and resource efficiency. The focus has been on solid, non-hazardous wastes including: municipal waste; commercial and industrial waste; and construction and demolition waste.

The terms of reference are broad, but in essence ask the Commission to advise on strategies to address market failures associated with the generation and disposal of waste. In this context, market failure includes, but is not necessarily limited to, externalities. Externalities are the unintended costs and benefits of an activity that are experienced by people or organisations other than those directly involved in that activity. For example, a landfill may leak, causing damage (a negative externality) to a valued environment.

The Commission's charter and the terms of reference require that a communitywide approach be taken that considers all of the financial, environmental and social costs and benefits of different strategies (box 1). This approach necessarily challenges notions of waste being inherently bad and recycling being inherently good. Policies that minimise waste are not costless and more recycling is not always a better thing. As we try to recycle more and more waste, diminishing returns set in, costs rise, and the potential for perverse environmental outcomes increases.

For example, it might be possible to collect and recycle virtually all glass containers used in Australia. But after taking into account all of the costs and benefits — financial, social and environmental — this will simply not be justifiable for all locations and circumstances.

The question policy makers must then answer is whether the community has reached a suitable balance between waste avoidance, resource recovery and waste disposal, and if not, what governments might usefully do to redress the imbalance.

Box 1 **Waste policy should maximise net community benefits not resource efficiency**

The Commission's approach to this inquiry has been guided by the terms of reference and its charter as set out in the *Productivity Commission Act 1998*. These require that all costs and benefits of different policy options for addressing market failures be considered, and that government intervention be considered only if it produces net benefits to the community.

Another way of putting this is to say that government intervention should aim to assist markets to maximise the returns from using *all* resources — land, raw materials, energy, labour and capital. This requires that no other combination of resource use could lead to a higher level of community wellbeing. This approach recognises that scarce resources have alternative valuable uses, and may yield greater returns to the community in other areas, such as education, health or other environmental projects.

Environmental and social issues can be brought into this framework by giving appropriate recognition to relevant externalities. For example, the costs of disposing of waste to landfill include the owner's costs of operating the landfill (a private financial cost). But they might also include environmental costs (such as possible impacts on the community from any contamination of groundwater), and social costs (such as loss of amenity for people living nearby during the operational phase of the landfill). The private (nonfinancial) costs and benefits that people might experience through participating in recycling activities should also be considered.

All of these costs and benefits should be brought together in a social cost–benefit framework, and quantified wherever possible. This will assist decision makers to identify the policy option that maximises net benefit to the community, including impacts on the environment.

An alternative approach that many people have been promoting is that waste policy should maximise resource efficiency. Resource efficiency is used in the terms of reference and is often interpreted as maximising the returns from using one or more natural resources (raw materials and energy). For the economy as a whole, it is sometimes expressed in terms of gross domestic product per unit of natural resource input.

This concept has intuitive appeal — maintaining living standards while decreasing our call on natural resources would surely be a good thing. But resource efficiency has some major limitations as a practical policy tool. The most substantial of these is that it only focuses on part of the picture, the natural resource or resources in question. Maximising the return to these inputs without any regard to the amount of other inputs, such as labour or capital (or indeed other natural resources that might be left out of the initial consideration), will not give the best returns to the community. This is why the net benefit from all resources is a better measure of the return to the community generally, and why policy should focus on maximising net community benefits, not resource efficiency.

What is waste and how much do we produce?

Waste can be defined as any product or substance that has no further use or value for the person or organisation that owns it, and which is, or will be, discarded. But what is discarded by one party may have value for another. Thus, a broad approach to defining ‘waste’ can include products that are recoverable by others.

In 2002-03, Australia generated approximately 32.4 million tonnes of solid waste. Approximately 27 per cent of this came from municipal sources, 29 per cent from the commercial and industrial sector, and 42 per cent from the construction and demolition sector. Waste recovered for recycling in 2002-03 was approximately 15 million tonnes, almost half of the total generated in that year.

The wide variety of wastes covered, the varying composition of waste streams, and the different environmental impacts of different types of wastes, add a layer of complexity to the policy issues. A tonne of broken clay bricks has quite different impacts on the environment to a tonne of putrescible household waste. To adapt an old catchcry — ‘wastes ain’t wastes’.

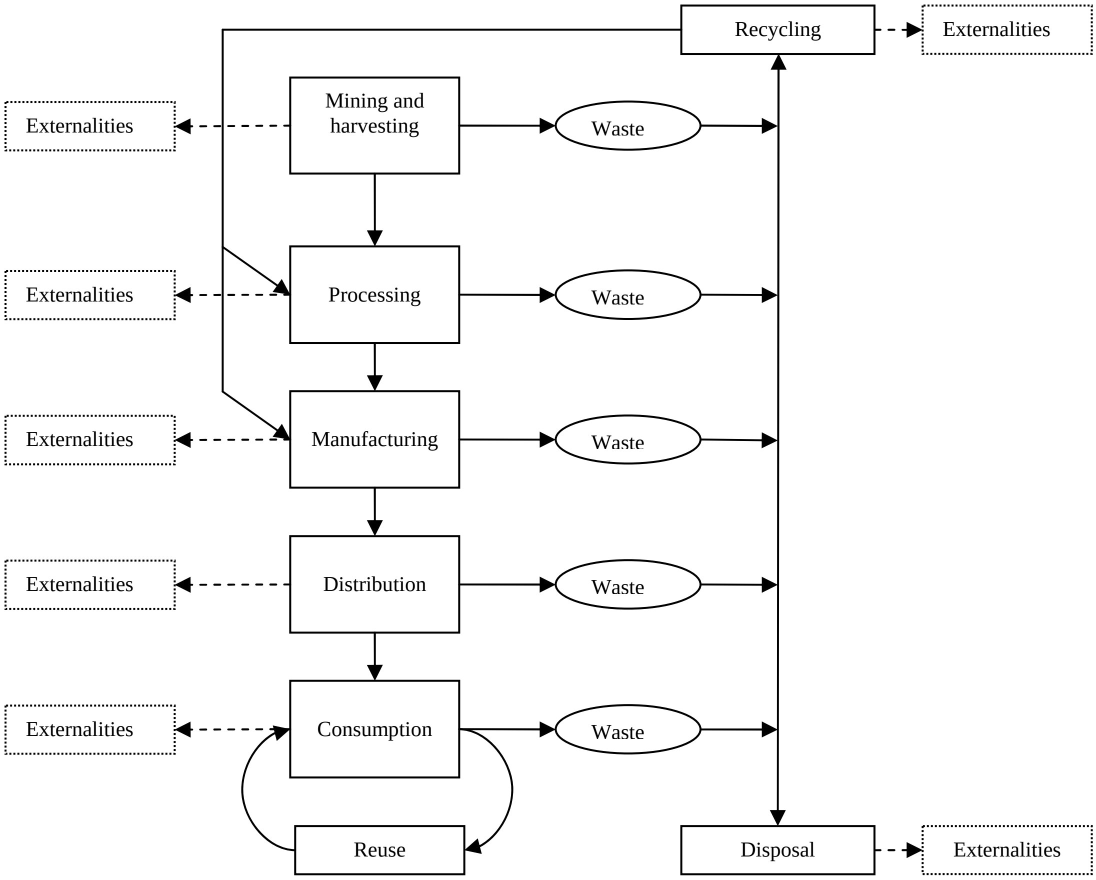
How big a problem is waste?

Waste is perceived to be a problem for many reasons, but the three reasons most often cited are that: waste disposal can harm the environment and human health; space for landfills is claimed to be becoming scarce; and waste is the end product of a life cycle process that can have upstream environmental and resource depletion implications (figure 1). Some people also take an essentially moral view of waste generation, arguing that it is symptomatic of wasteful and undesirable overconsumption.

Unintended environmental and social costs of waste disposal

The main method of waste disposal in Australia is landfill. This can cause environmental and social externalities through leachate discharges, gaseous emissions, loss of visual amenity, foul odours, and harbouring of disease-carrying pests. The main alternative is incineration, which if not properly controlled, can produce toxic emissions. Other externalities arise through illegal dumping and littering.

Figure 1 **Disposal and recycling in the product life cycle**



This diagram is a simplified representation of what can happen in a product's life cycle, from the time natural resources are mined (in the case of nonrenewable resources) or harvested (in the case of renewable resources), through the stages of processing, manufacturing, distribution (including wholesaling and retailing activities) to where it is consumed. Waste can be generated at all points in the life cycle, not just in the post-consumer phase. It can be either disposed or recovered in some way (represented here as recycling).

The diagram also shows that environmental and other externalities can occur at each stage in a product's life cycle. From a waste management perspective, downstream externalities are those that might arise from disposal or recycling (including the waste collection and transport associated with these activities). Upstream externalities occur prior to the point at which waste is generated. For example, the 'externalities' boxes on the left hand side of the diagram indicate the externalities that might occur upstream of, or prior to, final consumption.

It is difficult to generalise about the extent of the externalities associated with landfills. Some pollutants can be persistent and have the potential to be harmful if they escape. But not all wastes cause problems in disposal. Most construction and demolition waste is relatively inert, and hence does not give rise to many emissions. What is clear is that the environmental impacts of modern landfills (that is, those that are properly located, engineered and managed) are much lower than old landfills.

The Commission has reviewed the available estimates and considers that, where such modern landfills include gas capture and electricity generation, the externalities are likely to be no more than $5 per tonne of waste. Without gas capture, the external costs could be up to $24 per tonne for wastes with high levels of organic content, due mainly to the costs of greenhouse gas emissions. Inert wastes appear to produce negligible externalities in landfill.

Availability of landfill space

It is sometimes argued that Australia is running out of suitable space to use as landfills, and hence landfilling is an unsustainable practice. Typically, landfills have used old quarry or mine sites in or near urban areas. Generally speaking, Australia is creating new holes faster than we are filling old holes with waste. But it is where those holes are located, and their geological suitability for landfills, that are the crucial issues. Overlaying this are the concerns of many people about having a landfill in their ‘backyard’.

The Commission considers that these issues are not insurmountable and can be addressed for the most part through the market and appropriate planning frameworks. To the extent that landfill space near an urban area becomes scarce, rising gate fees will make it financially worthwhile to transport the waste further afield, thus opening up possibilities for new landfills, and encouraging more recycling.

Upstream issues

Avoiding waste, or increasing the amount of waste recovered, can have environmental impacts in the product life cycle upstream from where it is created (figure 1). These can be grouped into two main categories: environmental externalities avoided, and sustainability issues. Externalities associated with the harvesting of renewable resources, and the extraction of minerals, can include greenhouse gas emissions, water and air pollution, landscape degradation, and loss of biodiversity. Sustainability concerns include the equity considerations of consuming resources today that might not be available for future generations (box 2), and managing resource depletion.

Box 2 **Ecologically sustainable development policy considerations**

Sustainable development is generally interpreted as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development, 1987, p. 43). Similar approaches have been adopted in Australia. In 1992, Australian governments endorsed the National Strategy for Ecologically Sustainable Development, an objective of which is to enhance individual and community wellbeing by following a path of economic development that safeguards the welfare of future generations.

The issue of sustainability is complicated by the diversity of things we pass on to future generations. These include:

- *human capital* — knowledge and understanding;
- *man made capital* — economic and social infrastructure; and
- *natural capital* — biodiversity, renewable and nonrenewable resources and ecological integrity.

Additions to, or conservation of, any of these types of capital are likely to contribute to sustainability (or at least improve the endowment we pass on to future generations). To some extent it might be possible to substitute one type of capital for another. Thus, sustainability might be achieved even where some nonrenewable resources become heavily depleted. However, some natural resources, such as clean air and water, are not readily substitutable.

Apart from these essential resources, we do not know with any precision what the resource needs of future generations will be, so it is difficult to know what needs to be conserved. Further complicating this issue, it is likely that technological change will mean that we will be able to do more with less, and we might be able to switch our dependence on some non-renewable resources to other non-renewable, or renewable resources. And as known reserves become scarce, prices will rise, stimulating exploration and development of new reserves, greater recycling, conservation through greater efficiency of use, and the development of substitutes (where this is possible). Besides, the economically-recoverable amount of the sorts of natural resources typically recovered for recycling — such as iron, aluminium, copper, and silica — has tended to increase over time, not diminish.

Further issues arise in considering who should be asked to make sacrifices for the welfare of future generations: the more advanced economies that currently account for a high proportion of resource consumption, or the less developed economies for whom economic growth is a means of lifting current standards of living from much lower levels.

To the extent that there is a case for intervention, such upstream issues are best addressed as directly as possible, not through waste management policy. Using waste management policy to address these issues is likely to be inefficient and ineffective. For example, the kerbside recycling of steel cans might lead to a small decrease in the domestic demand for steel (and hence iron ore), and less environmental externalities from mining and processing. But it is likely to be far less effective than applying direct policy instruments to address particular upstream problems. This is especially the case where the problems are specific to particular mine sites or practices. In addition, any benefits from curbing domestic consumption would be illusory if the iron ore conserved were redirected to exports, as is likely for a major minerals exporter such as Australia.

Taking indirect action through waste management policy also presumes that direct actions are not being taken, or that the upstream externalities that have not been addressed are substantial. Yet with the exception of a comprehensive response to greenhouse gas abatement, a host of existing policies already address directly most known upstream externalities occurring in Australia. If greenhouse gas abatement is the major unresolved issue, and resource recovery reduces greenhouse gas emissions, some cautious downstream intervention — such as subsidies for kerbside recycling — might be justifiable. However, government intervention to address climate change would be more effectively and efficiently achieved through a comprehensive national approach. Once this were done, any downstream interventions predicated on greenhouse gas benefits would need to be re-examined and, where relevant, removed.

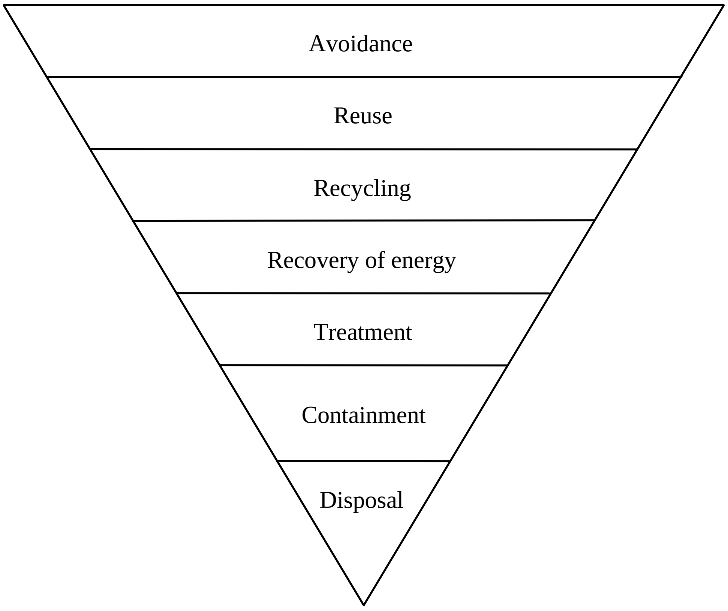
The rate at which we deplete nonrenewable resources is a concern to many people. Yet increasing scarcity will induce rises in prices that dampen demand and encourage exploration for new supplies and substitution to other materials. It also makes recycling more attractive. Such dynamic responses mean extraction rates for nonrenewable resources should be left largely to markets to determine, provided all relevant market failures and distortions have been addressed. The Commission considers that waste policies are unlikely to be an effective way of addressing ‘resource scarcity’ issues.

The Commission is not recommending that market failures further upstream in the product life cycle should be ignored. Quite the contrary — direct intervention at various points throughout the product life cycle should be continued and where necessary supplemented by additional measures. This would help ensure that product prices reflect all relevant costs. Complemented by awareness raising campaigns that help consumers make more informed choices, this will also help address concerns about over-consumption.

Targets and the waste hierarchy

Many State and Territory Governments have developed waste management strategies based around the concept of the waste hierarchy (figure 2). Under this approach, waste avoidance is argued to be preferable to reuse, reuse to recycling, and so on. Disposal is seen to be the least desirable option. In compliance with this approach, many jurisdictions have set targets for diverting waste, some going so far as to aim for zero waste to landfill. This approach is inconsistent with good policy principles.

Figure 2 **A waste management hierarchy**



Source: Victorian Government (2005).

Although target setting may be a useful way of improving performance where targets relate to sound policy objectives, have been rigorously set, and clear lines of accountability can be established, these conditions are inherently difficult to achieve with respect to waste diversion. In practice, waste diversion targets have tended to be set using technical and other criteria that are highly unlikely to maximise net benefits to the community. A better approach would be to address all relevant market failures and allow the market to establish the most appropriate balance between disposal and resource recovery.

Similarly, waste management options should not be dictated by the simple priorities suggested by the waste hierarchy. High order options in the hierarchy may not necessarily be better than lower order options, once all of the costs and benefits to the community have been considered. Policy makers and regulators might profess to use the waste hierarchy as a broad framework, but in practice it appears to have had an inordinate influence on waste management policy.

Some jurisdictions have been (directly and indirectly) subsidising the installation of alternative waste technology facilities (for municipal waste) as a means of achieving their targets, despite the dubious net environmental benefits of such facilities. Waste management policy should aim to achieve the best possible outcomes for the community, not prescribe one technical solution at the expense of others. Yet jurisdictions' adherence to the waste hierarchy and waste diversion targets can favour policy options that have higher net costs to the community than other alternatives.

Choosing good policy instruments

A variety of policy instruments have been used in different jurisdictions, with varying degrees of success. These include regulation, pricing measures (including landfill levies), and extended producer responsibility or product stewardship schemes.

Regulation of disposal has tightened considerably

The regulation of landfills has tightened considerably in recent times (though more could be done to enforce existing standards). While landfill operators have some freedom to design their landfills to most efficiently meet licensing requirements, jurisdictions often also prescribe certain features drawn from 'best practice' guidelines. Prescription has the advantages of clarity and certainty, but it can stifle innovation and impose additional costs. It would be more appropriate to consider landfill proposals on how they would reduce the risk of adverse outcomes to acceptable levels, rather than require particular features. Furthermore, it is crucial that regulatory solutions are tailored to match the circumstances of particular landfills, and that they only address the externalities produced by the landfill, not upstream issues.

Currently, some environmental regulators require that landfills install gas capture systems. These systems can have many benefits, including reducing greenhouse gas emissions, the risks of fires and explosions, and unpleasant odours. While landfill gas capture might prove to be one of the more cost-effective greenhouse gas abatement options, this would best be judged within the framework of a comprehensive national greenhouse response. Regulatory requirements to install such systems should be reviewed, whenever this occurs.

Given that most externalities emanating from modern, fully-complying landfills seem to have reached acceptably low levels, any further tightening of the regulations would need to be carefully evaluated.

The other main alternative for disposing of some wastes — incineration — is also tightly regulated, and in some Australian jurisdictions effectively banned altogether. Although capital intensive, incineration can be combined with energy recovery facilities and appropriate flue gas treatment to provide an environmentally acceptable alternative to landfill. In Europe, where incineration is common, regulations require the use of technologies that have effectively eliminated damaging levels of pollution. Lifting the effective bans on the use of incineration of certain wastes in Australia, while insisting on appropriate performance standards, would appear to be long overdue.

Other waste management regulation is designed to limit processes, and sometimes products themselves. Foreshadowed regulation to reduce the use of plastic shopping bags is one example. Governments should ensure that any such regulation is likely to deliver a greater net benefit to the community — including impacts on the environment — than other policy options. But, based on evidence available to the Commission, the case for proceeding with the phase out of plastic bags appears particularly weak. A more cost-effective approach to addressing the underlying issues of concern would be to target plastic-bag litter directly.

Getting prices right will help

If the prices for waste disposal, virgin materials, and manufactured goods reflected the full costs involved — including environmental and social externalities — markets would be the best way of determining the appropriate mix of resource recovery and disposal. Where these externalities have been addressed through regulation or market-based instruments, costs would already be internalised in the prices of goods and services (including landfill gate fees). Such pricing would also allow consumers' willingness to pay for recycling and waste services to be gauged directly. But further refinement of waste disposal price signals is not straightforward.

Varying charges according to the amount of waste can be difficult

Many firms arrange their own waste disposal services and pay according to how much they generate. In contrast, most households are charged a flat annual fee and, therefore, have no incentive to reduce the amount of waste they dispose (until they have filled their bin). This may exacerbate the extent of any downstream disposal externalities.

Some local governments have introduced a modest degree of variability into their charging arrangements. The most simple of these involves an additional fee for the use of a larger than standard bin. Broader adoption of these pay-as-you-throw approaches is warranted, where this is cost effective. More explicit cost-based charging arrangements for kerbside recycling would also be appropriate.

Cost recovery has not been fully implemented

Cost recovery means setting disposal fees to cover the financial, environmental and social costs. However, this depends on levels of compliance, which for some landfills are relatively poor. State and Territory Governments should do more to ensure that all landfills comply with appropriate environmental licence conditions, and that government-owned landfills adopt sound charging policies. This would also promote competitive neutrality between government and private sector providers.

Landfill levies

Most Australian jurisdictions impose a levy on waste disposed to landfill, which users must pay in addition to gate fees. In some cases, levies vary according to the type of waste and location. The primary purpose of levies now seems to be to discourage waste being sent to landfill, and thus to support the achievement of waste diversion targets. Levies are also used in some cases for raising revenue, with some or all of the revenue hypothecated (earmarked) for environmental projects.

Levies might encourage waste diversion from landfills and achievement of targets, but unless based on the environmental and social externalities of the landfill, will send the wrong price signals to users. Their use as revenue raising devices is not supported, nor is hypothecation to particular expenditure programs. Hypothecation introduces rigidities into public sector financing and is rarely warranted.

Basing levies on the environmental and social externalities of the landfill would be very difficult to achieve in practice. Externalities vary according to location, the type of waste and how the landfill is constructed and managed. Varying the levy to account for these differences with any precision is virtually impossible, and would also encourage evasion by waste disposers to gain the cheapest disposal option. The practical response might be to average the levies across all landfills (or a class of landfills), but this would give no incentive to improve landfill practices. To the extent that regulation and other policies already address externalities, levies duplicate existing costs. No matter how they are set, landfill levies increase the incentive to illegally dump waste — a serious problem in some locations.

On balance, the Commission does not favour the use of landfill levies, but rather regulation that reduces externalities to acceptable levels, and better enforcement. In this way, gate fees can internalise the environmental and external costs that would otherwise occur, and hence provide appropriate price signals to landfill users.

Kerbside recycling

Kerbside recycling is undoubtedly valued by many households, yet it almost invariably increases the financial costs of waste management. A substantial environmental return would often be necessary if it were to achieve net benefits for the community.

The support for kerbside recycling, and resource recovery generally, stems in part from the alleged upstream benefits. But while some upstream issues warrant intervention, these would be more effective and efficient if undertaken directly, not through waste management policy. Furthermore, some commonly quoted assessments of the upstream benefits of kerbside recycling are, in the Commission's view, greatly exaggerated.

Care also needs to be taken in the design and application of kerbside recycling if it is to achieve the best returns to the community. Taking a harder nosed approach to restricting the items collected might be appropriate. For example, glass is a marginal proposition in comingled collection systems, due to a combination of its relatively low value, its high sorting costs, its inertness in landfill and its contaminating influence on other recyclables. In some locations, far from markets and processing opportunities, undertaking any kerbside recycling is probably not worthwhile, even after accounting for all of the environmental benefits.

Household support for kerbside recycling needs to be tested through more explicit cost-based charges, and informed through better education and awareness raising.

Extended producer responsibility and product stewardship schemes

As noted earlier, policy makers have increasingly turned to approaches that target producers, or distributors, of products that are deemed to be problematic for one reason or another. These are called extended producer responsibility (EPR) or product stewardship (PS) schemes.

EPR and PS schemes (which generally require producers to take more responsibility for end-of-life disposal or recovery) can include a variety of policy instruments, such as take-back schemes, advance disposal fees, deposit refunds, and awareness raising. Typically, EPR and PS schemes involve separating the target product from the waste stream it is found in (for example, mobile phones in municipal solid waste), and using dedicated means for its disposal or recovery. To fund this, levies are often used.

Some EPR and PS schemes operate on a voluntary basis, but increasingly they are being implemented through co-regulation. In this model, industry is charged with the task of developing a ‘self-regulatory’ scheme, and the Australian, State and Territory Governments back this with regulation that picks up free riders, effectively making participation mandatory. The Australian Government and relevant industry groups have been keen to ensure that policy develops on a more coordinated basis where national issues are at stake.

A number of schemes already exist or are in the pipeline. One of the most notable is the National Packaging Covenant (NPC). Others include an existing waste oil scheme and foreshadowed schemes for televisions and tyres. Like the NPC, it is understood that these new schemes will be introduced via a National Environment Protection Measure, and implemented by the jurisdictions through regulations.

The proliferation of EPR and PS schemes is a concern, because, among other things:

- there is little evidence to suggest that the problems to which many of these schemes are being directed are sufficient to justify the costs of intervention;
- they are vulnerable to the influence of vested interests; and
- financial incentives in some schemes appear to be based on the waste hierarchy, not net benefits to the community.

Further mandatory schemes should only be introduced where a net benefit to the community can be demonstrated and other policy options would not deliver a greater net benefit. These conditions are unlikely to be satisfied unless:

- there are considerable benefits to the community from avoiding the product’s inappropriate disposal, possibly because it is hazardous;
- the parties that need to be targeted to make the requirements effective can be readily identified and held accountable; and
- compliance can be readily monitored and enforced.

The effectiveness of the NPC will be reviewed in 2008, with some parties already calling for it to be substantially strengthened and/or extended. The Commission considers that the nature of this review should be changed to focus on the costs and benefits of various options, including not continuing with the NPC.

To ensure future schemes have a sound basis, the Commission recommends two reforms. First, policy objectives should be reformulated to focus on reducing risks — to human health, the environment and social amenity — from waste to acceptable levels. Waste avoidance and resource recovery may be outcomes of achieving this objective, but they are not objectives justifying government intervention in their own right. Second, there should be a requirement that, before intervening, governments consider the findings of an independent review of a product's alleged adverse impacts. The review should define exactly what the problem is, attempt to quantify its magnitude, and describe what actions might address the problem. It should also make a preliminary assessment of the likely costs and benefits of intervention.

As part of good regulatory practice, the effectiveness and efficiency of all existing schemes should be reviewed as a matter of course.

The role of local government is changing

The role of local government in waste management is changing, particularly in large urban areas. Technical, regulatory and policy developments mean that waste management and recycling facilities are becoming bigger and more sophisticated. These developments are exacerbating planning and operational issues for all but some of the larger local governments.

Local governments in urban areas are increasingly forming partnerships to jointly negotiate with suppliers of waste services, but this is not without its problems. Not the least of these is that it does nothing to resolve the tensions between local governments over where such facilities should be located. In some states, regional approaches have been adopted, but if these do not have appropriate expertise or capital backing, and are unable to address the 'not-in-my-backyard' reactions to planning issues, they can prove little more effective. To address these issues, State and Territory Governments should consider:

- declaring major waste and resource recovery facilities to be projects of state or regional significance, where this is not already the case; and
- passing the responsibilities for waste disposal to appropriately-constituted regional waste authorities, particularly in those larger urban centres where the majority of local governments do not have the scale or resources to efficiently and effectively handle such roles.

Some regulations impede resource recovery

Inconsistencies in the regulatory requirements of the states and territories are creating problems for industry and discouraging resource recovery. In particular, differences in definitions, waste classification systems and exemption processes mean that some materials are being more heavily regulated in some jurisdictions than others. Greater coordination of classification and exemption systems, and less reliance on prescriptive definitions is required.

Another impediment is that some product standards and government purchasing practices continue to favour the use of virgin over recycled products. Some jurisdictions have made welcome improvements to product standards, adopting a performance-based approach. But old habits die hard, and many participants argued there was still room for improvement.

Role for the Australian Government

While states and territories hold most of the policy levers in waste management, the Australian Government has significant coordinating and leadership roles to play. It also has the crucial power to levy indirect taxes — a virtual necessity in implementing most mandatory EPR and PS schemes. The Commission considers that the Australian Government could play a more significant role by:

- supporting research into the significant externalities caused by waste disposal;
- playing a leadership role in the development of EPR and PS schemes by insisting on clear objectives, and that thorough identification of the problem precedes the development of such schemes;
- ensuring rigorous adherence to its regulatory impact assessment guidelines (and encouraging states and territories to do likewise);
- working with states and territories to develop and implement consistent waste classification systems and databases;
- refining information, education and awareness programs to help ensure the community is well informed about the costs and benefits of waste management options, particularly with respect to issues of community concern and misunderstanding (such as energy-from-waste options); and
- ensuring that upstream market failures that concern waste policy makers are reviewed by other relevant ministries, and where appropriate, addressed directly.

Concluding remarks

Waste management policy should primarily be focused on reducing social and environmental risks from waste collection and disposal to acceptable levels. The Commission considers that policy makers have become distracted by the pursuit of other, waste hierarchy inspired, objectives — such as minimising waste and conserving resources — and given insufficient regard to whether their interventions would actually lead to net benefits to the community.

Directly addressing relevant market failures and distortions throughout product life cycles will assist markets to determine the right balance between waste avoidance, resource recovery and disposal. Waste management policy can play its role in this process, but it should not be used to indirectly address upstream environmental and social issues. Many of these impacts may warrant intervention, but these would be (and often already are) much more effectively and efficiently addressed using direct policy instruments.

Unfortunately, much waste management policy in Australia has been initiated with insufficient consideration of all of the likely financial, environmental and social costs and benefits. Waste disposal problems, and community support for the remedies proffered, are too often simply asserted, rather than demonstrated. Many interventions have certainly gone too far. In particular, landfill levies, direct and indirect subsidies for alternative waste technology facilities, and some EPR and PS schemes, are not justified.

The reforms the Commission is proposing will help achieve a more appropriate balance between waste avoidance, resource recovery and disposal by, among other things: requiring a more rigorous approach to identifying environmental problems; tightening regulatory compliance; and reinforcing the roles of prices and awareness raising in assisting the community to make more informed choices (table 1).

As in other areas of environmental policy, the way forward is not always intuitively obvious. But what is clear is that simple rules such as ‘recycling is good, more is better’, are no substitute for sound policy-making procedures. Policy makers and community attitudes need to be guided by open and rigorous analysis of costs, benefits and risks, if waste management policy is to best serve the community.

Table 1 **Summary of main issues and the way forward**

The current situation	*The Commission's preferred approach*	*Main benefits of change*
Landfills can damage the environment (chapters 4, 9 and 12 and appendix B)		
• Regulation has tightened considerably, but tends to be prescriptive. Where regulations are complied with, environmental damage is reduced to low levels.	• Make regulation as performance based as possible and tailored to the circumstances of each landfill.	• Desired level of pollution control achieved at lower cost. • Allow operators maximum flexibility in meeting environmental standards.
• Enforcement of regulations appears variable and lax and some (local-government owned) landfills do not recover their full costs.	• Tighten enforcement of the regulations, thus internalising environmental costs. • Ensure full cost recovery of government-run landfills.	• Less risk of environmental damage. • Full cost pricing (including environmental costs) will promote the right level of recovery.
• Landfilling is discouraged through landfill levies. Levy revenue is often earmarked for environmental projects.	• Remove the levies as regulations are a better way of addressing externalities. • Raise funding for projects through general revenue.	• Inappropriate cost impost on the community removed. • Better assessment of the merits of projects funded.
Waste avoidance and resource recovery can be good for the environment (chapter 4)		
• The upstream benefits of resource recovery vary according to circumstances. Downstream external benefits are small.	• Address upstream sources of externalities directly (for example, require mining operations to meet specified standards) and greenhouse gas abatement nationally.	• Far more effective and efficient responses to upstream environmental issues. • Lower risk of perverse outcomes.
• Maximising resource efficiency (the return to one or more natural resources) is a major determinant of policy. • But, as a partial indicator, resource efficiency fails to consider the returns from using all inputs.	• Policy should be guided by consideration of all inputs and all costs and benefits, whether financial, environmental or social in nature.	• Policies are more likely to maximise the returns to the community generally.
• Resource recovery is promoted through landfill levies, subsidies, state strategies etc.	• Make support for resource recovery as transparent as possible using direct policy instruments.	• Transparent subsidies and charges help householders and others make better choices.
• The waste hierarchy is used to help guide policy and set waste diversion targets.	• Waste policy should be guided by assessments of all costs, benefits and risks.	• Avoids costly measures that do not deliver commensurate environmental benefits.
• Targets have been set for recycling and waste diversion in various jurisdictions.	• Discontinue use of targets as they are difficult to set at an optimal level.	• Full cost pricing will give the right balance between disposal and recovery.
• In line with the hierarchy, waste avoidance is seen as highly desirable.	• Greater adoption of pay-as-you-throw methods for both recycling and disposal.	• Reduction in waste generation commensurate with full costs of collection and disposal.

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Table 1 (continued)

The current situation	*The Commission's preferred approach*	*Main benefits of change*
Community support for recycling should count (chapters 6 and 11)		
• Surveys show high levels of community support for recycling, but less is known about the strength of this support. • Support for recycling does not always extend to a willingness to purchase products with recycled content.	• More direct testing of people's preferences and willingness to pay for recycling. • Governments should provide better information on, and promote debate about, the costs and benefits of recycling and other waste management options.	• Community and policy makers able to make better informed waste management choices.
Waste legislation should reduce risks to acceptable levels (chapters 3, 6 and 7)		
• Some of the objects of existing State and Territory legislation are inappropriate and inconsistent. They include reducing harm to the environment, but also include adherence to the waste hierarchy, using less resources, and avoiding waste.	• Overriding objective should be to reduce risks to human health, the environment and social amenity to acceptable levels. • Waste avoidance and resource recovery are not objects justifying government intervention in their own right.	• Help avoid perverse outcomes, for example, that recycling is maximised irrespective of net environmental benefits. • Reduce net costs to the community.
Extended producer responsibility or product stewardship schemes may be warranted in some circumstances (chapter 10)		
• Governments have urged industries to adopt extended producer responsibility (EPR) or product stewardship (PS) schemes for many products. • There is rarely a thoroughly-researched and clearly-justified case for government intervention.	• Use much clearer, earlier and more rigorous processes for identifying where government intervention is warranted. • Ensure focus is on potential harm to human health, the environment and social amenity. • Give closer consideration to other approaches, including doing nothing.	• EPR and PS schemes are only adopted when there is likely to be a net benefit to the community.
Plastic-bag litter can cause problems (chapter 8)		
• Plastic-bag litter is unsightly and may harm marine wildlife. • Governments plan to phase out plastic shopping bags by the end of 2008.	• Identify the nature, extent and underlying causes of plastic-bag litter. • Evaluate recent plastic-bag reduction efforts. • Examine whether other options — such as tougher anti-litter laws and targeting away-from-home sources of plastic-bag litter — would be more effective.	• Adoption of the most effective and efficient response to the problem of plastic-bag litter.

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Table 1 (continued)

The current situation	*The Commission’s preferred approach*	*Main benefits of change*
Institutional and regulatory factors can impede resource recovery (chapter 12)		
• Classifying materials as waste sometimes impedes opportunities for them to be recovered for recycling.	• Improve exemption processes to help ensure recovery opportunities are not unduly constrained.	• Better recovery of materials, particularly from industrial waste streams.
• Some product specifications favour use of virgin materials.	• Make product specifications performance based wherever possible.	• Better recovery, as materials judged on performance, not origin.
Local governments face considerable challenges in providing waste services (chapter 12)		
• Local governments deliver kerbside collection services. Many also own, or contract for the supply of, resource recovery and disposal services. • Planning, scale and technology issues are requiring regional solutions to waste disposal and resource recovery. In response, different models for regional groupings of councils have emerged.	• In large urban centres, State Governments should investigate moving waste disposal and resource recovery services to appropriately-constituted regional bodies. Collection could still be managed through local government. • Retain existing arrangements in rural areas with technical and other advisory help from State and Territory Governments.	• Better matching of tasks with responsibilities and capabilities. Regional approach to planning commensurate with regional impacts. • Potential for waste services to be delivered at lower cost, due to scale efficiencies in contract management.
Using waste to generate energy can be a useful form of resource recovery (chapters 4 and 8)		
• Energy-from-waste plants (for disposal of municipal solid waste) are not strictly prohibited in Australia, but are out of favour with many policy makers and the community. • Technological developments have provided the potential for flue emissions to be safely controlled. • Such plants are used in many developed countries.	• Modern, well-regulated energy-from-waste facilities, while financially costly, would have minimal net negative environmental externalities where they displaced fossil fuels used in electricity generation. • Cement kilns meeting all relevant environmental standards should not be prevented from using waste as an energy source.	• Better utilisation of wastes that might otherwise be sent to landfill. For example, packaging that is not readily recyclable would provide useful energy recovery with no adverse environmental implications.
Waste data are needed for developing sound policy (chapters 2 and 13)		
• Waste data are inconsistent and incomplete. • The data are influenced by the requirements and regulatory structures of the different jurisdictions. • Past attempts at establishing a national waste database foundered because it was costly and lacked support.	• EPHC should coordinate the development of a nationally-consistent data set for waste management. • Adopting common definitions would be an important first step. • Data should only be collected where there is a clear policy need.	• Enable comparisons of waste management performance across jurisdictions. • Enable each jurisdiction’s waste management performance to be compared against their policy objectives.

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Table 1 (continued)

The current situation	*The Commission's preferred approach*	*Main benefits of change*
Life cycle assessment can be used in estimating costs and benefits (chapter 4 and appendix B)		
• Life cycle assessment (LCA) can be used to identify some of the environmental impacts of production processes, from raw material extraction to final disposal. • Some researchers have used LCA in estimating the costs and benefits of waste management policies. • The costs and benefits thus derived are not adjusted for the risks of environmental damage occurring. Nor do they take into account some upstream policies that address externalities.	• Deficiencies relating to risk adjustment and failure to take upstream policies into account mean LCA must be used cautiously in estimating the costs and benefits of waste policies. • Some of these deficiencies might be able to be overcome (at some cost), but given that waste policy should focus on downstream externalities, this should not be given a high priority. • Where LCA is used, consideration should be given to referring any upstream issues identified to relevant upstream policy makers.	• Prevent highly unreliable estimates of costs and benefits from influencing policy development. • Help to refocus waste policy on the main policy-relevant market failure — downstream externalities.

Findings and recommendations

Waste management in Australia

FINDING 2.1

Australian waste data are collected from a range of sources. Differences in definitions and collection methodologies between data sets, and inherent difficulties in collecting data on waste, mean that the data have substantial gaps and biases.

FINDING 2.2

Comparisons between Australia's waste management outcomes — in terms of waste generation, recycling and disposal — and those of other countries should be made with caution. Differences in the way waste is classified, data are collected, and the economic, environmental and social circumstances of different countries, limit the usefulness of international comparisons.

The costs and benefits of waste

FINDING 4.1

The total external costs of properly-located, engineered and managed landfills that incorporate efficient gas capture (with electricity generation) are likely to be less than $5 per tonne of waste.

FINDING 4.2

Modern, well-regulated energy-from-waste facilities, while financially costly, can have minimal net negative environmental externalities, particularly where they displace fossil fuels used in electricity generation.

FINDING 4.3

Taking into account all private and external costs and benefits, properly-located, engineered and managed landfills incorporating gas capture and electricity generation, are likely to be much less costly than 'alternative waste technology' plants or dedicated energy-from-waste facilities, in most, if not all, circumstances.

FINDING 4.4

The financial costs of current kerbside recycling systems exceed the financial benefits. This is particularly the case where the cost of landfill is low. The case for kerbside recycling partly rests on its ability to deliver upstream external benefits, which are highly variable, and/or on the community's willingness to pay for recycling services. Technological progress and changes to the design of recycling systems may reduce the net financial costs of kerbside recycling.

The case for government intervention

FINDING 5.1

Upstream environmental externalities associated with waste are most appropriately addressed through directly-targeted policies. Waste policy should only be used to address upstream issues where more direct policies are not able to be used, and there are reasonable prospects that it would be both effective and produce net benefits to the community. These circumstances are likely to be the exception rather than the norm.

FINDING 5.2

The environmental impacts of resource extraction, processing and manufacturing, raise more significant sustainability concerns than the depletion of material resources. However, waste management policies are an indirect, imprecise and generally ineffective means of addressing these issues. Direct policy intervention is strongly preferred.

A waste policy framework

FINDING 6.1

Australian, State and Territory waste legislation and strategies often:

- *are not sufficiently focused on reducing risks to human health, the environment and social amenity from waste to acceptable levels;*
- *include objects relating to resource conservation and upstream environmental protection, even though these issues are more appropriately dealt with through directly-targeted policies; and*
- *give a high priority to waste reduction as an end in itself, even though there is no market failure that would justify this.*

RECOMMENDATION 6.1

Australian, State and Territory waste legislation and strategies should be reformulated to focus on reducing risks — to human health, the environment and social amenity — from waste to acceptable levels. Objects that detract from this focus, such as those relating to resource conservation and upstream environmental protection, should be removed.

RECOMMENDATION 6.2

Waste management policy should not be used to promote resource efficiency (defined as the value added per unit of resource input). This is because measures of resource efficiency:

- ***do not take into account the use of all resources; and***
- ***often involve aggregating quantities of different materials in a way that does not take into account their individual market values or environmental impacts.***

The waste hierarchy and target setting

RECOMMENDATION 7.1

To maximise net benefits to the community, waste management policy should be guided by rigorous analysis of the financial, environmental and social costs and benefits, not by the simple priorities suggested by the waste hierarchy.

FINDING 7.1

Targets for waste diversion are virtually impossible to set at an optimal level. Broad targets do not account for regional differences in waste diversion costs or the external costs of different types of waste. Nor are they sensitive to changes in market or institutional settings. While they might be argued to have some aspirational virtues, targets such as zero waste to landfill lack credibility and are unachievable. More importantly, excessive resource recovery can be costly to the community and result in perverse outcomes.

A better approach than using waste diversion targets, would be to directly address relevant market failures and distortions throughout product life cycles, thus assisting markets to achieve the right balance between waste avoidance, resource recovery and disposal.

RECOMMENDATION 7.2

Governments should not directly or indirectly impose waste diversion targets as part of waste management policy.

Regulation

RECOMMENDATION 8.1

Mandatory standards for including recycled content in products should not be implemented, as they are unlikely to produce net benefits for the community.

FINDING 8.1

There may be a case for adopting mandatory minimum standards for compost to address potential risks to human health or the environment, but this would need to be assessed after voluntary industry approaches have been tried and evaluated.

FINDING 8.2

Current State and Territory landfill regulations mostly focus on the policy-relevant externalities of landfill disposal including pollution of air, surface waters and groundwater, and amenity losses during the operational life of landfills and after their closure. However, some components of regulation have been driven by inappropriate objectives, such as increasing resource recovery and waste diversion. In addition, some regulations have pursued greenhouse gas abatement — an objective that would be best addressed through a comprehensive national approach.

RECOMMENDATION 8.2

Landfill regulation should focus on the policy-relevant externalities of landfill disposal. It should be based on a rigorous assessment of the risk of damage from those externalities, and should aim to reduce that risk to levels at which the cost of further reductions begins to exceed the benefit.

Regulation should consist of a mix of prescriptive and performance-based measures and should provide for alternative methods of compliance, if there is a likelihood that a particular requirement could impose unjustifiably high compliance costs.

RECOMMENDATION 8.3

The State and Territory Governments should evaluate the cost effectiveness of current regulations in addressing the externalities of landfill disposal, to determine whether current requirements are at an appropriate level to deliver the greatest net benefit to the community.

FINDING 8.3

Compliance with landfill licence conditions in Australia appears to be relatively poor, and enforcement somewhat variable and lax.

RECOMMENDATION 8.4

Once landfill licences are appropriately configured to account for all relevant risks and externalities, the State and Territory Governments should ensure that all landfills comply with their licence conditions.

FINDING 8.4

Modern, efficient, well-regulated energy-from-waste facilities have proven to be a satisfactory means of disposing of some non-hazardous waste in many advanced economies. In theory, Australian regulation does not completely preclude energy-from-waste facilities but, in practice, strong community and political opposition has, to date, prevented appropriate consideration of this disposal option.

FINDING 8.5

Regulation and enforcement for litter and illegal dumping are necessary but not sufficient to achieve the best result for the community. Accompanying measures, such as education, community involvement and moral suasion, can make regulation more effective.

FINDING 8.6

Plastic-bag litter has the potential to injure marine wildlife, including endangered species. However, claims that at least 100 000 animals are killed each year by plastic-bag litter are not supported by evidence. Such claims appear to be based on the misinterpretation of Canadian research on the impact of fishing nets. Some have also misinterpreted case studies of individual animals that have come into contact with plastic debris (not just plastic bags) as being representative of the overall impact of plastic-bag litter. The true extent to which plastic-bag litter injures populations of marine wildlife, as opposed to individual animals, is likely to remain very uncertain because it is extremely difficult to measure.

FINDING 8.7

Based on the evidence available to the Commission, it appears that the Australian, State and Territory Governments do not have a sound case for proceeding with their proposed phase out of plastic retail carry bags. Similarly, there does not appear to be a sound basis for the Victorian Government's proposed per-unit charge on plastic bags. A cost–benefit study commissioned by the Governments shows that the benefits of a phase out or a per-unit charge would be significantly outweighed by the costs. This is because the policies would penalise most uses of plastic retail carry bags, whereas the potential benefit would only come from the small proportion of bags that are littered. A more cost-effective approach would be to target littering directly.

RECOMMENDATION 8.5

To help ensure governments adopt the best policy approach on plastic bags, the Environment Protection and Heritage Council should include the following in its forthcoming regulation impact statement:

- ***a clearly-specified objective to reduce plastic-bag litter in a way that maximises the net benefit to the community;***
- ***a comprehensive review of evidence on the environmental impacts of plastic-bag litter;***
- ***a thorough evaluation of recent initiatives to reduce plastic bags in Australia, including consideration of why the large reduction in supermarket plastic carry bags in recent years appears not to have translated into an environmental improvement;***
- ***assessment of an alternative policy approach that, rather than targeting supermarkets or most uses of plastic carry bags, involves a combination of:***
  - ***strengthened litter-reduction policies, such as education, enforcement of litter laws, and containment with litter traps and other infrastructure; and***
  - ***measures focused directly on away-from-home sources of plastic-bag litter, including measures that target plastic-bag litter entering marine and riverine environments.***

Market-based instruments

RECOMMENDATION 9.1

Governments should discontinue using landfill levies because:

- ***the externalities of disposal to a properly-located, engineered and managed landfill are typically small, and the scope for applying levies without duplicating the effect of existing regulation is very limited;***
- ***residual disposal externalities vary significantly according to waste type, location of disposal and type of landfill facility, and it would be impractical to vary the levy to reflect that variability; and***
- ***using levies to achieve selected landfill diversion targets and revenue generation to fund environmental programs will not encourage outcomes which are in the best interests of the community, and may have perverse consequences, such as increases in illegal dumping and other forms of evasion.***

FINDING 9.1

Charges for household waste collection that vary with the amount of waste could promote more efficient outcomes, where they are cost effective and practical to introduce. This will depend on the implementation costs and any consequent increase in illegal disposal. Wider adoption of simple forms of variable charges, such as charging an additional fee for a larger than standard bin, would seem desirable, with more sophisticated 'pay-as-you-throw' approaches adopted if and when they become more cost effective and practical.

FINDING 9.2

The scope for applying advance, rather than end-of-life, charging for disposal and recycling is limited by the difficulties in setting the fee at the correct rate and the high administrative cost of such schemes. Advance disposal and recycling schemes are only likely to be justified for products carrying a high risk and cost of illegal disposal.

FINDING 9.3

Deposit-refund schemes are typically costly and would only be justified for products that have a very high cost of illegal disposal. Container deposit legislation is unlikely to be the most cost-effective mechanism for achieving its objectives of recovering resources and reducing litter. Kerbside recycling is a less costly option for recovering resources, while general anti-litter programs are likely to be a more cost-effective way of pursuing overall litter reduction.

FINDING 9.4

It is currently not clear what purpose tradeable property rights mechanisms would serve in Australian waste policy. Such mechanisms can be useful means of achieving targets cost effectively. However, developing meaningful waste disposal and resource recovery targets is practically impossible, and enforcing arbitrary targets can impose large costs on the community.

Extended producer responsibility and product stewardship

FINDING 10.1

Mandatory extended producer responsibility and product stewardship schemes — involving either industry–government co-regulation or government regulation — tend to be costly. They are unlikely to deliver a net benefit unless:

- *there are considerable benefits to the community from avoiding the product's inappropriate disposal, for example because it is hazardous;*
- *the relevant parties can be readily identified and held accountable; and*
- *compliance with the requirements can be readily measured and enforced.*

The Commission is not convinced that many of the products currently being targeted by governments — including office paper, packaging, tyres, computers, televisions and other electrical appliances — satisfy all of these requirements.

RECOMMENDATION 10.1

The objectives of the National Packaging Covenant and National Environment Protection (Used Packaging Materials) Measure should be amended so they are consistent with the objects clause of the National Environment Protection Council Act 2004. This should include removing the goal of resource conservation as a reason for government intervention.

RECOMMENDATION 10.2

The terms of reference for the scheduled 2008 review of the National Packaging Covenant should be expanded by the Australian Government beyond an assessment of effectiveness. An independent review should consider all relevant evidence about whether the Covenant (and supporting regulation) delivers a net benefit to the community.

RECOMMENDATION 10.3

The Environment Protection and Heritage Council, and its member Governments, should adopt the following two reforms to their product stewardship and extended producer responsibility policies.

First, the objective should be reformulated to focus on reducing risks — to human health, the environment and social amenity — from waste to acceptable levels (that is, where the expected benefits of further reducing the risk are less than the costs of doing so). Objects that detract from this focus, such as those relating to resource conservation and upstream environmental protection, should be removed.

Second, adopt a prerequisite that, before intervening, governments must consider the findings of a thorough review of scientific evidence on a product's alleged environmental and public health impacts. Such reviews should:

- ***be conducted by independent panels of scientists, formed on an ad hoc basis as required, who have a history of peer-reviewed research in respected academic journals that is objective and relevant;***
- ***consider public and relevant industry comment before being finalised; and***
- ***make a preliminary assessment of the level of risk compared to the likely costs of intervention (informed by relevant economic and financial expertise).***

Such a panel should answer the questions 'Does a comprehensive review of all relevant scientific research indicate that the product's existing or anticipated production process, reuse, recycling and disposal in Australia has the potential to cause significant harm to the community and/or the environment? If so, define exactly what the problem is, attempt to quantify its magnitude, and describe what actions might address the problem, and at what likely cost'.

A panel's report should always be completed and published before the relevant government(s) begins to design or encourage a product stewardship or extended producer responsibility scheme.

Government information provision and procurement practices

RECOMMENDATION 11.1

Australian governments should identify any major misunderstandings the community may have about the risks, costs and benefits of waste management issues and address these by ensuring the supply of factually accurate, relevant and accessible information to the public.

RECOMMENDATION 11.2

Governments should leave the provision of waste-exchange services to private markets.

FINDING 11.1

There are significant practical difficulties in designing and implementing an effective system of labelling for recycling, and any mandatory scheme would need to be supported by a comprehensive cost–benefit analysis. Where labelling schemes are adopted, they should be complemented with government and industry-supplied awareness-raising programs and information hotlines.

FINDING 11.2

Using government procurement practices to create demonstration effects for the broader community and assist the development of markets for recovered materials is an indirect and, most likely, relatively ineffective way of pursuing those waste policy objectives.

Institutional and regulatory impediments to resource recovery

RECOMMENDATION 12.1

State and Territory Governments should ensure that all government-operated landfills charge users the full costs of waste disposal.

RECOMMENDATION 12.2

State and Territory Governments should:

- ***consider making land-use planning and development approvals for major waste disposal and resource recovery facilities matters of regional or even state*** *significance, and the responsibility of the relevant minister, where this is not already the case;*

- *ensure that land-use planning and development approvals for major waste disposal and resource recovery facilities are handled efficiently and effectively, providing transparency and consultation for the relevant communities but also clarity and certainty for the waste management industry; and*
- *consider shifting the responsibility for waste disposal and resource recovery from local government to appropriately-constituted regional waste authorities, particularly in those larger urban centres in circumstances where the relevant local governments do not have sufficient scale or resources to efficiently and effectively handle these roles.*

RECOMMENDATION 12.3

The Australian Government should work with the State and Territory Governments to:

- ***develop and implement a national definition of waste and a national waste classification system;***
- ***review the appropriate balance between prescriptive and risk-based classifications of waste;***
- ***standardise, coordinate and improve the efficiency of current processes for granting exemptions to recoverable resources from irrelevant environmental controls; and***
- ***explore opportunities to achieve further consistency in regulatory standards applying to waste.***

RECOMMENDATION 12.4

State and Territory Governments should direct their agencies and local governments to develop uniform skip bin policies, and to augment current permitting processes with an accreditation system for skip bin suppliers to reduce the need for multiple permitting applications.

RECOMMENDATION 12.5

Governments responsible for specifying the use of materials for products, including building and construction materials, should review all product standards that unjustifiably frustrate the use of recycled products and/or call for the use of virgin materials, with a view to replacing them with performance-based equivalents where this is feasible.

RECOMMENDATION 12.6

The Australian Government should ensure that export, import and transit permits granted under the Hazardous Waste Act 1989 (Cwlth) are issued expeditiously and commence from the day the Minister grants approval, rather than from the date of application, unless the applicant requests otherwise.

Performance measurement

FINDING 13.1

Performance indicators of the amounts of waste being disposed to landfill or recovered have limited value because they do not provide any information on the costs and benefits of these options.

FINDING 13.2

Performance indicators relating to compliance with licence conditions at landfill sites may be useful in revealing the extent of externalities, and whether further policy intervention is needed.

FINDING 13.3

Performance indicators of cost effectiveness can have a role to play in measuring the cost of achieving social and environmental objectives in waste management, and in benchmarking performances of local governments in providing kerbside collection services.

RECOMMENDATION 13.1

The Australian Government should work with the State and Territory Governments to coordinate the development and implementation of a concise, nationally consistent data set for waste management that:

- ***facilitates evaluation and comparison of waste management policies across jurisdictions;***
- ***assists governments in undertaking cost–benefit analysis;***
- ***focuses on the data needed to address priority policy issues;***
- ***has regard to data collection practices already in use, including the framework provided by the Australian Waste Database; and***
- ***recognises the importance of government-funded data when there is a market failure in information.***

1 Introduction

Key points

- The Australian Government has asked the Productivity Commission to conduct an inquiry into waste generation and resource efficiency.
- The focus of this inquiry is on non-hazardous, solid waste, and three main waste streams: municipal solid waste; commercial and industrial waste; and construction and demolition waste.
- The objective of the inquiry is to identify policies to address market failures and externalities associated with the generation and disposal of waste. Externalities are the unintended costs or benefits of an activity that are experienced by people other than those involved in that activity. For example, a waste processing or recycling facility may have adverse effects on the amenity of neighbours (a negative externality).
- A flexible, value-based approach to defining waste is adopted. This recognises that what is waste to one person, might not be to another. It also recognises that different types of waste can have different environmental impacts, and the location where the waste is produced can be important in terms of the opportunities for cost effective recycling or otherwise recovering that material.
- The term resource efficiency, which is widely used in waste management policy to imply that the amount of material (and energy) used per unit of output be minimised, has limitations as a criterion of good public policy.
- A focus on net benefits to the community is adopted. This is a measure of the social welfare or wellbeing of the community generally, and includes all private costs and benefits (whether financial or nonfinancial in nature), and the impact of all relevant externalities.
- Maximising net benefits to the community requires that the use of all natural resources, together with other inputs such as intermediate goods, labour and capital, be considered, and that the efficiency of their combined use should be maximised.

The Australian Government has asked the Productivity Commission (the Commission) to conduct an inquiry into waste generation and resource efficiency in Australia, and recommend ways in which economic, environmental and social outcomes can be improved. This introductory chapter discusses the scope of the inquiry and the broad policy background.

1.1 Scope of the inquiry

The scope of this inquiry is broad. It covers a wide variety of solid wastes, the environmental, economic and social consequences of those wastes, and the policy frameworks of all levels of government in Australia.

What is waste?

Waste can generally be defined as any product or substance that has no further use or value for the person or organisation that owns it, and which is, or will be, discarded. It thus excludes products or substances that are reused or sold by the organisation that owns them.

For practical reasons, the definition covers products that are discarded by one party but have value for another. Thus, it can include products that are recoverable, including through reuse, recycling or by energy extraction. However, what is recoverable in one context might not be recoverable in another. For example, in many urban locations the costs and benefits of collecting newspapers favour recycling, but the opposite might be true for a remote location. As the Business Roundtable on Sustainable Development (sub. 70, p. 4) put it: ‘Waste is not an absolute — it is a matter of value, place and time’.

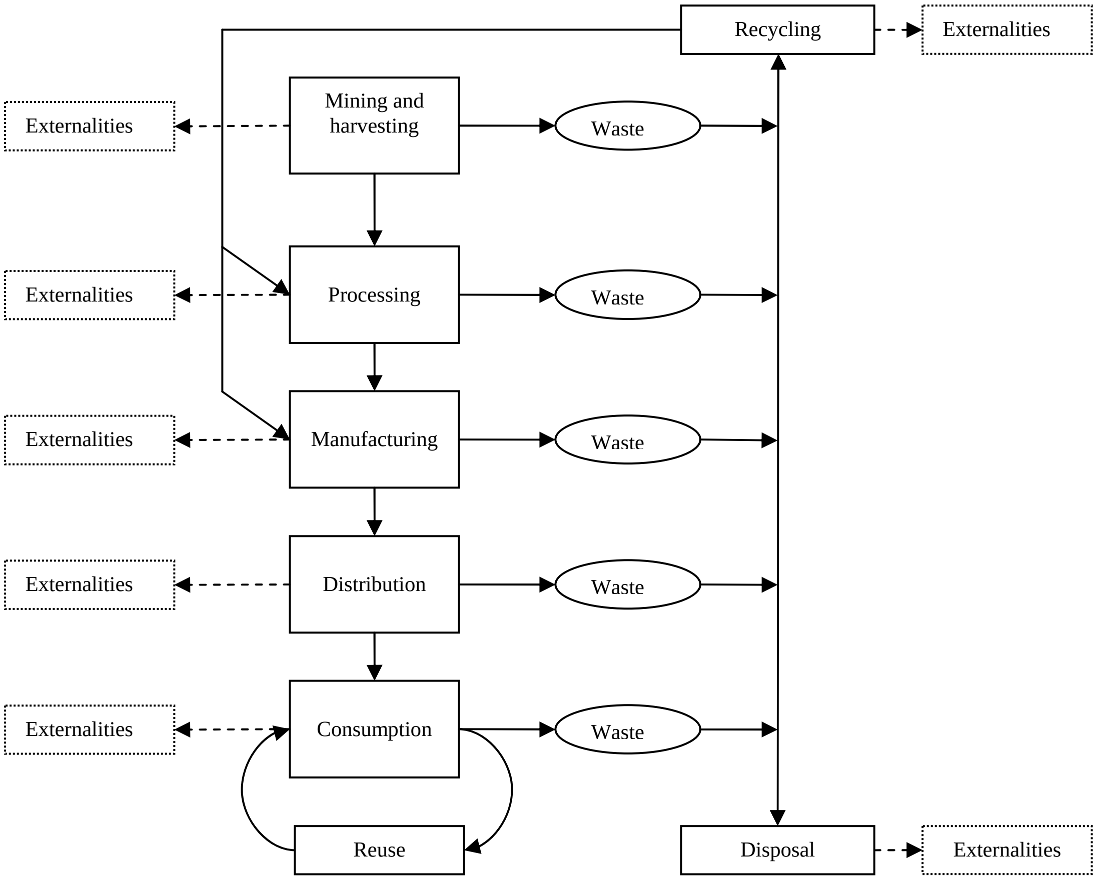
What types of waste are covered?

The Commission is directed to look at solid waste, that is, the inquiry has not focused on policies and practices surrounding the generation, treatment and disposal of liquid or gaseous waste. The Commission has been expressly asked not to cover hazardous waste (see below).

The terms of reference specify that the inquiry must cover, but is not necessarily limited to, three main solid waste streams: municipal waste; commercial and industrial waste; and construction and demolition waste. Thus, for example, under municipal solid waste, the inquiry covers the kerbside collection of waste (whether separated into putrescible and nonputrescible components or not), away from home collection, and hard waste collection.

The terms of reference also direct the Commission to adopt a life-cycle perspective that incorporates ‘raw material extraction and processing, to product design, manufacture, use and end of life management’. Waste may be generated during the extraction of raw materials, the processing of those materials to intermediate and final products, and the consumption of final products (figure 1.1).

Figure 1.1 **Disposal, recycling and externalities in the product life cycle**



This diagram is a simplified representation of what can happen in the life cycle of a product, from the time natural resources are mined (in the case of nonrenewable resources) or harvested (in the case of renewable resources), through the stages of processing, manufacturing, distribution (including wholesaling and retailing activities) to where it is consumed. Note that waste can be generated at all points in the life cycle, not just in the post-consumer phase. Waste can be either disposed or recovered in some way (represented here as recycling).

The diagram also shows that environmental and other externalities can occur at each stage in a product’s life cycle. From a waste management perspective, downstream externalities are those that might arise from disposal or recycling (including the waste collection and transport associated with these activities). Upstream externalities occur prior to the point at which waste is generated. For example, the ‘externalities’ boxes on the left hand side of the diagram indicate the possible externalities that might be present upstream of post consumer waste.

The product life cycle approach required the Commission to consider if it were appropriate to cover the on-site disposal of waste. On-site disposal is an integral feature of many upstream activities and can account for very considerable amounts of waste of one sort or another. For example, large amounts of residue are left after cropping or forest harvesting, and mineral processing can result in stockpiles of byproducts accumulating on or adjacent to processing plants (for example, the red mud associated with alumina refining).

However, the Commission was advised early in the process that it had been the Government's intention for the inquiry to concentrate on off-site, not on-site disposal issues, when it drafted the terms of reference. For the most part the Commission has followed this approach, but inevitably grey areas emerge that mean on-site and off-site issues cannot always be separated. For example, policy instruments that affect off-site disposal options can provide incentives for firms to adopt on-site disposal methods, such as recovering energy from waste.

Notwithstanding the general exclusion of on-site disposal the coverage of the inquiry has been very broad. The wide variety of waste covered, the varying composition of waste streams, and the different environmental impacts of different types of waste, have also added a layer of complexity to the inquiry. A tonne of broken clay bricks has quite different impacts on the environment to a tonne of old lead acid batteries, or a tonne of putrescible household waste. To adapt an old catchcry — 'wastes ain't wastes' — meaning that polices designed to address one type of waste might not be the best instruments to address other types of waste.

These differences caution against drawing strong conclusions from comparisons between different regions or jurisdictions based on broad measures of waste volumes or tonnages. Different institutional and regulatory frameworks can also mean that data are collected in different and inconsistent ways.

The observation made in the terms of reference that Australians generate solid waste at a high rate compared with most other Organisation for Economic Cooperation and Development countries is not, by itself, very informative. To understand the policy relevance of this comparison for Australia necessitates a great deal more information about such things as: the composition of waste; the impacts of waste on human health and the environment; the determinants of waste generation; and the waste disposal and recycling options available to different countries. The same applies to comparisons made between jurisdictions or regions within Australia (chapter 2).

The adequacy of the current data is an important element of this inquiry. Good policy outcomes will depend on focusing on the key problems we face in waste generation and disposal, and then being able to measure how substantial they are. Relevant and comparable data are essential for this purpose.

Hazardous waste is not directly covered

The terms of reference specify that the inquiry 'will not cover wastes that exhibit hazardous characteristics and pose an immediate and unacceptable risk of harm to human beings or the environment'. But, not surprisingly, this is open to interpretation.

A good starting point for deciding what is hazardous and what is not, is to look at state and territory regulations concerning what are commonly called 'prescribed' or 'controlled' wastes. These invariably use definitions based on the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, an international agreement ratified by 166 countries, including Australia.

The Basel Convention uses two approaches to defining hazardous waste. The first is to classify something as hazardous waste if it has 'hazardous characteristics'. These characteristics include that the waste is: explosive, flammable, oxidising, poisonous, infectious, corrosive, toxic or ecotoxic. In this inquiry, radioactivity is also considered a hazardous characteristic. The second approach the Basel Convention uses is to list particular types of waste that are considered 'hazardous wastes'. These include waste streams such as clinical waste, waste from specific production processes, and some constituents of waste such as zinc, mercury, lead and asbestos.

The Commission has been guided by the broad framework offered by the state and territory regulations, and the terms of reference, in deciding which waste streams are covered. Even so, a flexible approach is required for three main reasons:

- Despite being based on the Basel Convention, the coverage and treatment of different state and territory regulations is not uniform, meaning that a certain waste type might be considered to be hazardous in one jurisdiction but not in another. This can have implications for the recovery of waste materials where cross-border issues arise.
- Classifying something as a hazardous waste can limit the subsequent options for use of that material, which can change over time as technological and market developments occur. For example, boiler fly ash is classified in Queensland as controlled (that is, hazardous) waste, whereas in other states it is not, and is commonly used as road base.
- Some wastes can contain hazardous elements or compounds, but the risks might be considered acceptable enough under normal circumstances to allow them to be disposed of in general waste streams, such as in municipal solid waste

(box 1.1). This might be because the hazardous material forms only a small part of the overall waste stream, or is in a relatively inert or immobile form.

Box 1.1 **Potentially hazardous wastes that might be found in municipal solid waste**

Items in the municipal waste stream that exhibit characteristics that could, under some circumstances, be described as hazardous include:

- lead acid batteries, mobile phones, televisions and computers that can contain toxic and ecotoxic heavy metals, such as lead, nickel, copper and cadmium, chromium and mercury;
- pesticide, paint and household chemical containers, which can contain toxic, ecotoxic and poisonous materials;
- car parts, which can contain toxic, ecotoxic and poisonous components;
- tyres, which can catch fire thus leading to toxic emissions;
- domestic smoke detectors, which contain small amounts of radioactive material; and
- copper chrome arsenate treated timber.

For these reasons, the Commission has endeavoured to use a pragmatic approach to determining the boundary between hazardous and non-hazardous waste. Thus, small amounts of hazardous waste in the municipal, construction and demolition, and commercial and industrial waste streams must be accepted as a reality (albeit potentially undesirable), as it is very difficult, and possibly too costly, to attempt to prevent such items entering the waste stream or to completely remove them.

Nonetheless, the Commission considers that this inquiry was not intended to cover waste streams that predominantly contain particular types of hazardous solid waste including:

- radioactive waste;
- clinical waste from health services;
- asbestos;
- sewage, sewage sludge and sewage treatment residues;
- agricultural manures;
- solid chemical waste classified as hazardous; and
- intractable chemical wastes containing compounds such as hexachlorobenzene and polychlorinated biphenyls.

Market failure arguments for government intervention

The objective of this inquiry is to 'identify policies … to address market failures and externalities associated with the generation and disposal of waste'.[1] 'Market failure' is a term that refers to circumstances in which markets will not achieve the best outcomes for the community. Market failures include negative and positive externalities (for example, environmental pollution and research and development, respectively), the supply of public goods (for example, disease-control measures), market-power issues (for example, the presence, for whatever reason, of monopoly power) and imperfect information (for example, information asymmetries between buyers and sellers of products).

Negative externalities have been singled out for particular attention in the terms of reference because these can be potentially significant in waste generation and disposal. A negative externality will occur when a transaction between two parties has detrimental effects on third parties and is not reflected in the prices paid for the product concerned. For example, a waste processing or recycling facility may have negative effects on the amenity of neighbours (a negative externality). If the negative externality is not addressed in some way, the parties directly concerned (in this case, the waste facility's operator and his or her customers) have no incentive to curb their production and consumption to take into account their impact on others.

The presence of negative externalities (and other market failures) may justify government intervention (for example, by introducing regulations, creating and enforcing property rights, adjusting price signals or providing information). However, government intervention can be costly and can introduce its own distortions. Taking this into account, government intervention is only warranted when the benefits are likely to be greater than the costs involved (chapter 5).

Market failure is a term that is sometimes confused with situations where a good or service is not supplied in the market either because there is insufficient demand or the costs of supply are too great. For example, some inquiry participants argued that market failure exists in the market for compost, not necessarily because of any inherent externalities or market power issues, but because of the presence of growing stockpiles of compost. In practice, what appears to be happening is that the supply of compost (of varying quality) has been stimulated by landfill levies and other policies discouraging disposal of waste to landfill. As a result, nearby markets for compost are becoming saturated, and transport costs are ruling out marketing it further afield. This is not market failure.

1 The distinction between market failure and externality in the terms of reference is considered immaterial as an externality is a type of market failure.

A focus on net benefits to the community

The terms of reference require the Commission to examine the 'economic, environmental and social benefits and costs of optimal approaches for resource recovery and efficiency and waste management'. In conducting this inquiry, the Commission is also guided by its economywide charter that requires that all the costs and benefits of different policy options be considered, in order to maximise community wellbeing. Another way of saying this is that policy should maximise *net social benefit*.

Net social benefit is the sum of all financial and nonfinancial costs and benefits, and includes the value of all externalities (box 1.2). It is a useful way of bringing together all costs and benefits, but can be confused with the more narrow definition that some people apply to 'social' costs or benefits. The reference to 'economic, social and environmental benefits and costs' implies that these are essentially different from each other, yet all fall within a general net social benefit framework. For example, some negative externalities might be perceived to be particularly social in nature (for example, the amenity impact of a waste facility as mentioned previously), while others might be perceived to be more environmental in nature (such as the effects of smokestack pollution on the health of living organisms). But because these all directly or indirectly affect the wellbeing of members of the community, they are all essentially social in nature. To avoid confusion, in this report the Commission has used the term *net benefit to the community* in place of net social benefit.

By focusing on all costs and benefits, this approach will involve tradeoffs; something many people are reluctant to accept when it comes to environmental issues. But there are competing demands for the community's limited resources (labour, capital and natural resources), meaning that tradeoffs cannot be avoided. For example, resources used for more sophisticated waste treatment plants have an opportunity cost, in that they are not then available for building hospitals, establishing national parks or other uses that may have a greater value to the community.

Resource efficiency

Resource efficiency is a term that is used in the terms of reference and by many inquiry participants to imply that the returns from using one or more materials (and sometimes also energy) be maximised. The Commission of the European Communities (CEC 2003, p. 9) defined resource efficiency to mean 'the efficiency with which we use energy and materials throughout the economy, i.e. the value added per unit of resource input'.

Box 1.2 **Private and external costs and benefits**

The costs and benefits of economic activities are not measured just by the amount of money that changes hands in the marketplace.

In a well-informed, competitive market, the sale of a product for $X might be seen to be an indication of the cost and benefit of the transaction, that is, that the product cost $X to bring to market, and that the person or organisation that purchased it did so because they expected to gain a benefit of $X from its consumption. In this case, the money that changes hands is a private financial cost in the hands of one party and a private benefit in the hands of the other. (Note that the term private does not just refer to a person, but to all people and all organisations; whether firms or government or non-government organisations.)

But it is not the only private benefit that arises from the transaction. The consumer purchases the product because they value it at least as much as the purchase price. The excess of their willingness to pay over the actual purchase price is called consumer surplus. This is a private, but nonfinancial benefit.

The costs and benefits associated with the transaction might also extend to third parties if there are external effects or externalities. These are not private costs or benefits in the sense that they are experienced by someone other than the parties to the transaction. Although money has not changed hands, the costs and benefits are nevertheless real, and hence should be considered in assessing the overall impacts on the community more generally. As noted in the text, there may be ways of internalising negative externalities to make the parties to the transaction aware of the wider effects (for example, through regulation to limit the extent of harm, or by establishing property rights that allow the affected parties to come to some mutually satisfactory arrangement).

Private costs and benefits can also be associated with goods and services that are not traded in the market. For example, people might place a value on a pristine area of wilderness, and although there might be no market mechanism to reveal their preferences, would have a willingness to pay for preserving that environment.

Net social benefit is the sum of all private costs and benefits and all externalities. In this report it is referred to as *net benefit to the community*.

The concept of resource efficiency has considerable intuitive appeal to the many people interested in decreasing the community’s dependence on scarce natural resources. But by focusing on the use of certain resources and not others, resource efficiency measures are likely to be useful only in fairly limited circumstances. For example, a resource efficiency measure of the amount of mineral ore that is needed to produce a refined product might be useful in comparing two different processing technologies. But if it fails to account for *all* inputs, including other materials, energy, capital and labour, this approach will not maximise net benefits to the community.

The terms of reference for this inquiry ask the Commission to make recommendations on how 'resource efficiencies can be optimised'. Given the limitations of resource efficiency as an indicator of community wellbeing, the Commission's approach has been to focus on maximising net benefit to the community as the more appropriate criterion.

The limitations of resource efficiency, its application to the waste policy debate, and participants' views, are discussed in more detail in chapter 6. Related issues concerning the role of government in addressing resource-depletion issues are addressed in chapter 5.

Ecologically sustainable development

The Commission considers that maximising net benefits to the community is also broadly consistent with the concept of ecologically sustainable development (ESD). ESD is often defined in terms of meeting the needs of the current generation in a way that does not compromise the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). The Commission considers that ecologically sustainable development is best approached through rigorous cost–benefit evaluation. Where all foreseeable impacts are considered — short term or long term, private or social — choosing the policy option with the highest net benefit would also be consistent with the principles of ecologically sustainable development (PC 1999).

However, ESD also raises issues of intergenerational equity, requiring policy makers to consider tradeoffs between current and future generations, and to the extent that the current generation must make sacrifices for the future, how those sacrifices are to be made and by whom. ESD is addressed in more detail in chapter 5.

Other aspects of the terms of reference

In addition to the items covered above, the Commission is required to give consideration to:

- institutional, regulatory and other impediments (chapter 12);
- the impact of international trade and trade agreements on the level and disposal of waste in Australia (chapter 12);
- the effectiveness of performance indicators to measure the efficiency of resource recovery practices (chapter 13); and
- government procurement and commercial procurement practices (chapter 11).

1.2 Policy background

The changing nature of waste management policy

Waste management policy in Australia has evolved considerably in the last two to three decades (chapter 3). As in most countries, Australian governments have long intervened in waste management for public health and amenity reasons. In the absence of intervention, households and firms would likely use less-than-ideal means of disposal, creating risks of disease, and dumping and littering problems. The systematic collection and disposal of waste to a centralised facility offered a solution to these problems, but also created new problems.

Australia's predominant means of disposing of waste was, and remains, to bury it in landfills, but some incineration was also practiced. But these were relatively unsophisticated facilities and were used to dispose of a wide range of waste (including hazardous waste), with little regard to the environmental risks they created. In the 1970s, concerns about these and other impacts led to the enactment of environmental protection legislation, and regulations governing waste management facilities have been progressively tightened since. Urban growth pressures have also limited the options for developing new landfills and other waste management facilities in some locations.

More recently, waste management policy has become concerned with broader issues concerning sustainability and conservation. Rather than just focusing on end-of-pipe or downstream solutions (that is, waste disposal), a waste hierarchical approach that values in decreasing order of preference: avoidance, reuse, recycling, energy recovery and lastly disposal, has been adopted. In some jurisdictions and applications, these or similar options are applied in strict order. In other cases, they are more a consideration of alternatives (chapter 7). Consistent with this hierarchy, most jurisdictions have adopted policies of discouraging waste disposal in landfills, minimising or eliminating waste (for example, South Australia and the Australian Capital Territory have zero waste policies), and increasing the proportion of materials that are recycled.

There has also been growing interest in making producers more responsible for the cost of disposing of products at the end of their life. This has resulted in considerable pressure to implement extended producer responsibility and product stewardship schemes, and has already resulted in the implementation of the National Packaging Covenant and the Product Stewardship for Oil program. Other schemes relating to tyres, computers, and televisions are being developed (chapter 10).

The roles of the different levels of government

The roles of the different levels of government in developing and implementing waste management policy, and the public and private sectors in providing waste management services have also changed.

Local government

Traditionally, local government has been responsible for waste collection, disposal and resource recovery services for households, and much of the away-from-home services offered to the general public (such as street bins and litter abatement). It also has a role in planning issues. There are signs that local government is struggling with many of the emerging issues and growing community expectations. The increasing sophistication of the technologies needed for recycling and waste disposal has resulted in fewer, larger facilities. These are often well beyond the size needed for any one local government. In an era where it seems that nobody wants a waste management facility in their backyard, this in turn exacerbates planning issues.

State and territory governments

State and territory governments have the constitutional powers for regulating the waste management industry. For example, state and territory regulations cover the licence conditions for constructing and operating a landfill (chapter 8). In many cases, state and territory governments have introduced strategies to minimise waste, imposed landfill levies and subsidised recycling. They also tend to provide support and/or direction to local governments within their jurisdiction (where relevant).

Some state and territory governments also provide waste management services directly. The most prominent example of this is the New South Wales Government's ownership of WSN Environmental Solutions — the majority supplier of municipal waste services in the greater Sydney region.

Australian Government

The role of the Australian Government in waste management policy has largely been one of national coordination, though it also has the responsibility to ensure Australia meets its international commitments (for example, the Basel Convention) and it regulates exports. The growing interest in extended producer responsibility and product stewardship (EPR and PS) schemes is providing a challenge to the Australian Government. To the extent that these are justified, there is a good case for them to be introduced on a nationally-consistent basis. As these schemes can involve a tax on the products they target (for example, as is mooted to be the case for a product stewardship scheme for tyres), the Australian Government's taxation powers might also be critical to their implementation.

One means of achieving national coordination is through the Environment Protection and Heritage Council (EPHC). Operating under the general auspices of the Council of Australian Governments, the EPHC comprises environment ministers from all Australian jurisdictions and New Zealand. The ministers from all Australian jurisdictions in turn form a statutory body called the National Environment Protection Council that has the power to introduce National Environment Protection Measures. These measures are a regulatory device for developing a common set of rules that are then applied by the states and territories either through adoption of consistent policies and/or regulation (chapters 3 and 6).

1.3 Conduct of the inquiry

The Commission received the terms of reference for this inquiry on 20 October 2005. The terms of reference required the Commission to report to the Australian Government within twelve months, to hold public hearings, and to produce a draft report.

The Commission's approach to this inquiry is also governed by the *Productivity Commission Act 1998* that requires the Commission to conduct inquiries in an open and transparent way. The Commission encouraged public participation in the following ways:

- At the commencement of the inquiry, the Commission advertised nationally and promoted the inquiry on its website (the inquiry website is www.pc.gov.au/inquiry/waste/index.html).
- A circular was mailed to people and organisations that the Commission thought might be interested in the inquiry. Subsequent circulars were sent to those who had expressed an interest in the inquiry, to keep them posted on inquiry progress.
- Informal discussions were held with a wide range of organisations and individuals throughout the inquiry. These involved visits to most capital cities.
- An issues paper was released in December 2005 to assist and stimulate interested parties in preparing submissions to the inquiry.
- During February and March 2005, the Commission held public hearings for participants to discuss their submissions with the Presiding Commissioner. These were held in Adelaide, Brisbane, Canberra, Melbourne, Perth and Sydney.

- A draft report was released in May 2006 for public comment, and further submissions were invited.
- During June and July 2006 a second round of public hearings were held to discuss the findings and recommendations in the draft report. Hearings were held in Brisbane, Canberra, Melbourne, Perth and Sydney. In both rounds of hearings participants in other locations were involved in the Melbourne hearings through teleconference links.
- Written submissions were placed on the Commission’s web site for others to read.[2] The Commission received 123 submissions before the release of the draft report and 150 since (that is, 273 in total).
- Transcripts from the hearings were also posted on the inquiry website.

The Commission thanks inquiry participants for meeting with the Presiding Commissioner and Commission staff, facilitating visits to many industry sites, making submissions and discussing those submissions at public hearings. Appendix A provides details of these individuals and organisations.

Like all Commission inquiry reports, the release of this report required that it first be tabled in both houses of Parliament. In the terms of reference for the inquiry, the Government has undertaken to respond to the report as soon as possible after its receipt.

2 The exception to this general rule was that submissions (or parts of submissions) were not made publicly available if they contained information provided in confidence, and it was deemed to be in the public interest to accept that information in confidence.

2 Waste management in Australia

Key points

- Though it has improved in recent years, the quality of Australian waste management data has traditionally been quite poor. Each state and territory collects and reports data differently, and there are gaps in the coverage of regions, waste streams and materials.
- Despite these data limitations, it is reasonable to conclude that:
  - Total waste generation per person in Australia has been increasing over time.
  - In recent years, recycling rates have increased at a faster rate than disposal to landfill. Despite this growth, more solid waste is disposed to landfill (54 per cent) than is recycled (46 per cent). However, this varies markedly between materials.
  - The export of recyclable material has increased in recent years, mostly driven by increased demand from Asia.
- Caution must be used when comparing Australian waste generation, landfill and recycling rates with those of other countries. There are significant problems with the quality of some data, and the data are not always comparable between countries.
- Measured differences between Australian municipal waste generation per person and those of other countries may be due to:
  - differences in the ways that member countries have classified municipal waste in their responses to OECD surveys;
  - differences in the composition of waste — the generally larger housing allotments in Australian towns and cities may mean that more green waste is generated in Australia than many European countries; and
  - socioeconomic differences including differences in per person income levels, population densities and available waste management technologies in the home (such as in-sink garbage disposals).

This chapter provides a snapshot of the amounts of waste generated, recovered and disposed of in Australia. It provides comparisons between the different states and territories within Australia, and between Australia and other countries. It also discusses some of the reasons for the differences observed.

Caution should be exercised when interpreting the data provided in this chapter. Australian waste data are collected and reported by a variety of organisations including: landfill operators, material reprocessors (recyclers), local governments, environment protection agencies (EPAs) and their affiliates, and industry associations. Each has its own data collection and reporting requirements, and may use different waste classifications, and different regional and industry coverage.

Some state and territory environmental protection and/or waste management authorities draw upon these data to report on the quantity and composition of material recycled, and/or waste generated and disposed to landfill (DEC 2004e; EcoRecycle Victoria 2005d; EPA Queensland 2006b). While the quality and coverage of data have improved over time, there are still some gaps and inconsistencies, including:

- differences between jurisdictions in the classification of waste, the definition of recycling and data collection methods;
- low (though improving) response rates from reprocessor surveys; and
- difficulties in collecting data on waste generation, disposal and recycling in rural and regional areas.

Most of the Australian data presented in this chapter are for 2002-03, due to the difficulties in obtaining more recent data that are comprehensive in their coverage of waste management activity in Australia. These data were compiled by Hyder Consulting as part of the submission by the Department of the Environment and Heritage to this inquiry (DEH, sub. 103). Data have also been taken directly from international organisations, government and industry sources.

2.1 Trends in waste generation and disposal

This section illustrates current and past patterns of waste generation, recycling and disposal in Australia.

Waste generation in Australia

Australia generated approximately 32.4 million tonnes of solid waste in 2002-03. Of this amount, approximately 27 per cent was municipal waste, 29 per cent was from the commercial and industrial (C&I) sector, and 42 per cent was from the construction and demolition (C&D) sector (table 2.1). Overall, approximately 1.6 tonnes of waste were generated for every Australian in 2002-03. These estimates do not include waste generated and dealt with on-site by the waste generator.[1]

Table 2.1 **Solid waste generation in Australia, 2002-03**

State/Territory	*Municipal*	*Commercial and industrial*	*Construction and demolition*	*Total*	*Per person*
	kilotonnes	kilotonnes	kilotonnes	kilotonnes	kilograms
New South Wales	3 326	4 196	4 649	12 171	1 828
Victoria	2 291	2 743	3 575	8 609	1 763
Queensland[a]	1 742	959	1 166	3 973	1 057
Western Australia[b]	833	744	1 945	3 522	1 820
South Australia[c]	600	677	2 156	3 433	2 255
Tasmania[d]	142	na	na	na	na
ACT[a]	111	150	250	674	1 420
Northern Territory[e]	68	na	na	na	na
Total	**8 903**	**9 469**	**13 741**	**32 382**	**1 639**

a Total waste generation estimates for Queensland and the ACT include 105 kilotonnes and 163 kilotonnes of 'organics' respectively that were recycled by the private sector but were not disaggregated by source sector as the split was unknown. **b** Incorporates recycling data for the financial year 2004-05. Waste generation estimates incorporate landfill disposal data that are for metropolitan Perth only. **c** Data are for calendar year 2003. The estimate of total waste generation includes meat waste, a prescribed industrial waste, which was included in the recycling data. **d** Municipal waste generation is the sum of the total amount of municipal waste disposed to landfill and the total amount of recyclable material collected via kerbside recycling services. Kerbside collection data are for 2004-05 and are only available for 9 out of 29 local governments. **e** Not included in total figures. Municipal waste generation is the sum of the total amount of waste disposed to landfill to the total amount of material sold or sent for secondary use (including energy recovery) from kerbside recycling services. **na** Not available.

Data sources: ABS (*Australian Demographic Statistics*, Cat. no. 3101.0); AGO (unpublished); DEH (sub. 103, att. A); NEPC (2003, 2005b).

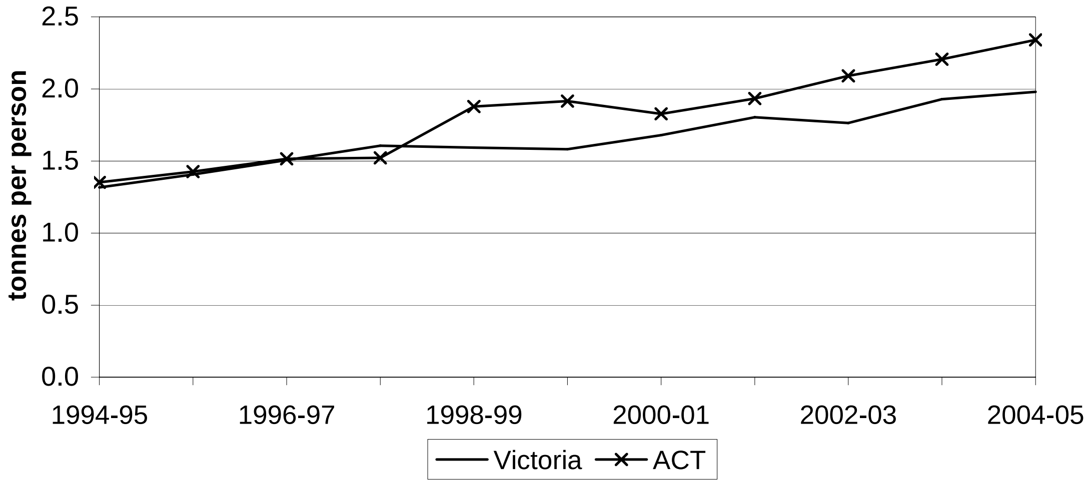
The generation of waste appears to have been growing over time

Time-series data from Victoria and the ACT suggest that the amount of waste generated in Australia has grown over time. Approximately 1.3 tonnes of solid waste were generated per person in both Victoria and the ACT in 1994-95 (figure 2.1). This amount had risen to approximately 2.0 tonnes and 2.3 tonnes per person respectively in 2004-05. This implies an average growth rate in waste generation of 4 per cent per person for Victoria, and 5 per cent per person for the ACT.

1 The data contained in this chapter refer only to waste (including recoverable materials) dealt with by a party other than the waste generator. Data on on-site reuse, recycling and disposal are not included. On-site waste treatment is common in the mining and mineral processing, agriculture, and manufacturing sectors.

Comprehensive time-series data on waste generation are not available at the national level, nor in many jurisdictions. Until recent years, comprehensive data on the recycling of putrescible and nonputrescible material have not been available, and landfill disposal data have not been available for regions outside of metropolitan areas. However, it is likely that waste generation has been increasing throughout Australia.

Figure 2.1 **Waste generation in Victoria and the ACT[a]**



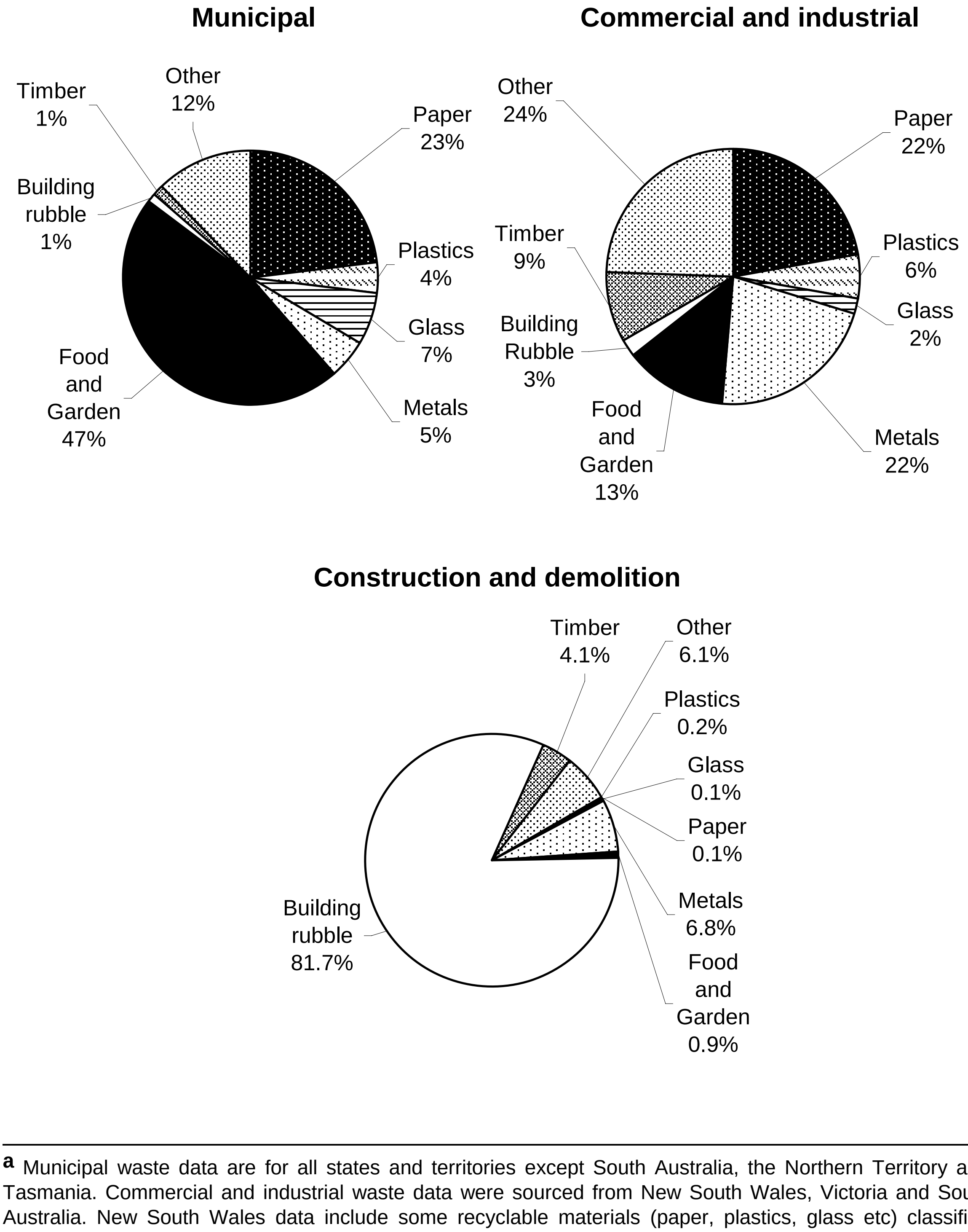
a Estimates of waste generation per person were calculated by dividing total waste generation by the total population of each jurisdiction. Total waste generation was calculated by adding the total amount of waste disposed to landfill to the total amount recycled in each jurisdiction. Victorian data for the financial years 1994-95, 1995-96 and 1996-97 were estimated using calendar year data. Estimates of waste generation for these years do not include waste disposed to landfill outside of metropolitan Melbourne, Geelong, Ballarat, Bendigo and the Mornington Peninsula.

Data sources: ABS (*Australian Demographic Statistics*, Cat. no. 3101.0); ACT NoWaste (sub. 36); Sustainability Victoria (unpublished).

The composition of waste from each source varies significantly

There are significant differences in the composition of each waste stream. For example, while almost half (47 per cent) of the municipal waste stream is food and garden waste, the commercial and industrial waste stream contains only 13 per cent food and garden waste, and the construction and demolition waste stream contains almost none (less than one per cent) (figure 2.2). In fact, over three-quarters (82 per cent) of the C&D waste stream is building rubble (concrete, brick, rubble and soil), compared to three per cent and one per cent for the C&I, and the municipal waste streams respectively.

Figure 2.2 **The composition of waste generated in Australia, 2002-03**[a]



[a] Municipal waste data are for all states and territories except South Australia, the Northern Territory and Tasmania. Commercial and industrial waste data were sourced from New South Wales, Victoria and South Australia. New South Wales data include some recyclable materials (paper, plastics, glass etc) classified under the category ‘other recyclables’. New South Wales data on metals excludes nonferrous metals such as aluminium. Construction and demolition waste data are for New South Wales, Victoria and South Australia only.

Data source: DEH (sub. 103, att. A).

Differences in the composition of waste streams have implications for the way they are managed. For example, the prevalence of food and garden waste in the municipal waste stream can make it difficult to extract other recyclable materials that are more valuable to reprocessors without first having it sorted by the householder. Without proper sorting, many of these materials would have to go to landfill due to contamination.

Also, the large percentage of food and garden waste in the municipal waste stream can potentially make it a significant source of greenhouse gas emissions, such as carbon dioxide and methane, as it biodegrades in landfill. In contrast, the high percentage of inert materials in C&D waste implies that it will have only minimal environmental impact in landfill (chapter 4).

The large percentage of uncategorised (other) waste reported for the C&I sector is the result of significant gaps in the data. C&I waste data are particularly difficult to accurately collect and report due to:

- differences in the way that waste data are disaggregated between jurisdictions;
- the inability of data collection exercises (including audits) to categorise all of the waste in each stream; and
- commercial sensitivity issues.

There are many reasons why waste generation has grown over time

The amount of waste generated per person in Australia is driven by a number of economic, demographic and lifestyle factors.

International evidence suggests that economic growth contributes to growth in waste generation per person (Christiansen and Fischer 1999; de Tilly 2004; OECD 2001b). Australia's economic prosperity over the past 10 to 15 years has undoubtedly contributed to the growing generation of waste. However, the exact size and nature of this relationship in Australia is uncertain due to the lack of adequate time-series data on waste generation.

Growth in waste generation per person may have also been driven by the decline in the size of the average Australian household (Department of the Environment and Heritage, sub. 103; Packaging Council of Australia, sub. 67). Average household size in Australia decreased by 14 per cent in the 20 years to 2001 (ABS 2004a). The Packaging Council of Australia (PCA, sub. 67) argued that this decrease in household size has contributed to the ownership of more durable goods per person and a wider range of packaged-good sizes. Many of the smaller-sized goods now available have greater packaging-to-product ratios than larger goods.

Other factors contributing to growing waste generation per person may include the growing travel time between home and work, and increased purchases of durable items. As travel time increases, the amount of time available for domestic tasks decreases, and may increase the demand for time-saving devices (such as washing machines and dishwashers) and pre-prepared food. The European Environment Agency (EEA 2005) has argued that durable goods, such as household appliances and electronic devices, are being replaced more often now than in the past due to changes in fashion, reduced product durability, and lower prices compared with the cost of repairs.

Resource recovery in Australia

Resource recovery refers to the creation of a useful resource from what would otherwise be waste material. It includes the reuse, recycling, and recovery of energy-from-waste. Recycling refers to the recovery of used products and their reformation for use as raw materials in the manufacture of new products, which may or may not be similar to the original.

Recyclable materials are collected either by household kerbside collections, public recycling bins, or are delivered directly by the householder to recycling depots. Large producers of waste in the commercial and industrial, and construction and demolition sectors normally arrange for the private collection and delivery of recyclable materials to be reprocessed.

The materials collected are generally reprocessed by specialist recyclers. A range of materials — including paper, glass, metals and plastics — are separated, cleaned, and reprocessed for use as inputs in the production of new products. Food and garden waste (and other putrescibles) can be separated and converted, usually by composting, into a nutrient input for parkland, gardens and agriculture.

Energy recovery is usually carried out through the collection and use of heat generated through the controlled combustion (incineration, pyrolysis and gasification) of waste materials. Energy can also be generated from methane released in the decomposition of waste in landfill. This form of energy recovery is discussed in the next section.

Hyder Consulting (DEH, sub. 103, att. A) estimated that 30 per cent of municipal waste, 44 per cent of C&I waste, and 57 per cent of C&D waste generated was recycled in 2002-03. Overall, the recycling rate was estimated to be 46 per cent (table 2.2). However, recycling data should be interpreted with caution, especially when making comparisons between jurisdictions and with other countries (box 2.1).

Table 2.2 Recycling rates in Australia, 2002-03[a]

State/Territory	*Municipal*	*Commercial and industrial*	*Construction and demolition*	*Total*
	per cent	per cent	per cent	per cent
New South Wales	35	33	71	48
Victoria	33	63	54	51
Queensland[b]	26	22	42	31
Western Australia[c]	11	44	21	23
South Australia[d]	39	69	67	63
Tasmania	na	na	na	na
ACT[b]	26	35	89	69
Northern Territory[e]	10	na	na	na
Total	**30**	**44**	**57**	**46**

a Recycling rates show the percentage of waste generated in each waste stream (tonnes to landfill disposal plus tonnes recycled) that was recycled. **b** Total recycling estimates for Queensland and the ACT include 105 kilotonnes and 163 kilotonnes of organics respectively that were recycled by the private sector but were not disaggregated by source because the split was unknown. **c** Data are for 2004-05. Waste generation estimates incorporate landfill disposal data that are for metropolitan Perth only. **d** Data are for calendar year 2003. Recycling data includes meat waste, a prescribed industrial waste. **e** Productivity Commission estimate. Recycling rates from nonmunicipal waste streams were not estimated due to insufficient data. **na** Not available.

Data source: AGO (unpublished); DEH (sub. 103, att. A); NEPC (2003, 2005b).

Box 2.1 **Problems with Australian recycling data**

There are many reasons why caution should be used when interpreting Australian recycling data. Some recycling data report the amount of material *collected for recycling*, while others report the amount that was actually *reprocessed*. If a jurisdiction or country reports the amounts collected for recycling rather than the amount actually reprocessed, effective recycling activity will be overstated. Data for New South Wales, Victoria, Western Australia, South Australia and the ACT appear to report amounts reprocessed, while Queensland data report amounts collected (although this is likely to change in forthcoming surveys). Some of the material collected may be stockpiled for use in future years, and some may be disposed to landfill due to contamination.

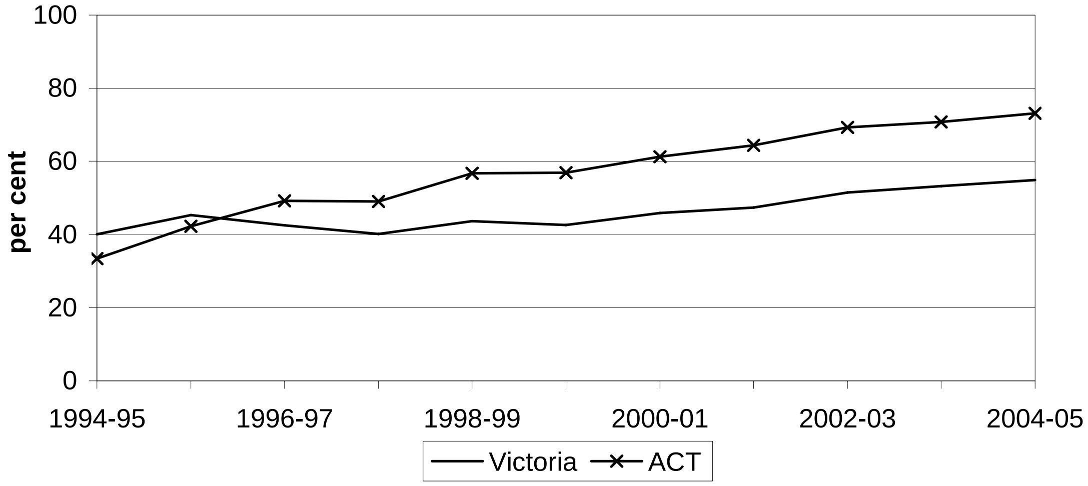
Using state and territory data to create national recycling estimates may result in some overlaps in reprocessing data between jurisdictions. Most jurisdictions' data sets report the material exported/imported in each period, and unless these amounts are explicitly taken into account to avoid double counting (and it is likely that they have not), recycling estimates may be slightly overreported. Many jurisdictions' reprocessor surveys also suffer from low response rates, which may underreport recycling activity in Australia. For example, Queensland recycling surveys had a 54 per cent response rate in 2002-03, and in New South Wales the response rate was 63 per cent (though responding businesses made up 90 per cent of the industry).

Sources: DEC (2004e); EPA Queensland (2006b); Knight, L., Queensland Environmental Protection Agency, pers. comm., Brisbane, 28 April 2006; Mannall, G., ACT NoWaste, Canberra, pers. comm., 12 April 2006; Partl, H., Hyder Consulting, Sydney, pers. comm., 10 April 2006.

Recycling rates have increased over time

The amount of material recycled in Australia appears to have increased over time both as a proportion of total waste generated, and in absolute terms. Victoria recycled approximately 40 per cent of its total waste and the ACT 33 per cent in 1994-95 (figure 2.3). This had risen to 55 per cent and 73 per cent respectively in 2004-05.

Figure 2.3 **Recycling rates in Victoria and the ACT**[a]



a Recycling rates were calculated for each jurisdiction by dividing the tonnes of material recycled by tonnes of waste generated (recycled plus disposed to landfill) in each period. Victorian data for the financial years 1994-95, 1995-96 and 1996-97 were estimated using calendar year data. Estimates of recycling rates may be overestimated for these years due to the lack of landfill tonnage data (with which to calculate them) outside of metropolitan Melbourne, Geelong, Ballarat, Bendigo and the Mornington Peninsula.

Data sources: ACT NoWaste (sub. 36); Sustainability Victoria (unpublished).

While recycling rates for concrete, bricks and asphalt; paper; plastics and metal grew substantially in Victoria from 1994-95 to 2004-05, the recycling of glass actually fell (Sustainability Victoria 2005). The main reason for this decline appears to have been the replacement of crate-based recycling collection systems with co-mingled systems. Glass breakage is much greater in a co-mingled system, which means that less glass is able to be economically separated and reprocessed.

While recycling trends could be determined for the materials mentioned above, food and garden waste, and rubber (predominantly rubber tyres) experienced great year-on-year fluctuations in the tonnes recycled. This appears to be due to differences in survey response rates, and industry activity, between periods.

There are many reasons why recycling rates have increased

Recycling rates have increased over time for many reasons. In particular, there has been an increase in the proportion of Australian households with access to kerbside recycling services — from 76 per cent in 1996 to 87 per cent in 2003 (ABS 2003). Collection has also become easier for households following the introduction of 'wheelie bins', resulting in a greater quantity and variety of materials now being collected. While the greater provision of recycling collection services, and the ease of use of new collection methods, have increased aggregate yields of recyclable materials, they have also lead to greater contamination rates.[2]

Demand for many of the materials recovered — especially metals and plastics — has increased in recent years, encouraging greater levels of recovery (AAC 2004; DITR 2004; PACIA 2005). This has been driven, for the most part, by the demand for raw materials in international markets. However, commodity markets are inherently volatile, and thus while the recovery of some materials is currently profitable, it may not be during some periods in the future (box 2.2).

Landfill levies have been introduced or increased in many states and territories. This has created incentives for many in the commercial and industrial, and construction and demolition sectors to find alternatives to landfill for the treatment of waste and recyclable materials (chapters 3 and 9).

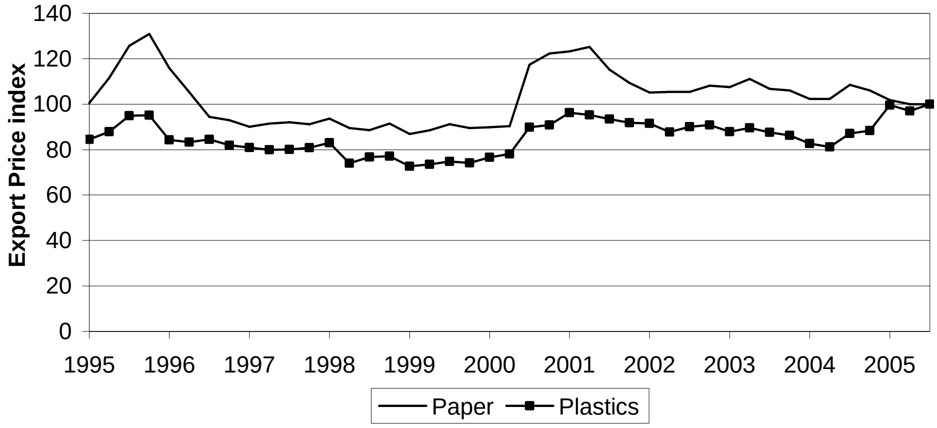
Many inquiry participants argued there is strong community support for recycling (and by implication, this has contributed to growth in recycling rates) (for example, ACT Department of Urban Services, sub. DR139; Department of the Environment and Heritage, sub. 103; NSW Government, sub. DR195). However, while evidence suggests that the majority of households participate in recycling schemes, and consider it an important activity, the strength of their support, and its inherent effect on recycling rates, is much less certain (ABS 2003; Harrison Market Research 2005). Many households' recycling participation may simply be a response to having a convenient and easy to use recycling service provided for them (Peter Carroll, sub. 162). Other likely contributors include the actions by many local governments to encourage recycling by reducing the size of household general-waste bins, and making it less costly to obtain a larger recycling bin than a larger general-waste bin.

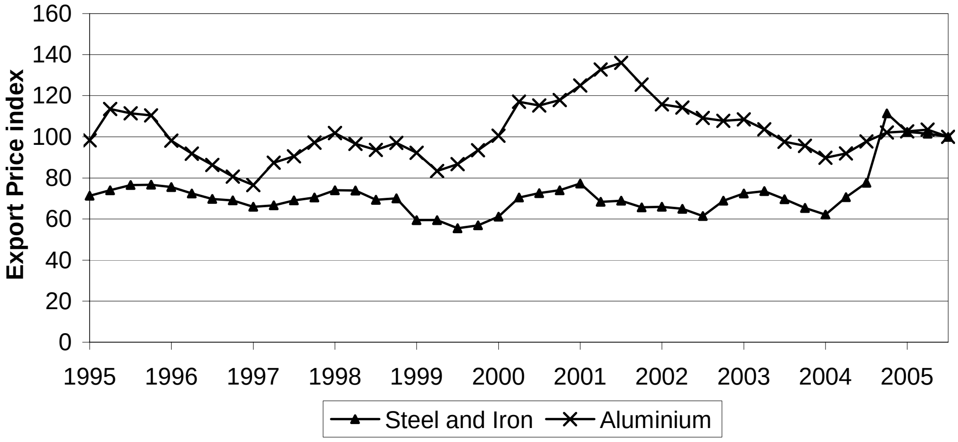
2 Surveys conducted by EcoRecycle Victoria (2005d) (now Sustainability Victoria) suggest that, in 2003-04, 5 per cent of material collected for reprocessing was contaminated and had to be disposed to landfill. The contamination rate appears to be growing over time as recycling tonnages increase.

Box 2.2 **Commodity markets and recovered resources**

Like the virgin materials from which they are derived, many of the materials recovered in Australia — such as paper, plastic and metals — are traded on world commodity markets. Where recovered materials are close substitutes for virgin materials, the prices received for recovered materials will be influenced by both the prices of virgin materials and the supply and demand of recovered materials. Given that world prices for many virgin materials can be volatile (as shown in the figures below), the prices for recovered materials can also be expected to be volatile.

Commodity Export Prices[a]





[a] Price indexes use June 2005 as the base period and were calculated using export prices in Australian dollars. Price indexes include prices for both virgin and recovered material, although the latter component is likely to be small.

Data source: ABS (*International Trade Price Indexes: Australia*, Cat. no. 6457.0)

(Continued on next page)

Box 2.2 (continued)

Porter (2002) noted that the prices of recovered materials may be even more volatile than the prices of virgin materials. Part of the reason for this is that the supply of recovered materials does not respond readily to market conditions. Kerbside collection, for example, is subject to long-term contracts, meaning that the supply of recyclables is relatively fixed in the short term. If supply does not respond to changes in demand in the short term, price fluctuations will be even greater than for virgin materials.

Recovered materials are also often marginal supplements used as needed in the production process (Ackerman 1997). Where this is the case, the demand for recovered materials will fluctuate even more than demand for the virgin material. However, as markets for recovered materials mature (for example, the investment in Australia in a de-inking plant is underpinning domestic demand for used newsprint), or new uses are developed for recovered materials, demand will tend to become less volatile.

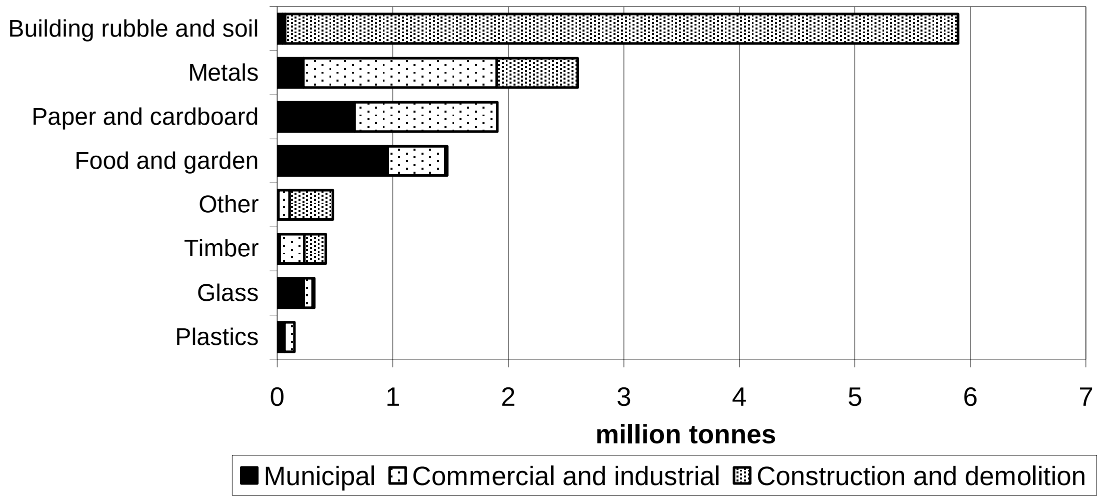
Prices for virgin and recovered materials are expected to fluctuate over time as new supplies of raw materials are discovered, technologies and consumer preferences change, and as general economic conditions vary. Such price changes are likely to periodically affect the viability of resource recovery in the future.

Some materials are recycled more than others

By weight, building rubble (including concrete, brick, tile and asphalt) and soil are by far the most recycled materials. Approximately 5.9 million tonnes of building rubble and soil were recycled in New South Wales, Victoria, Western Australia and South Australia combined in 2002-03 (figure 2.4). This was more than twice the amount of metal recycled (2.6 million tonnes), and more than three times the amount of paper and cardboard (1.9 million tonnes), and food and garden waste (1.5 million tonnes).

Among the most significant materials recycled, as a proportion of each waste material generated, appears to be metals, paper and cardboard, and building rubble and soil. Data for Victoria show that metals had the highest recycling rate in that state (82 per cent), followed by paper and cardboard (74 per cent), building rubble and soil (55 per cent), and glass (38 per cent) in 2002-03 (figure 2.5). These materials were also among the most recycled in New South Wales and the ACT, though the relative percentages and rankings differ.

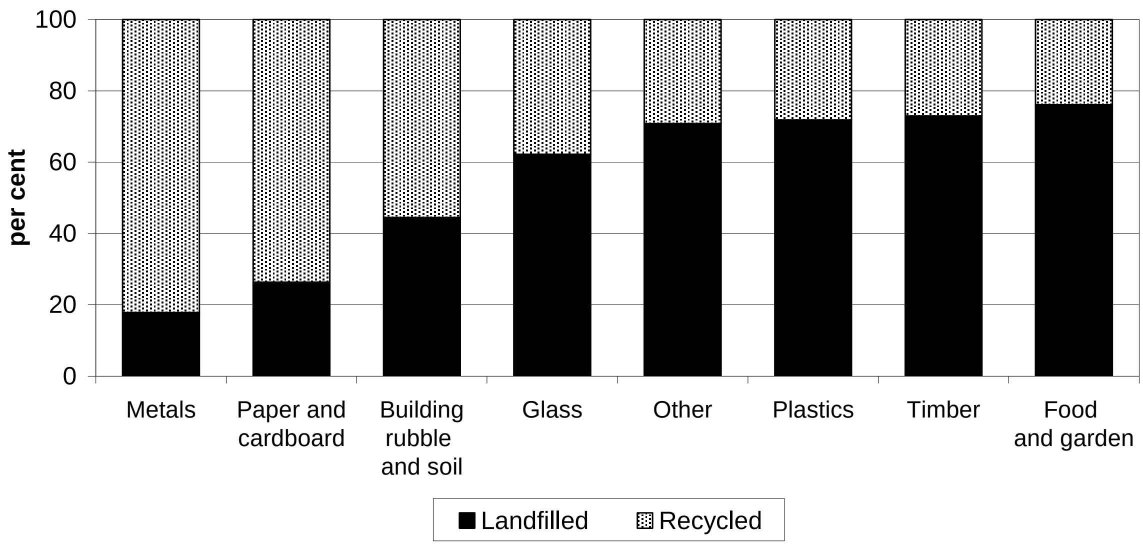
Figure 2.4 **The composition of recycling in Australia, 2002-03**[a]



a Data are for New South Wales, Victoria, Western Australia and South Australia only. Other states and territories have substantial gaps in their compositional data. Recycling data measure the amount of material either reprocessed locally or exported interstate or overseas for reprocessing. Data on metal recycling in New South Wales do not include non-ferrous metals. For South Australia, food and garden waste includes meat waste. Other waste includes data from New South Wales on ‘other recyclables’ including aluminium and other non-ferrous metals, liquid paper board, ‘mixed hardcore’ construction and demolition waste, and other construction and demolition waste.

Data source: DEH (sub. 103, att. A).

Figure 2.5 **The recycling and landfill disposal of waste in Victoria, 2002-03**[a]



a Recycling and landfill disposal rates were calculated as the total number of tonnes of each material recycled or disposed to landfill as a percentage of the total number of tonnes of waste generated. Recycling rates measure the percentage of each resource generated that was reprocessed in Victoria or exported interstate or overseas for reprocessing.

Data source: DEH (sub. 103, att. A).

Some industry bodies collect their own data on the recovery of their products. For example, the Plastics and Chemicals Industries Association collects data on plastics consumption and recycling (box 2.3), and the Newsprint Producer and Publisher Group reports on the percentage of newsprint that is recycled.

Box 2.3 The Plastics and Chemicals Industries Association's reports on plastic recycling in Australia

The Plastics and Chemicals Industries Association has commissioned regular annual surveys of plastics recycling in Australia since 2001 (following on from less frequent surveys conducted in the 1990s). These surveys are conducted to provide information on the import, export, consumption and recycling of plastics to the National Packaging Covenant Council and governments.

Reprocessors, manufacturers and exporters are surveyed for the weights, polymer types, source and destination of their plastics. Response rates to surveys are very high, with 53 out of 59 reprocessors responding to the survey, and both known waste-plastics exporters responding, in 2005.

Key findings from the most recent survey include:

- 191 kilotonnes of plastics were recycled in 2004, of which 68 per cent was reprocessed locally and 32 per cent was exported to Asia for reprocessing.
- From 1997 to 2004, the total recycling rate of plastics increased from 7 per cent to 13 per cent.
- Over half (56 per cent) of recycled plastics came from the C&I sector, 42 per cent came from the municipal sector, and 1 per cent came from the C&D sector.
- 141 kilotonnes of the plastics recycled in 2004 were packaging. Given that approximately 634 kilotonnes of plastic packaging were consumed in that year, this gives a recycling rate of approximately 22 per cent.

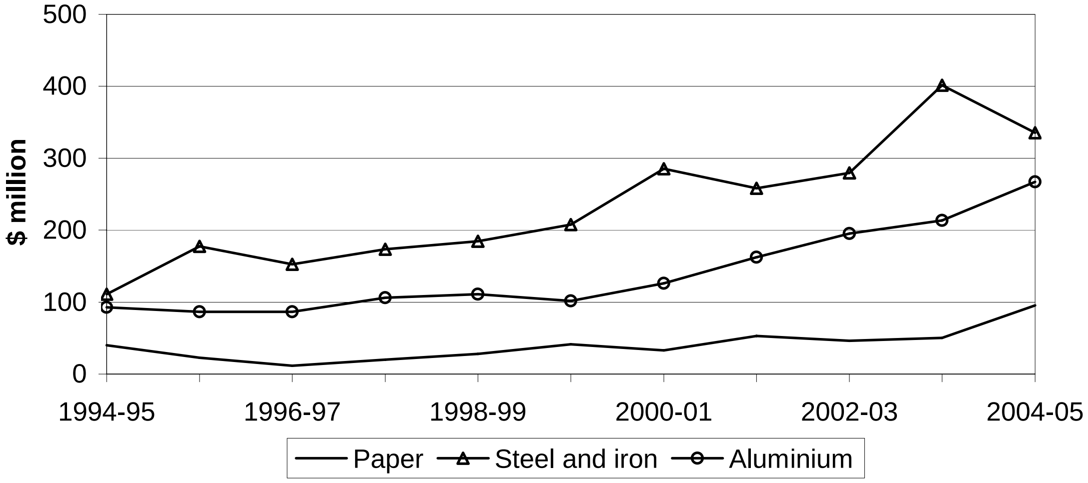
Sources: PACIA (2002, 2005).

Exports of some recyclable materials have increased

There has been significant growth in the value of recyclable materials exported between 1994-95 and 2004-05. The value of waste and scrap exports of steel and iron more than tripled to $335 million; aluminium almost tripled to $267 million; and paper more than doubled to $95 million (figure 2.6). Similarly, exports of waste plastics grew from 33 kilotonnes in 2001 to 62 kilotonnes in 2004 (PACIA 2005). This was driven by growing demand in Asia, and rising world prices.

Nearly all of Australia's recyclable-material exports were sent to Asia, driven by increasing demand. Australia's most significant export market was China, though substantial quantities of steel and iron were also sent to Malaysia, India and Taiwan (AAC 2004; DITR 2004).

Figure 2.6 **The export of recyclable material from Australia[a]**



[a] Export values have been converted to a constant (June 2005) price level using export price indexes for each commodity group. They have also been adjusted from quarterly to annual (financial year) figures. Manufacturing waste has not been included in these figures. Paper waste includes waste and scrap of unbleached kraft paper, corrugated paper and paperboard; waste and scrap paper or paperboard made mainly of bleached chemical pulp; waste and scrap paper or paperboard made mainly by mechanical pulp (for example newspapers and journals); and other unsorted waste and scrap paper or paperboard. Steel and iron waste includes waste and scrap of cast iron, stainless steel, other alloy steel, tinned iron or steel, and other ferrous waste and scrap excluding machining waste.

Data sources: ABS (unpublished); ABS (*International Trade Price Indexes: Australia*, Cat. no. 6457.0).

Similar trends are found in the export of paper and plastic recyclables. A significant proportion of mixed waste paper and newsprint is exported to Indonesia, Malaysia and Thailand, with smaller amounts sent to Korea and China (Newsprint Producer and Publisher Group 2005). Large amounts of plastic recyclate, which is mostly industrial and post-consumer packaging waste, were sent to Asia, with China being the most significant buyer (PACIA 2005).

There is very little energy recovered from waste in Australia

An alternative destination for waste is thermal treatment (including incineration, pyrolysis and gasification) either with or without energy recovery. There are limited data available on the use of thermal treatment in Australia. Anecdotal evidence suggests that (excluding on-site facilities) little energy recovery is undertaken in Australia, other than in cement kilns, where some waste, such as oil and tyres, are used as supplementary fuels.

There are currently no large-scale thermal treatment facilities for the disposal of non-hazardous municipal solid waste in Australia. Although historically Australians incinerated a great deal of their waste — often with the use of backyard incinerators — its use has declined since the 1970s. This decline has been driven by many factors, including changes in the public perception of incineration, and the increasing stringency of air quality regulations (chapter 8). However, incineration continues to be used in many Australian jurisdictions for the disposal of hazardous substances — such as clinical and biomedical waste — that are often too dangerous to dispose of in other ways.

Waste disposal in Australia

Hyder Consulting (DEH, sub. 103, att. A) estimated that 70 per cent of municipal waste, 56 per cent of C&I waste, and 43 per cent of C&D waste generated was disposed to landfill in 2002-03 (table 2.3).

Table 2.3 **Landfill-disposal rates in Australia, 2002-03[a]**

State/Territory	*Municipal*	*Commercial and industrial*	*Construction and demolition*	*Total*
	per cent	per cent	per cent	per cent
New South Wales	65	67	29	52
Victoria	68	37	46	49
Queensland	74	78	58	69
Western Australia[b]	89	56	79	77
South Australia	61	31	33	37
Tasmania	na	na	na	na
ACT	74	65	11	31
Northern Territory[c]	90	na	na	na
Total	**70**	**56**	**43**	**54**

a Landfill-disposal rates show the percentage of waste generated in each waste stream (tonnes to landfill disposal plus tonnes recycled) that was disposed to landfill. **b** These disposal figures are for metropolitan Perth only. **c** Productivity Commission estimate for municipal waste. It was not possible to estimate landfill disposal rates for other waste streams due to insufficient data. **na** Not available.

Data source: DEH (sub. 103, att. A).

The overall-landfill disposal rate is estimated to be 54 per cent. However, landfill data should be interpreted with caution, especially when making comparisons between jurisdictions and with other countries (box 2.4).

Box 2.4 **Problems with Australian landfill data**

There are a number of difficulties in the collection and reporting of landfill data, and in using these data to identify trends over time.

It is often difficult to determine the source and composition of waste due to the way that waste is generated and disposed. Waste is transported to landfills using a variety of methods and from a diverse range of sources. Landfill operators are not in the position to determine, except in a broad sense, where waste comes from, nor the composition of the waste streams.

Many jurisdictions have used targeted landfill audits to get an indication of the source and composition of waste disposed to landfills. Targeted landfill audits involve surveying the people who deliver waste to the landfills about the source and composition of their waste delivery, and then visually inspecting this waste after it has been unloaded. However, audits are not without their problems. Their results may be affected by the characteristics of the landfills targeted and the time(s) of year in which they are conducted. Also, differences in methodology may make the results difficult to compare between audits.

Similarly, different waste classification systems are used in different jurisdictions. This makes it difficult to compare landfill data between jurisdictions (chapter 12).

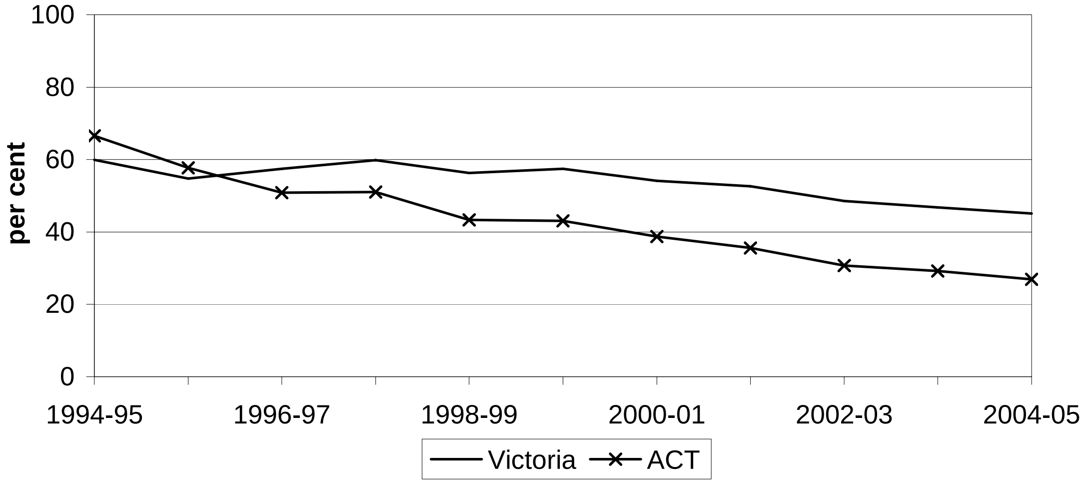
Traditionally, landfill data for regional and rural areas have either not been available, or where they are available, their accuracy has been in question. However, this situation appears to have improved in recent years. Increasing scale has made more non-metropolitan landfills subject to licensing and data collection requirements, and increased the use of weighbridges, which improve the accuracy of data.

More waste has been diverted away from landfills over time

The amount of waste disposed to landfill in Australia as a proportion of total generated, appears to have fallen. For example, landfill-disposal rates decreased from 60 per cent to 45 per cent and 67 per cent to 27 percent respectively, in Victoria and the ACT between 1994-95 and 2004-05 (figure 2.7). It is not possible to estimate landfill-disposal rates for other jurisdictions over more than a few years due to a lack of data.

Landfill-disposal rates have declined for the same reasons that recycling rates have increased. A discussion of these reasons can be found earlier in this chapter.

Figure 2.7 **Landfill-disposal rates in Victoria and the ACT**[a]



[a] The landfill-disposal rate is the total tonnes of material disposed to landfill as a percentage of the total tonnes of waste generated. Victorian data for the financial years 1994-95, 1995-96 and 1996-97 were estimated using calendar year data. Landfill data for these years only cover metropolitan Melbourne, Geelong, Ballarat, Bendigo and the Mornington Peninsula. ACT landfill disposal data were adjusted by the Commission to remove significant quantities of contaminated soil disposed to landfill in 1997-98, and metal floc from Sydney disposed to landfill in 1998-99 and 1999-2000.

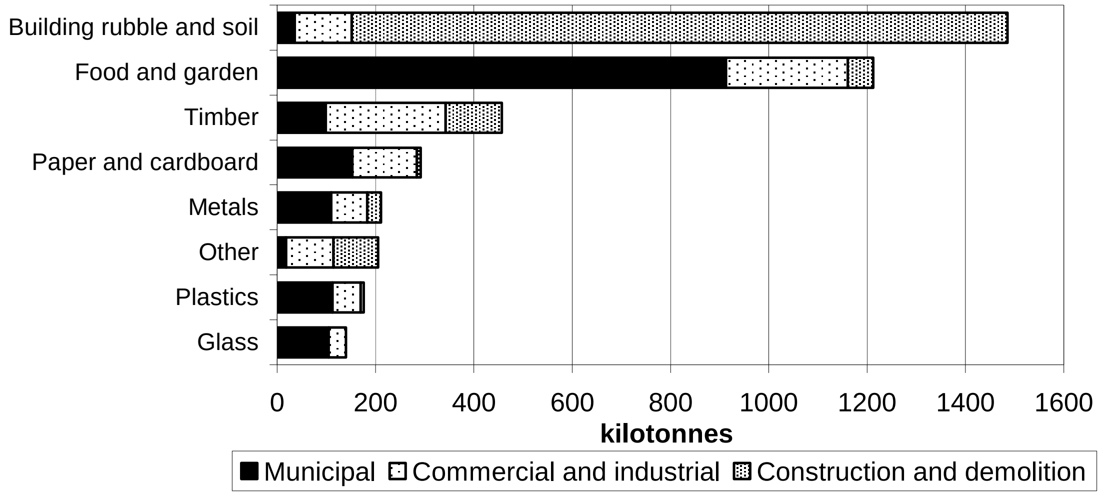
Data sources: ACT NoWaste (sub. 36); Sustainability Victoria (unpublished).

Some waste types are disposed to landfill more than others

The materials with the greatest tonnages disposed to landfill appear to be building rubble and soil, food and garden waste, and timber. Victorian data show that the majority of building rubble and soil, and timber came from C&D sources in 2002-03 (figure 2.8). It is difficult to determine the relative sources, quantities and landfill-disposal rates of each waste type for other jurisdictions, or Australia as a whole, due to the lack of adequate compositional data.

Victorian data also indicate that food and garden waste had the highest landfill-disposal rate (76 per cent), followed by timber (73 per cent) and plastics (72 per cent) in 2002-03 (figure 2.5).

Figure 2.8 **The composition of waste disposed to landfill in Victoria, 2002-03[a]**



[a] Compositional data are also available for New South Wales and the ACT. Victorian data are used as an example.

Data source: DEH (sub. 103, att. A).

The use of landfill gas recovery is growing

The Department of the Environment and Heritage (DEH 2005b) has estimated that, between 1990 and 2003, the proportion of methane generated in landfills that was captured in Australia grew from almost zero to approximately 24 per cent. Once collected, the methane and other gases are flared (thus reducing greenhouse impacts) or used to generate electricity. The DEH also estimated that up to 75 per cent of landfills servicing major urban areas and capital cities use gas-capture technologies (DEH 2005f).

Growth in landfill-gas capture has occurred for a variety of reasons. These include government incentives and regulatory requirements promoting the generation of electricity from renewable sources, attempts to reduce greenhouse gas emissions from landfills, and commercial incentives (DEH 2005b). Other reasons given by inquiry participants included occupational health and safety measures, odour control and improved revegetation (for example, Victorian Government, sub. DR187; WMAA Landfill Division, sub. DR159). Most of the methane captured in Australian landfills is used for electricity generation (for use either on- or off-site).

Landfill-gas capture does not represent a significant energy source for Australia. Landfill-gas capture projects represent only one per cent of total renewable energy generation in Australia and less than five per cent of Australia's total energy consumption came from renewable sources in 2003-04 (ABARE 2005b; DEH 2005b).

The illegal disposal of waste is a significant problem

Although little data are available on illegal disposal, there is sufficient evidence to suggest that it is a significant problem. The costs imposed on local governments from the cleanup of litter and illegal dump sites (chapter 4), and the enforcement of littering and illegal dumping laws (chapter 8) can be considerable. Some data are available from studies conducted on the nature and causes of littering behaviour, and the prevalence of litter in the community.

Illegal dumping

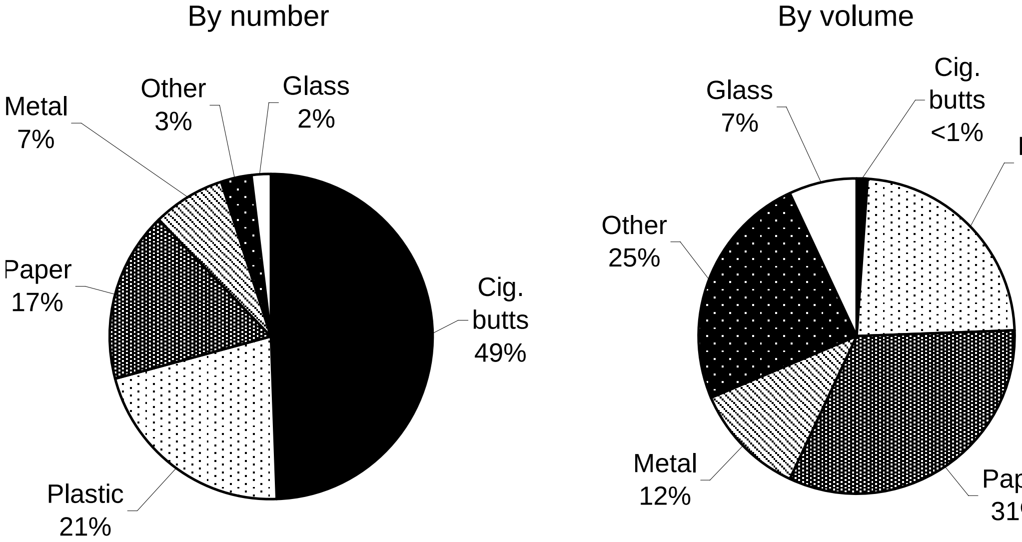
Incidences of illegal dumping are only officially recorded when the appropriate authorities receive complaints from the public, it is investigated, and the appropriate remedies are sought. For example, the Western Sydney Regional Illegal Dumping Squad (covering the Baulkham Hills, Bankstown, Fairfield, Hawkesbury, Holroyd and Penrith councils) heard 779 complaints, and conducted 782 investigations in 2002-03 (DEC 2004e). There were 236 penalty infringement notices and 50 clean-up notices issued in that year to the values of $152 492, and $16 000 respectively.

Data on investigations and infringement notices are not necessarily reliable indicators of the incidence of illegal dumping. The number of investigations and infringement notices reported in any given year will be correlated with the strength of illegal dumping regulations, and the resources dedicated to their enforcement.

Litter

Data on the incidence of litter, its composition, and littering behavioural trends are collected by several industry groups and non-government organisations. A recent national study for Keep Australia Beautiful by McGregor Tan Research (2006b) found the most significant items in the Australian litter stream (by number) were: cigarette butts (49 per cent), plastics (21 per cent) and paper products (17 per cent) (figure 2.9). In contrast, volumetric estimates (in cubic metres) suggest that paper and plastic products are the most significant litter items, and cigarette butts the least significant. The study also found that litter is most likely to be found alongside highways, at car parks and at industrial sites. These results are broadly consistent with a similar study conducted six months previously (McGregor Tan Research 2006a).

Figure 2.9 **The composition of litter in Australia, 2006**[a]



[a] Litter is defined as all waste located within any survey site apart from that properly disposed of in a waste receptacle. Food is not counted as litter. While most count data (number of litter items) were collected via counting each item individually, in some cases, such as where large numbers of cigarette buts were found, estimates were used. Volumetric estimates take into consideration that a certain proportion of items found would be crushed and weathered.

Data source: McGregor Tan Research (2006b).

Studies by the Beverage Industry Environment Council (BIEC 2004) suggest that the incidence of correct disposal behaviour (for example, not littering, and placing items in the correct bins) by individuals in Australian public places has increased in recent years. The majority of people observed in the BIEC studies disposed of items correctly in 2004. Sydney and Melbourne were found to have the lowest incidence rates of incorrect disposal behaviours of all of the capital cities in 2004, while Canberra had the highest. Littering behaviour is more prevalent for particular groups and under certain conditions. The people most likely to litter are aged below 25 years old, unemployed and/or are part of large groups (BIEC 2004).

Furthermore, the results suggest that some of the most common reasons for observed littering behaviour are a lack of sufficient bins and ashtrays in close proximity (cigarette butts were the most common litter item observed by number). The BIEC (2004) also found that the incidence of correct disposal behaviour was greater in locations that were clean to begin with, and in regions where an 'environmental awareness' (for example, anti-litter) campaign was in place. Several inquiry participants cited previous government education programs, such as the 'Do-the-Right-Thing' campaign, as contributing to the substantial decrease in litter levels since the late 1970s (Australian Food and Grocery Council, sub. 93).

FINDING 2.1

Australian waste data are collected from a range of sources. Differences in definitions and collection methodologies between data sets, and inherent difficulties in collecting data on waste, mean that the data have substantial gaps and biases.

2.2 Comparisons with other countries

This section attempts to illustrate how Australian trends in the management of municipal waste compare and contrast with those of other countries. Nonmunicipal waste is not discussed due to the significant difficulties in comparing data between countries. These difficulties include: differences in economic structures; the lack of comparable nonmunicipal waste data in OECD reports; and inconsistencies in the application of OECD data definitions between countries.

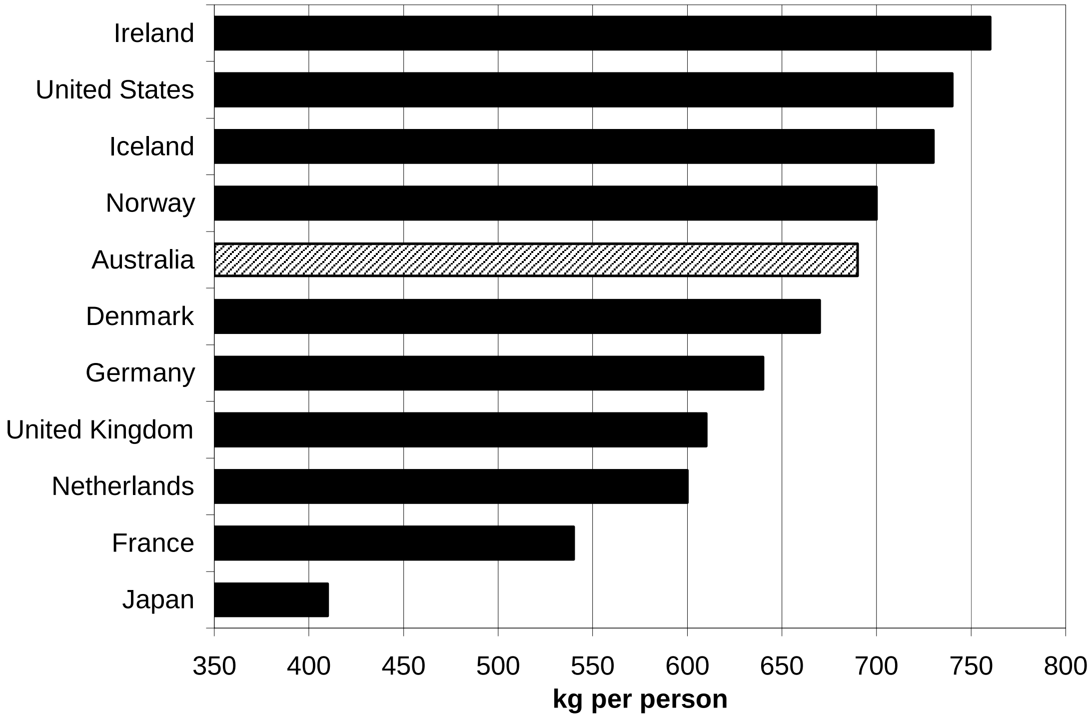
Waste generation in Australia and other countries

Many commentators and inquiry participants have argued that Australians generate large amounts of waste by international standards. The terms of reference for this inquiry include the statement that ‘Australians generate solid waste at a high rate compared with most other OECD countries’. OECD data report that 690 kilograms of municipal waste per person was generated in Australia in 2003 (OECD 2005b). This places Australia fifth in the OECD rankings of municipal waste generation (out of all 30 countries in the OECD), exceeded only by Ireland, the United States, Iceland and Norway (figure 2.10).

Part of the reason for Australia’s high apparent rate of waste generation can be explained by the OECD secretariat’s practice of generating its own estimates of Australia’s total municipal waste generation since the late 1990s (OECD 2005b). The OECD’s estimate of municipal waste generation was 13.8 million tonnes in 2003. This is significantly higher than estimates made by Hyder Consulting (DEH, sub. 103, att. A) (8.9 million tonnes estimated for 2002-03) and WCS Market Intelligence (2001) (8.4 million tonnes estimated for 2001).

The reasons for these differences may include the OECD’s broader definition of municipal waste, the extrapolation by the OECD of data from earlier years, and the inclusion of (a potentially significant amount of) C&I waste in estimates for Australian municipal waste generation (OECD 2005b).

Figure 2.10 **Municipal waste generation in Australia and selected OECD countries, 2003[a]**



a Municipal waste is waste collected and treated by or for municipalities. It includes waste originating from households, commercial activities, office buildings, institutions such as schools and government buildings, and small businesses that dispose of waste at the same facilities used for municipally-collected waste. Household waste includes garbage, bulky waste, and separately-collected waste. Data are either for 2003 or latest available year. Data for Ireland includes estimates of waste generation by households not served by waste collection services. Data for Iceland are for 2002. Data for Norway includes approximately 20 kg per person of C&D waste. Per person amounts are adjusted for the population served by municipal waste collection services. Data for Australia were estimated based on data for the late 1990s, and may include significant amounts of C&I waste. Data for Germany were estimated. Data for Japan are for 2001, and include municipal waste collection, waste directly delivered and in-house treatment, but excludes separate collection for recycling by the private sector (approximately 22 kg per person).

Data source: OECD (2005b).

Waste generation data are not strictly comparable between countries

Collection, classification and reporting issues make waste data difficult to compare between countries. Waste source and type classifications used in each country's data collections are often inconsistent and do not necessarily match those used by the OECD.

This is especially true in the case of municipal waste data. The OECD (2005b, p. 68) defined municipal waste as:

> … waste collected and treated by or on the order of municipalities. It includes waste originating from households, commercial activities, office buildings, institutions such

> as schools and government buildings, and small businesses that dispose of waste at the same facilities used for municipally-collected waste …. Household waste … includes garbage, bulky waste, and separately-collected waste.

However, some countries' municipal waste data varies significantly from this definition. For example, New Zealand municipal waste generation figures only include 'household waste landfilled … and packaging waste recycled' (OECD 2005b, p. 68). Municipal waste generation estimates for different countries may be under- or over-reported depending upon how local data definitions compare to those of the OECD and the availability of data.

These, and other, data collection and comparability issues have been identified by the OECD and the European Commission in its publications. According to the OECD (2005c, p. 8):

> … in many countries, systematic collection of environmental data has a short history; sources are typically spread across a range of agencies and levels of government, and information is often collected for other purposes.

Furthermore, a recent review of the European Commission's Packaging and Packaging Waste directive found that member states had not harmonised their data collection methodologies (Perchards 2004). This meant that data were not necessarily comparable between members. These weaknesses make it difficult to make definitive comparisons of waste generation and management data between countries, and as such these data should be used with caution.

The composition of municipal waste streams differ between countries

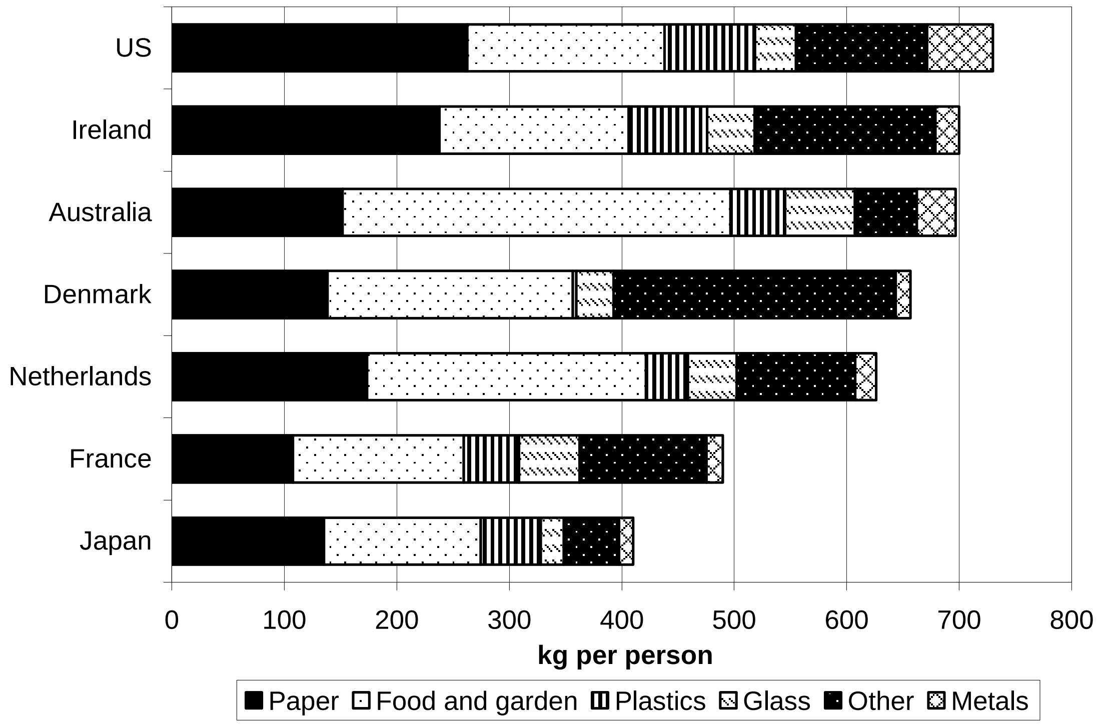
The OECD's estimate of Australia's municipal waste generation per person may also reflect the greater significance of food and garden waste in the Australian municipal waste stream. The proportion of food and garden waste in Australia's municipal waste stream was 50 per cent in 2002, compared to, for example, 24 per cent for both Ireland and the United States (figure 2.11). Data from New South Wales, Victoria and South Australia suggest that garden waste made up half of food and garden waste in 2002-03 (DEH, sub. 103, att. A).

There are many other reasons why the weight and composition of waste generated in each country may differ. These include:

- differences in per person income levels and consumption;
- differences in population density and the size of household yards;
- the adoption of alternative waste disposal systems, such as household composting and in-sink garbage disposal units; and

- the prevalence of public parks, sporting grounds and other open spaces.

Figure 2.11 **The composition of municipal waste generated in Australia and selected OECD countries, 2002[a]**



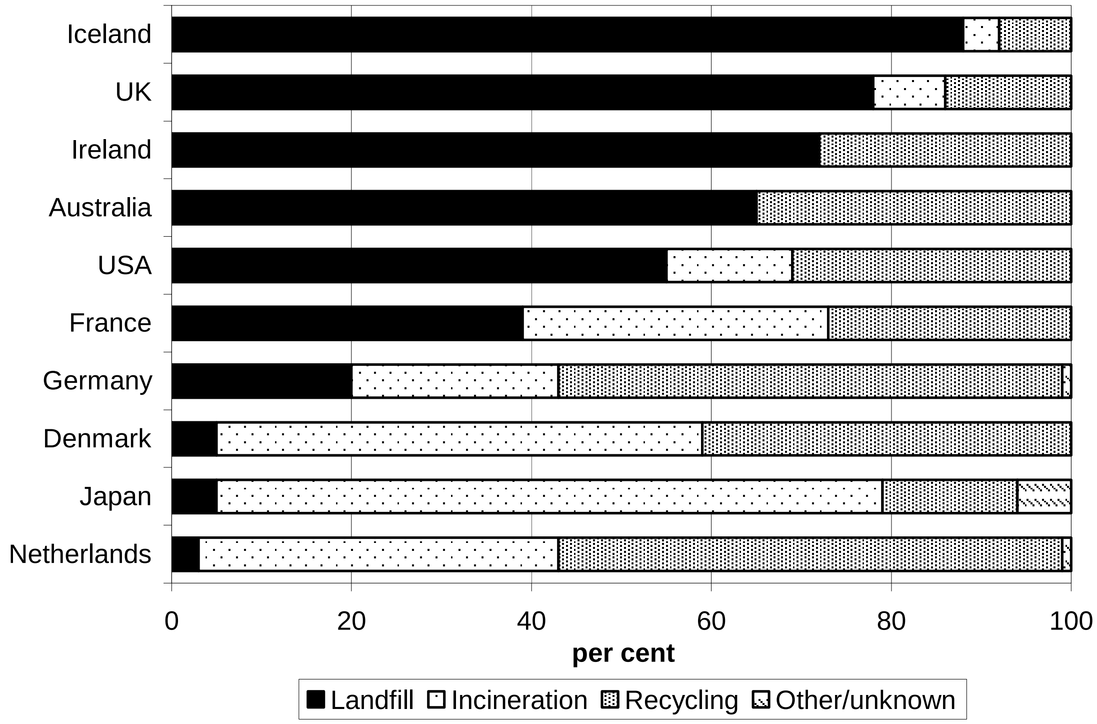
[a] Municipal waste is defined as waste collected and treated by or for municipalities. It covers waste from households, including bulky waste, similar waste from commerce and trade, office buildings, institutions and small businesses, yard and garden waste, street sweepings, the contents of litter containers, and market cleansing waste. The definition excludes waste from municipal sewage networks and treatment, as well as construction and demolition from the above sources. Data for Australia were estimated using data for the late 1990s, and may include significant amounts of C&I waste. Data for France on municipal waste include similar waste from commerce and trade. Data for Japan on municipal waste exclude municipal waste collected for recycling by the private sector.

Data source: OECD (2005c).

Resource recovery in Australia and other countries

Australia’s recycling rate in 2003 (incorporating the recycling of putrescible and non-putrescible waste) was approximately 35 per cent of waste generated, according to OECD data (figure 2.12). This is similar to other estimates made by Hyder Consulting (DEH, sub. 103, att. A) (30 per cent for 2002-03) and WCS Market Intelligence (2001) (23 per cent for 2001).

Figure 2.12 **The treatment of municipal waste in Australia and selected OECD countries, 2003[a]**



a Categories may overlap because residues from some types of treatment (incineration, composting) are landfilled. Categories do not necessarily add up to 100 per cent because other types of treatment may not be covered. Data for Iceland are preliminary. Data for the United Kingdom are for 2002. Percentages for Ireland are based on collected amounts. Data for Australia are for 2001. Data for the United States on incineration capture the amounts after recovery, and on landfill capture the amounts after recovery and incineration. Data for France are for 2002. Data for Japan are for 2001, and percentages are based on waste treated by municipalities and separate collection for recycling by the private sector. Recycling includes amounts directly recycled (including private collection) and recovered from intermediate processing. Landfill includes direct disposal (excluding residues from other treatments). Percentages for the Netherlands exclude amounts undergoing mechanical sorting before treatment/disposal.

Data source: OECD (2005b).

The Australian recycling rate compares favourably with that of other countries

The Australian recycling rate (35 per cent) is above the OECD average for 2003 (27 per cent) (OECD 2005b).[3] However, it is much lower than the countries with the highest recycling rates, Austria and Belgium (61 and 60 per cent respectively) and another seven countries including the Netherlands and Germany (both 56 per cent).

3 The OECD average is a Productivity Commission estimate using OECD (2005b) data. Only countries with available non-zero recycling percentages were included in this calculation.

However, comparisons need to be made with caution. It appears that many EU countries only report the total amount of waste collected for recycling, rather than the amount that was actually reprocessed (Eurostat 2005). Thus, in some of these countries, recycling estimates may be overstated. This is consistent with claims by the PCA (sub. 67, p. 30) that there 'may be a difference of 30 per cent between what is collected and what is recovered' in many European countries.

There are also problems with the way waste treatment methods are classified in other countries. Japan and some European countries use thermal treatment to deal with a high proportion of their waste. This type of treatment will typically have energy recovery, and therefore it may be classified as recycling rather than disposal (OECD 2005c). It is not clear that the distinction between incineration and recycling is consistently made in waste data published by the OECD.

The rate of recycling in different countries may be driven by a number of different factors including: community support for recycling and/or aversion to landfills, waste policies and the availability of land on which to locate landfills (OECD 2002). OECD data suggest that decreasing landfill-disposal rates, and increasing recycling rates, are trends occurring in many countries (de Tilly 2004).[4]

Waste disposal in Australia and other countries

Many inquiry participants argued that Australia's rate of disposal to landfill is too high when compared to other countries, and that it should be reduced. According to OECD estimates, approximately 65 per cent of Australia's waste was sent to landfill in 2003 (figure 2.12). This is not very different from the average across OECD countries (53 per cent)[5], and significantly below rates in countries such as Mexico, Turkey and Poland (all 97 per cent), and New Zealand (85 per cent). This estimate is broadly consistent with those from other data sources. Hyder Consulting (DEH, sub. 103, att. A) estimated that the rate of disposal to landfill in Australia was 70 per cent in 2002-03, and WCS Market Intelligence (2001) estimated it was 77 per cent in 2001.

Caution should be used when comparing landfill-disposal rates between countries. In addition to potential problems with the data's accuracy and consistency

4 Comparisons over time using OECD data should be made with caution. For example, in the case of Australia, recycling rates are much higher (and landfill-disposal rates much lower) in more recent data releases than in those previously. While Australian data for 2002 were based on estimated data for the late 1990s, data for 2003 are based on 2001 percentages (OECD 2005b; OECD 2005c).

5 Productivity Commission estimate using OECD (2005b) data. Only countries with available non-zero landfill percentages were included in this calculation.

(discussed earlier), a range of economic, environmental and social factors also need to be considered. These include the financial and regulatory incentives for waste treatment methods other than the disposal of waste to landfill, the availability of suitable land, and the availability and cost of other waste-management technologies.

FINDING 2.2

Comparisons between Australia's waste management outcomes — in terms of waste generation, recycling and disposal — and those of other countries should be made with caution. Differences in the way waste is classified, data are collected, and the economic, environmental and social circumstances of different countries, limit the usefulness of international comparisons.

2.3 The waste management industry

The waste management industry comprises organisations involved in the collection, sorting, recycling and disposal of solid waste. Liquid and gaseous waste, and waste treated on-site, are outside the scope of this inquiry and are separated from reported statistics unless otherwise specified.

The four most important areas of activity in the industry include:

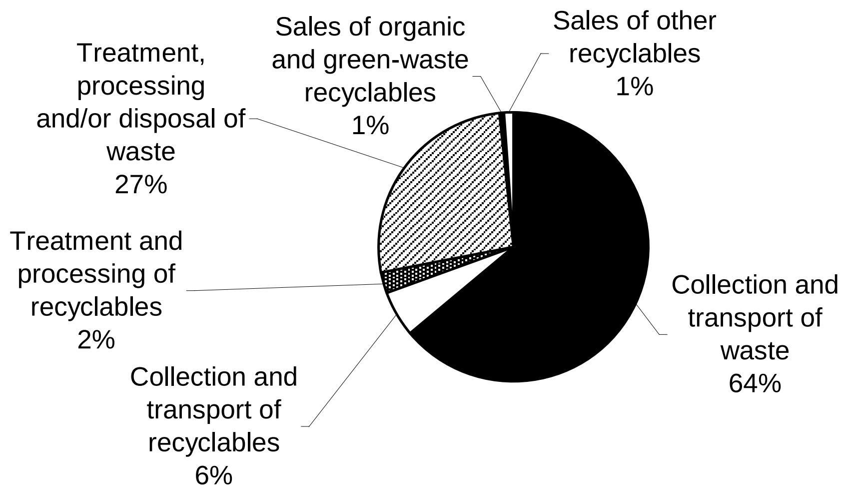
- the collection and transport of waste and recyclables, often through the use of kerbside bin and skip-bin collection;
- the sorting of waste and recyclables so that they may either be disposed of, or recycled;
- the recycling and reuse of material recovered from the waste stream; and
- the final disposal of those materials that are not (or cannot be) recovered or reused.

As a share of total revenue, the sector that collects and transports waste is the largest component (64 per cent); followed by the processing, treatment and/or disposal sector (27 per cent); and the collection and transport of recyclables sector (6 per cent) (figure 2.13).

The industry is comprised of the trading sector (private firms and government trading enterprises), and the general government sector. The general government sector is mostly involved in waste collection, transport, and landfill activities at the local government level.

The trading sector dominates the industry. In 2002-03, it earned 90 per cent ($2.7 billion) of total industry revenue, employed 77 per cent (10 000 people) of the total industry workforce, and accounted for 64 per cent (1200) of the total number of organisations in the industry (ABS 2004b).[6]

Figure 2.13 **Distribution of total revenue in the Australian waste management industry, 2002-03[a]**



[a] Data on the general government sector are preliminary. Revenue from sources not shown in the figure, such as leasing, hiring, and the generation of renewable energy, are not included.

Data source: ABS (*Waste Management Industry*, Cat. no. 8698.0).

In 2000-01, of the 1200 trading sector operators, the top 50 companies had a total market share of 70 per cent (WCS Market Intelligence 2001). Of these companies, the top five — Cleanaway, Visy Recycling, Collex, PWM Australia and Thiess Services — held 42 per cent of the market.

6 The data from which these revenue and employment estimates were derived include liquid waste (except through sewer systems). However, the Commission estimates that the liquid waste sub-sector accounted for less than 20 per cent of the total number of organisations, and 10 per cent of total revenue in 2002-03.

3 Government policy responses

Key points

- Waste management policy was initially focused around public health issues. From the early 1970s, it also started to take into account the environmental impacts of waste disposal.
- In the early 1990s, public concerns extended to the environmental impacts associated with the generation of waste, and the sustainability of natural resource use associated with production and consumption.
- The Australian, State and Territory Governments responded to these concerns by agreeing to national waste strategies intended to protect the environment and promote resource sustainability.
- These strategies focused mainly on promoting resource recovery to reduce the level of waste being disposed to landfill. Landfill diversion targets were adopted as a consequence.
- More recently, most states and territories have introduced new waste minimisation strategies. The objectives of these strategies are diverse and many promote ‘zero waste’ to landfill goals. Landfill diversion targets set most recently are more stringent than the targets first set in the 1990s.
- Prominent features of these strategies include the use of the waste hierarchy in policy making, and the sharing of responsibility between industry and the community to manage end-of-life consumer goods.

In Australia, as elsewhere, waste management was concerned traditionally with addressing the potentially adverse consequences of putrescible waste on public health and its associated disamenity (such as odour). From the early 1970s, the public became increasingly concerned with the effects of pollution on the environment. This concern extended to the management of landfills.

From the early 1990s, the public’s concerns in Australia extended to the upstream consequences of waste generation. These included environmental impacts (such as the impacts on sensitive ecosystems from the extraction of natural resources), as well as the perceived rapid depletion of non-renewable resources. A number of inquiry participants have suggested that landfill space was also a scarce and depletable resource.

This chapter describes the key policy responses that have been undertaken by the Australian, State, Territory and local governments from the early 1990s to the present day.

3.1 National policy responses

Australian, State and Territory Governments have introduced a suite of strategies and legislation aimed at minimising the amount of waste generated and being disposed to landfill.

Under the *Australian Constitution*, environmental protection and natural resource management are the jurisdiction of the states. According to the Intergovernmental Agreement on the Environment 1992, the Australian Government's responsibilities relating to 'national environmental matters' include:

> (i) matters of foreign policy relating to the environment and, in particular, negotiating and entering into international agreements relating to the environment and ensuring that international obligations relating to the environment are met by Australia;
>
> (ii) ensuring that the policies or practices of a State do not result in significant adverse external effects in relation to the environment of another State or the lands or territories of the Commonwealth or maritime areas within Australia's jurisdiction …
>
> (iii) facilitating the co-operative development of national environmental standards and guidelines … (s. 2.2.1, Intergovernmental Agreement on the Environment 1992)

National waste strategies

Many of the policy responses currently in place in the states and territories have their origins in two key national policy initiatives adopted in 1992: the National Waste Minimisation and Recycling Strategy (NWMRS) and the National Kerbside Recycling Strategy (NKRS).

National Waste Minimisation and Recycling Strategy

The NWMRS was published by the Australian and New Zealand Environment and Conservation Council (ANZECC 1992). The over-arching goals of the NWMRS are to:

- encourage the ecologically sustainable non-wasteful use of resources;
- reduce potential hazards to human health and the environment posed by pollution and wastes; and
- maintain or improve environmental quality (CEPA 1992, p. 10).

The NWMRS represented the first major national waste minimisation strategy that had resource efficiency and conservation as a policy goal. However, it was made clear in the NWMRS that governments should only pursue waste-related policies if they also maximised the net benefits to the community (that is, they met the 'economic efficiency' criterion) (box 3.1).

Box 3.1 Net benefits in the National Waste Minimisation and Recycling Strategy

According to the National Waste Minimisation and Recycling Strategy:

> Waste management is not cost free. To improve community welfare and environmental amenity it is essential that the costs and benefits of this activity are brought into balance. This will involve ensuring that the prices of waste management resources and services are adjusted to reflect their full social and environmental consequences. Improving the efficiency of a range of markets (including the areas of transport and resource usage for example) will be a key factor in working towards optimal recycling levels.
>
> As the provider and owner of many waste management services and resources, governments have a particular responsibility to ensure that their policies and activities are consistent with this principle. Government actions designed to influence levels of waste generated and recycled should have regard to the economic efficiency of their proposals. Within this constraint, governments may also be able to assist the objectives of this strategy through their other activities.

Source: CEPA (1992, p. 12).

A target of reducing the amount of waste per capita going to landfill by 50 per cent by 2000 was adopted in the NWMRS (CEPA 1992). This target was set in reference to the amount of waste disposed in 1991. Despite the principle agreed to in box 3.1, the costs and benefits associated with this target were not estimated, or if they were, they were not published.

To help meet the landfill diversion and recycling targets, the roles of extended producer responsibility and product stewardship schemes were also discussed in the NWMRS. These schemes place greater responsibility on producers for recovering or disposing of specific goods (chapter 10). Products identified in the strategy as possibilities for future schemes included used tyres, plastics, batteries, paper and packaging (CEPA 1992).

National Kerbside Recycling Strategy

This strategy was developed to advance some of the policy actions outlined in the NWMRS. Recycling targets were agreed between governments and industries for plastic containers, glass, aluminium and steel cans, liquid paperboard containers, newsprint and paper packaging. For example, the strategy called for 65 per cent of aluminium cans to be recycled by 1995, up from 62 per cent in 1990 (ANZECC 1992).

To assist governments and industries to meet these targets, it was also proposed that:

- domestic waste charges should be based on full waste disposal costs and preferably on a weight or volume basis by June 1994;
- more than 90 per cent of urban households should have regular kerbside recycling collection by June 1994; and
- at least 60 per cent of households with access to kerbside collections should use it at least once a month by June 1993 (ANZECC 1992).

The development of industry action plans and state and local government waste management plans was also called for in the NKRS. Although no longer current policy documents, the NWMRS and NKRS have been influential in the subsequent development of national, state and territory policies.

National legislation

In meeting its international obligations and in facilitating the cooperative development of national environmental standards and guidelines, the Australian Government has enacted the *Hazardous Waste (Regulation of Exports and Imports) Act 1989* (Cwlth) (HWA 1989), and the *National Environmental Protection Council Act 1994* (Cwlth) (NEPCA 1994). It is also responsible for a number of bilateral and multilateral trade agreements, each of which can have a bearing on the management of waste.

International agreements

As noted in chapter 1, the Australian Government is a signatory to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989) (the Basel Convention). Under the Basel Convention, the Australian Government agreed to control the movement of hazardous waste across its international borders.

The Australian Government implemented the Basel Convention through the HWA 1989. The objective of the HWA 1989 is to control the trade (the export, import and transit) of hazardous waste (including municipal solid waste) in an environmentally sound manner and to protect human beings and the environment.[1]

The Australian Government is also a signatory to a range of bilateral and multilateral trade agreements. These include the General Agreement on Tariffs and Trade, and four bilateral trade agreements (such as the Australia New Zealand Closer Economic Relations Trade Agreement, and the Australia–United States Free Trade Agreement). Each of these place limits on how Australian governments can use measures such as tariffs, quotas and government purchasing policies to restrict imports from signatory trading countries.

The role of these international agreements in influencing the market for recovered resources is considered in chapter 12.

National Environment Protection Council Act 1994

The Australian Government enacted the NEPCA 1994 to offer people throughout Australia the benefit of equivalent protection from pollution and to reduce any distortions to businesses and markets from differences between the states and territories in their environment protection measures. In particular, the objects clause of the Act states:

> The object of this Act is to ensure that, by means of the establishment and operation of the National Environment Protection Council:
>
> (a) people enjoy the benefit of equivalent protection from air, water or soil pollution and from noise, wherever they live in Australia; and
>
> (b) decisions of the business community are not distorted, and markets are not fragmented, by variations between participating jurisdictions in relation to the adoption or implementation of major environment protection measures. (*National Environment Protection Council Act 1994* (Cwlth), s. 3)

The NEPCA 1994 establishes the National Environment Protection Council (NEPC) and gives it the power to issue national environment protection measures (NEPMs). These are Australian Government regulations that include an environmental standard, goal, guideline and/or protocol.[2] NEPMs are typically enforced through a suite of uniform Acts or regulations at the state and territory level. The NEPC is one of the key national environmental policy-making bodies in Australia (box 3.2).

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1 s. 3(1), *Hazardous Waste (Regulation of Exports and Imports) Act 1989* (Cwlth).

2 s. 14(3), *National Environmental Protection Council Act 1994* (Cwlth).

Box 3.2 National policy making bodies

During the 1990s, the Australian and New Zealand Environment Conservation Council (ANZECC) was responsible for the development of the National Waste Minimisation and Recycling Strategy and the National Kerbside Recycling Strategy.

From this process, the National Environment Protection Council (NEPC) was established in 1992. It comprises ministers (usually environment protection ministers) from each Australian jurisdiction.

The Environment Protection and Heritage Council (EPHC) was created in 2001 from the amalgamation of ANZECC, the NEPC and the Heritage Ministers' meetings. The EPHC brings together ministers from all Australian jurisdictions and New Zealand, whose responsibilities include environment protection (Department of the Environment and Heritage, sub. 103).

The NEPC is the decision-making body for matters to do with national environmental protection measures.

The NEPCA 1994 provides the legislative basis for the Australian Government to regulate the interstate transport of waste, among other things. The objectives of the National Environment Protection Measure for the Movement of Controlled Hazardous Wastes between States and Territories are broadly similar to those of the Basel Convention.

The NEPCA 1994 also provides the regulatory basis for national extended producer responsibility schemes. For example, the National Environmental Protection (Used Packaging Materials) Measure provides the regulatory underpinning for the National Packaging Covenant (chapter 10). The Australian Government is in the process of establishing co-regulatory schemes for computers, televisions and tyres (chapter 10).

3.2 State and Territory Government waste minimisation strategies

The NWMRS and NKRS were the guiding policy frameworks for the states and territories throughout the 1990s. Most states and territories have subsequently introduced new waste minimisation strategies. Not only are these supported by environment protection legislation, they are commonly supported by new waste minimisation legislation (or amendments to existing environment protection legislation) (table 3.1). For example, the WA Government recently introduced the Waste Avoidance and Resource Recovery Bill 2006.

Table 3.1 **Key legislation and selected waste minimisation strategies**

	Waste minimisation strategies	*Legislation*
New South Wales	• Waste Avoidance and Resource Recovery Strategy 2003 • Waste Reduction and Purchasing Policy • Used Packaging Materials Industry Waste Reduction Plans	• *Protection of the Environment Operations Act 1997* • *Waste Avoidance and Resource Recovery Act 2001*
Victoria	• Towards Zero Waste Strategy 2005 • Environmental Sustainability Framework 2005	• *Environment Protection Act 1970*
Queensland	• Waste Management Strategy for Queensland 1996	• *Environmental Protection Act 1994* • *The Environmental Protection (Waste Management) Policy 2000*
Western Australia	• Statement of Strategic Direction for Waste Management in Western Australia 2004	• *Environmental Protection Act 1986* • *Environmental Protection (Landfill Levy) Act 1998*
South Australia	• South Australia's Waste Strategy 2005–2010	• *Environmental Protection Act 1993* • *Zero Waste SA Act 2004*
Tasmania	• Guide to Industrial Waste Management	• *Environmental Management and Pollution Control Act 1994* • *Litter Act 1973*
ACT	• No Waste By 2010 • Waste Pricing Strategy for the ACT	• *Environment Protection Act 1997* • *Waste Minimisation Act 2001* • *Litter Act 2004*
Northern Territory	• Litter Abatement and Resource Recovery Strategy 2003	• *Waste Management and Pollution Control Act 1998*

Objectives

The overarching objectives of the new waste minimisation strategies are, broadly, to protect the environment and conserve natural resources. For example, the 'three directions' identified by the Victorian Government for it to become a 'sustainable state' include:

- maintaining and restoring our natural assets
- using our resources more efficiently
- reducing our everyday environmental impacts. (Victorian Government 2005, p. 3)

Though these types of objectives are broadly mirrored in the environment and waste minimisation legislation of most states and territories, some jurisdictions have additional legislative objectives. For example, the objectives of the NSW *Waste Avoidance and Resource Recovery Act 2001* include encouraging resource efficiency, using the waste hierarchy for policy decision-making, avoiding waste, and sharing the responsibility to reduce waste between industry and the community (box 3.3). In contrast, some other jurisdictions have fewer and simpler objectives in their equivalent legislation. For example, Part IX (Resource Efficiency) of the Victorian *Environment Protection Act 1970* has as its objective to 'foster environmentally sustainable uses of resources'. The appropriateness of these objectives is discussed in chapter 6.

Box 3.3 **Objectives of selected legislation relating to waste avoidance and resource recovery**

The key legislation covering waste avoidance and resource recovery in New South Wales is the *Waste Avoidance and Resource Recovery Act 2001* (WARRA 2001). In Victoria, it is Part IX of the *Environment Protection Act 1970* (EPA 1970).

New South Wales

The objects of the WARRA 2001 are:

(a) to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development,

(b) to ensure that resource management options are considered against a hierarchy of the following order:

  (i) avoidance of unnecessary resource consumption,

  (ii) resource recovery (including reuse, reprocessing, recycling and energy recovery),

  (iii) disposal,

(c) to provide for the continual reduction in waste generation,

(d) to minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste,

(e) to ensure that industry shares with the community the responsibility for reducing and dealing with waste,

(f) to ensure the efficient funding of waste and resource management planning, programs and service delivery,

(g) to achieve integrated waste and resource management planning, programs and service delivery on a State-wide basis,

(h) to assist in the achievement of the objectives of the *Protection of the Environment Operations Act 1997*. (s. 3)

Victoria

In contrast, the object of Part IX of the EPA 1970 is:

… to foster environmentally sustainable uses of resources and best practices in waste management in order to advance the social and economic development of Victoria. (s. 49)

The objectives of waste minimisation strategies in most states and territories have given rise to 'zero waste', or 'towards zero waste to landfill' goals. For example:

- the ACT Government (1996) adopted a strategy of No Waste by 2010;
- the Victorian Government (2005) adopted a Towards Zero Waste strategy;
- the SA Government (2005) adopted a zero waste goal in its Waste Strategy 2005–2010; and
- the WA Government adopted a policy goal of towards zero waste in its Strategic Direction for Waste Management (WMB 2004).

These goals are more stringent than those first adopted in the NWMRS.

Some key features

There are a number of key features to the new waste minimisation strategies, two of the most prominent being: the requirement to use or consider the waste hierarchy in decision-making; and the sharing of responsibility for waste reduction between industry and the community.

Waste hierarchy

The new waste minimisation strategies have been based on the principle of the waste hierarchy. For example, the Victorian Government noted:

> A key criterion underpinning the [Towards Zero Waste Strategy] is the Victorian waste hierarchy … [It] provides a framework aimed at minimising resource consumption and the consequent environmental and economic costs associated with resource extraction and harvesting, as well as in the processing, manufacture, transport and disposal of materials. (Victorian Government 2005, p. 13)

First developed in the 1970s, the waste hierarchy is a simplified list of priorities (Rasmussen and Vigsø 2005). Under the hierarchy, policies that avoid waste are given highest preference and policies that encourage disposal are given lowest preference. The waste hierarchy appeared in the NWMRS though each state and territory government has its own version in its respective environment protection and waste minimisation legislation (box 3.4).

The role of the waste hierarchy in policy development is discussed in chapter 7.

Box 3.4 **Examples of the waste hierarchy in practice**

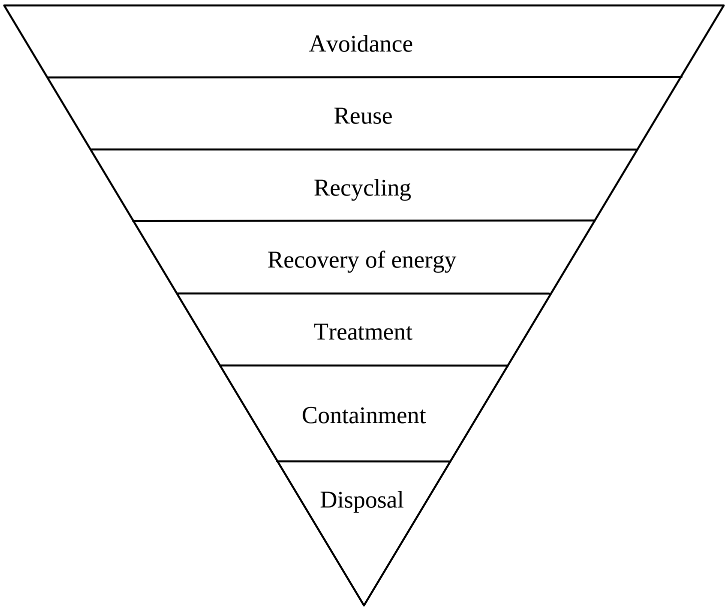
Different interpretations have been given to the waste hierarchy in various strategies such as the National Waste Minimisation and Recycling Strategy and in the Victorian Towards Zero Waste Strategy.

National Waste Minimisation and Recycling Strategy

> Central to the Strategy is a hierarchy of waste management priorities. In order of preference, options selected should be:
>
> - waste avoidance — practices which prevent the generation of waste altogether
> - waste reduction — practices which reduce waste
> - waste reuse — direct reuse of waste materials for the same grade of use
> - waste recycling or reclamation — using valuable components of waste in other processes
> - waste treatment — to reduce hazard or nuisance, preferably at the site of generation
> - waste disposal.
>
> In the above hierarchy, the first four stages should always be the preferred approach, being selected instead of waste treatment or disposal options. The ideal situation would be to have closed loops in overall material flows, with no usable materials lost as waste.

Victorian Towards Zero Waste Strategy

The hierarchy has been represented in a graphical form by the Victorian Government as follows:



EPA Victoria (nd1), defined containment as the long-term repository storage of prescribed industrial wastes ‘requiring a very high degree of control or those pending further diversion to productive purposes’.

Sources: CEPA (1992); EPA Victoria (nd1); Victorian Government (2005).

Shared responsibility between industry and the community

Waste minimisation strategies also tend to refer to the principle of shared responsibility. For example, the NSW Government noted that:

> Everyone must accept responsibility for the part that they can play in avoiding waste and recovering resources. This includes producer responsibility, product stewardship by all parts of the supply chain, consumers and all participants in resource recovery processes. (Resource NSW 2003, p. 10)

Many waste minimisation strategies refer to extended producer responsibility and/or product stewardship. While there is no universally agreed definition for either concept, extended producer responsibility is often defined to mean that producers should take responsibility for a product beyond the post-consumer stage of the product's life cycle. Product stewardship is often defined to mean that all members of a community must share the responsibility for the waste of a product over its life cycle. In practice, however, these terms are sometimes used interchangeably.

The role of extended producer responsibility and product stewardship schemes in the collection, recycling and disposal of end-of-life consumer goods is taken up in chapter 10.

Implementing waste minimisation strategies

Each state and territory's waste minimisation strategy outlines which agencies are involved and how the strategy is to be implemented.

Key institutional arrangements

A number of agencies are involved in implementing each jurisdiction's waste minimisation strategies. These generally include:

- A waste agency that is generally responsible for implementing the jurisdiction's waste minimisation strategy by: negotiating landfill diversion targets with industry and local governments; setting landfill levies; assisting industry meet their targets by providing information, education, and grants from monies collected from landfill levies; and collecting monitoring and reporting on progress against the strategy. These include the ACT NOWaste, the NSW Department of Environment and Conservation (formerly Resource NSW), Sustainability Victoria, Zero Waste SA, and the proposed Waste Authority in Western Australia.
- The environmental regulator that is responsible for regulating firms to protect the environment, such as by licensing landfills. The regulator may also be

responsible for enforcing extended producer responsibility and product stewardship schemes (Victorian Government 2005). In some jurisdictions, such as Victoria, the environmental regulator is also responsible for enforcing the development of regional waste management plans by local governments.

- Local governments that are responsible for providing kerbside collection and disposal services, and in a number of jurisdictions, setting aside land for future waste and resource recovery facilities, and considering new development applications.

Local governments have responded in a number of ways to meet ratepayers' expectations and their obligations under their waste management plans. They have expanded the range of waste management services on offer. Most offer kerbside collections for recyclables. Typically, local governments provide two-bin services (mixed waste and dry recyclables), though some now provide three-bin services (green waste, dry recyclables, and residual waste). Many local governments also offer occasional hard waste collections and provide drop-off depots for waste disposal and recycling.

Most local governments have outsourced their waste collection, transfer and disposal activities to private contractors. In addition, local governments are increasingly entering into partnerships with others to share waste disposal and resource recovery facilities, and to access more favourable waste management contracts (chapter 12). This is becoming increasingly necessary as local governments attempt to comply with state and territory waste minimisation strategies. In Victoria, this has been facilitated through the formation of regional waste management groups.

Target setting

Following on from the NWMRS and NKRS, some jurisdictions have set jurisdiction-wide landfill diversion targets. For example, the ACT Government aims to be a waste-free society by 2010 (box 3.5). The WA Government is currently developing a waste-diversion target for 2020 (WMB 2004).

To meet these broad targets, jurisdictions typically also set targets for each of the solid waste streams. For example, the Victorian Government aims to ensure that at least 65 per cent of all municipal solid waste in the state is recovered for reuse, recycling or energy generation by 2014 (box 3.5). The SA Government aims to increase the amount of construction and demolition waste being recovered and reused by 50 per cent by 2010. Though the NSW Government has not adopted a zero waste policy, it has adopted a number of jurisdiction-wide targets for each waste stream (Resource NSW 2003).

Box 3.5 **State and territory targets for waste**

Targets for New South Wales include (by 2014):

- 66 per cent recovery of municipal solid waste
- 63 per cent recovery of commercial and industrial waste
- 76 per cent recovery of construction and demolition waste

Targets for Victoria include (by 2014):

- a 1.5 million tonne reduction in the projected quantity of waste generated
- 75 per cent of solid waste recovered for reuse, recycling and/or energy recovery
- 25 per cent improvement in littering behaviour
- 65 per cent recovery of solid waste in the municipal sector
- 80 per cent recovery of solid waste in the commercial and industrial sector
- 80 per cent recovery of solid waste in the construction and demolition sector.

Targets for South Australia include:

- 25 per cent reduction in municipal solid waste to landfill by 2014;
- 75 per cent recycling of all municipal solid waste material presented at the kerbside by 2010;
- 30 per cent increase in the recovery and use of commercial and industrial materials by 2010; and
- 50 per cent increase in the recovery and use of construction and demolition materials by 2010.

The ACT aims to achieve a waste free society by 2010.

Sources: ACT Government (1996, 2000); Resource NSW (2003); SA Government (2005); Victorian Government (2005).

Targets have also been set at an industry level, sometimes as part of extended producer responsibility and product stewardship schemes. Industry targets include:

- *National Packaging Covenant recycling targets* — the Covenant commits signatories to an overall packaging recycling target of 65 per cent and no further increases in packaging waste disposed to landfill by the end of 2010 (NPCC 2005).
- *Plastic bag targets* — the Australian Retailers' Association Code of Practice for the Management of Plastic Bags (ARA 2003) required signatories to achieve a 50 per cent reduction in their supply of high density polyethylene plastic bags by December 2005.

The role of target setting is taken up in chapter 7. Performance indicators are discussed in chapter 13.

Waste management planning

In fulfilling their commitments under the state waste minimisation strategies, many local governments are required to prepare waste management plans. In Victoria and South Australia, local governments are also required to prepare regional waste management plans (Victorian Government 2005; SA Government 2005). The City of Whitehorse, for example, prepared its waste management plan in accordance with the plan of the Eastern Regional Waste Management Group (sub. 26). To achieve its target of reducing annual waste to landfill by 72 000 tonnes by 2014, the city proposed a number of strategies that covered the city's kerbside collection of waste, recyclables and green organics, its collection of hard waste, its recycling and waste transfer station facilities, and its waste education campaign.

Similarly, some firms and industry associations are encouraged to enter into agreements and prepare plans that outline how they intend to reduce the amount of waste they generate. In the case of extended producer responsibility and product stewardship schemes, this includes how they might meet specified landfill diversion and recycling targets. For example, each signatory to the National Packaging Covenant agreed to prepare an action plan that sets out how it 'proposes to implement and measure its actions and commitments under the Covenant' (NPCC 2005, p. 27).

Policy instruments

State and Territory Governments have adopted a range of policy instruments to manage waste as well as meet their targets to reduce the amount of waste being disposed to landfill, including:

- *waste management regulations* — to control various aspects of the collection, transportation and disposal of waste (chapters 8 and 12);
- *market-based instruments* — to provide incentives to charge the waste generating and disposal behaviour of households and firms (and include landfill levies, advance disposal and recycling fees, deposit-refund schemes and subsidies) (chapter 9);
- *extended producer responsibility and product stewardship schemes* — to promote shared responsibility between industry and the community (chapter 10); and

- *government provision of information and procurement practices* — to address problems associated with the lack of information about waste management options, to persuade consumers and firms to change their behaviour, and to use procurement policies to foster demand for particular resource-conserving goods (chapter 11).

4 The costs and benefits of waste management

Key points

- People have some incentives to manage waste in ways that reduce costs, whether through waste avoidance, reuse, recycling, or disposal.
- Waste management can lead to negative 'externalities' — impacts on unrelated parties that are not reflected in the private financial costs of waste management. If these externalities are significant, the waste management option that imposes the lowest financial costs may not be the best outcome from the perspective of the community as a whole.
- The best outcomes for the community are achieved where all costs and benefits are taken into account, whether financial, social or environmental in nature, and where net benefits to the community are maximised.
- Landfills that are poorly located and managed can impose significant external costs through emissions of leachate and greenhouse gases, and loss of amenity to nearby residents.
- Governments have introduced policies that address many of the externalities associated with waste management. In many cases where these policies have been implemented, they have reduced the external impacts to low levels.
- The external costs of properly-located, engineered and managed landfills that incorporate gas management systems are low. These costs are unlikely to exceed $5 per tonne of waste.
- It is likely that most municipal waste services that incorporate kerbside recycling have higher financial costs than would be incurred if all waste were sent to landfill. The size of the difference depends on the costs of landfill, the materials collected for recycling, the distance to the market for recovered materials and other factors.
- The case for kerbside recycling partly rests on its ability to deliver upstream external benefits, which are highly variable, and on the community's willingness to pay for recycling services
- The financial costs of alternative waste technologies (AWTs) and most dedicated energy-from-waste facilities are much higher than the financial costs of landfills. The environmental and other external benefits of using an AWT or energy-from-waste facility, rather than sending waste directly to a properly-located, engineered and managed landfill, appear to be small. Therefore, on balance modern landfills appear to have lower overall costs for the community than AWT or energy-from-waste facilities, and are likely to be preferred from a net community benefits perspective.

This chapter examines the financial, environmental, human health and other costs and benefits of waste collection, disposal, energy recovery and recycling. These practices are discussed with reference to the three waste streams being addressed by this inquiry: municipal solid waste; commercial and industrial waste; and construction and demolition waste. For each process, the drivers of the costs and benefits are set out, and where possible, estimates of the typical Australian costs and benefits are reported. The estimates of the external costs and benefits are described in more detail in appendix B.

4.1 Taking a net community benefits approach

For any particular person or organisation, waste materials are anything that is no longer privately valued by them for use or sale and is, or will be, discarded. Every day, individuals, households and firms make decisions that determine how much waste they generate and how they deal with it. These decisions are made in the face of a range of competing priorities. Owners of waste will generally be prepared to pay for its removal where it takes up space, causes health risks, emits odours or is inconvenient to deal with. Because waste disposal can be costly, households and firms have some incentives to reduce the amount of waste they generate. This may be accomplished by choosing goods and production processes that generate low levels of waste, or investing in maintenance to lengthen the life of goods.

Provided it does not conflict with their other priorities, people can be expected to deal with waste in the way that imposes the lowest net costs on them, whether this be through recycling, disposal or energy recovery. They might be expected to consider:

- the financial costs of waste disposal and recycling;
- the value of time and effort taken to manage waste; and
- any preferences they may have for recycling or reuse that arise from environmental concerns.

In this report, these are referred to as ‘private’ costs and benefits (box 1.2), as they accrue directly to the owner of the waste. There may be other costs and benefits associated with waste management that are experienced by other members of the community. These are often environmental and other types of ‘externalities’ — unintended costs and benefits of an activity that are experienced by people other than those involved in the activity.

Externalities associated with waste management can arise as a direct result of waste management practices, or at a point in a product’s life cycle before it becomes waste. In this report, these are referred to as 'downstream' and 'upstream' externalities (figure 1.1). An example of a negative downstream externality is the impact of greenhouse gases emitted from landfills. An example of a negative upstream externality is the damage done to mining land in the process of extracting minerals that are made into products that eventually become waste.

The best outcomes for the community are achieved where both the private (including financial and non-financial) costs and benefits and the external costs and benefits of managing waste are taken into account, and the net benefits to the community are maximised (or net costs minimised). This should include the costs and benefits that may arise in the future. Because households and firms generally do not take external costs and benefits into account, their decisions will not always align with what is best for the community. This idea is developed further in the next chapter, which examines where governments may be able to intervene to internalise the externalities and thereby improve outcomes for the community.

Taking a net community benefits approach relies on the use of a common unit for quantifying costs and benefits, the usual one being dollars. Valuing all of the costs and benefits of policy options in dollar terms allows decision makers to readily compare the net benefits of each option, and choose the policy that maximises the net benefits to the community.

While valuation in dollar terms is the preferred approach to assessing the costs and benefits of policy options, this can be difficult for environmental and social impacts. Sometimes the best that can be done is to analyse environmental and social impacts in quantified physical terms (for example, number of tonnes of emissions of a pollutant avoided) and/or qualitative terms (for example, a description of the potential human health and environmental benefits of avoiding emissions of a pollutant).

Potential and expected costs

The magnitude of some externalities vary according to the circumstances in which they occur. For example, a given quantity of a pollutant will often have greater costs where people and ecosystems are directly exposed to it in a concentrated form. It is important that estimates of the costs and benefits of externalities take this variability into account.

Where externalities are variable, it is important to draw a distinction between 'potential' and 'expected' costs. The potential cost refers to a 'worst-case scenario' that could arise under certain circumstances. The expected cost takes into account the potential cost and the probability that it will arise. For the purposes of cost–

benefit analysis, it is generally the expected cost of an externality, rather than the potential cost, that should be included in the analysis.

Estimating the expected cost of an externality may require a formal assessment of the risk that the potential impact will arise (box 4.1). The Commission considers that many of the existing estimates of the costs and benefits of externalities associated with waste management are overstated because of inadequate accounting for risk. Often potential rather than expected costs are reported. There has also been inadequate consideration of the least-cost means of dealing with risks. The Commission has attempted to undertake some analysis of the risks associated with waste management options, and where possible, has based estimates on these assessments (appendix B).

Box 4.1 **Steps in a risk assessment**

The Productivity Commission (PC 2000) identified four steps that are included in a formal scientific assessment of the risk to people's health posed by pollution. A similar procedure could be applied to other risks, such as the risk of damage to ecosystems, or the risk of photochemical smog.

1. Hazard identification — a hazard is a source of potential harm, such as a chemical that may be emitted as pollution. This step involves identifying hazards and where they might arise.
2. Exposure assessment — this step involves estimating the probability that people will be exposed to a hazard, and the number of people who will be exposed.
3. Dose–response assessment — this step involves determining the effects of exposure to a hazard. For example, the assessment may aim to determine whether the probability that people will develop cancer will increase as a result of exposure to a substance. Typically this is done using data from animal toxicity experiments and human epidemiological studies.
4. Risk characterisation — risk is the likelihood that harm will occur as a result of exposure to a hazard. The final step in a risk assessment is to draw together the information from steps two and three to gain an overall characterisation of the risk faced by a human population.

Source: Adapted from PC (2000).

Life cycle assessment

Life cycle assessment (LCA) is a material accounting technique that has been used by researchers to quantify some of the physical impacts of waste management practices, including landfill, recycling, energy-from-waste and composting. Life cycle assessment involves quantifying the material and energy inputs into a process, and the emissions associated with the process, including emissions of pollutants to air, land and water. Depending on the boundaries of the study, LCA can account for both upstream and downstream emissions, including ‘cradle-to-grave’ effects.

LCA is a limited analytical tool, because it accounts only for the flows of some natural resources that are associated with production processes. Other valuable resources and inputs, such as labour and capital, are omitted from the analysis. This suggests that a policy that appears attractive when compared to others using LCA may not be the best option for the community as a whole, when all of the relevant costs and benefits are taken into account. As well as this limitation, LCA is time consuming and expensive. The more complex the product or system being studied, the more expensive the analysis, and the less reliable its conclusions are likely to be. The Commission’s assessment of LCA is set out in more detail in appendix B and chapter 6.

4.2 Waste collection

Waste collection imposes financial and other private costs on waste generators, and external costs on the community.

Private costs and benefits

Collecting and transporting waste to facilities where it is sorted, reused, recycled or disposed of, is costly. The costs depend on the type of waste, its mass, the distance it must be transported and the costs of sorting the waste into recyclable and nonrecyclable materials.

Municipal waste collection

Householders place their waste in one or more bins. This waste is collected in trucks and taken to various facilities to be reused, recycled or disposed of. The practice of separating waste into a number of bins (typically recyclables and general waste) requires time and effort on the part of the householder, and as such it imposes nonmonetary costs on them. Community participation in waste sorting and recycling suggests that for some members of the community, the personal benefit that they derive from taking part in recycling exceeds the cost to them of the additional effort required. However, recycling systems that allow householders to place a variety of recyclable materials into one bin, rather than having to separate the recyclables into paper, plastic, glass and metals, tend to have much higher total yields of recyclables (Nolan-ITU and SKM Economics 2001). This suggests that some householders who are prepared to place all their recyclables in one bin would not be prepared to separate them any further, and hence that the degree of community support for recycling may have limits.

As well as the nonmonetary costs of sorting, waste collection imposes financial costs. The main drivers of these costs are the number of bins that are set out, and the distance that the waste must be transported. Increasing the number of bins to be picked up increases the costs of waste collection, because more trucks and more bin lifts are required. Also, the greater the distance the waste is transported, the higher the cost incurred. This means that towns and cities with more distant recycling facilities and landfills tend to have higher waste collection costs.

Consultancy firm Nolan-ITU has collected data on the costs of collecting and transporting waste in large Australian cities. These data are generally consistent with data from other sources. Nolan-ITU (2004b) concluded that, in 2004, for a waste management system incorporating two bins per household — one 240 litre garbage bin collected weekly and one 240 litre recycling bin collected fortnightly — the average costs of collection were $51 per household per year for nonrecyclable garbage collection and transport, and an additional $31 per household per year for recyclables. Adding another bin for green waste would further increase the costs of waste collection. The cost depends on how much waste is disposed of and how frequently it is collected. If green waste were collected fortnightly in a 240 litre bin, the Commission considers that the cost of collection would probably be around $30 per household per year (similar to the cost of a fortnightly collection of recyclables).

The costs of collection and transport would be lower if no recycling were undertaken, and a single 240 litre bin collected weekly was sufficient for all household waste — recyclables and residual garbage. A single bin system would cost less than $82 per household per year (the cost of a two bin system), but more than $51 per household per year (the cost of collecting the residual garbage in a two bin system). This is because only one truck and one bin lift would be needed to collect all the waste from each household, but each truck would fill more quickly so would need to make more frequent trips to unload. Porter (2002) reported that the savings for trucks and bin lifts are greater than the costs of additional trips. This suggests that the collection cost for a single bin system would be closer to $51 than $82 per household per year — that is, the cost would fall less than half way between $51 and $82. For the purposes of this report, the Commission has estimated that the costs of collection and transport for a single bin system would be $59 per household per year.

Business waste collection

Firms whose waste is not collected as part of the municipal waste system have to make their own arrangements for waste collection. Depending on the collection services available, firms may have opportunities to send some or all of their waste for recycling. How much recycling is done depends on the costs to the firm of separating the recyclables from the waste and having them collected separately. In some industries, these costs prevent widespread recycling. For example, the Housing Industry Association (sub. 87) noted that, for small and medium-sized firms in the building industry, the limited availability of space in which to sort their waste is a considerable barrier to source separation. Larger construction and demolition companies may benefit from economies of scale that make sorting their waste for recycling more cost effective.

As well as the costs of on-site waste sorting and storage, the other significant driver of the private costs of business waste collection is the cost of transport. The cost of waste transport depends on the distance to a landfill or recycling facility.

Environmental and other external costs and benefits

The largest external cost associated with waste collection arises from the impact of traffic. Waste collection requires large trucks, which are noisy, stop frequently, increase congestion and the risks of accidents. They also generate pollution and greenhouse gases. The external costs imposed by traffic are higher if the waste has been separated into a number of bins prior to collection, as this requires more trucks to be on the road. The costs imposed by these externalities are estimated to be $1 to $3 per tonne of waste, depending on where it is collected (BDA Group and EconSearch 2004; EPA NSW 1996c; appendix B). In urban areas, the external costs are closer to $3, while in rural areas, lower population densities mean that the external costs are closer to $1.

The Commission considers that these estimates, while not large, may overstate the external costs of waste collection. This is because the estimates do not account for all of the measures taken to internalise the externalities associated with road transport, such as legal liability, insurance and vehicle emissions standards (PC 2006a).

4.3 Waste disposal

Waste disposal options include landfill, incineration and other energy-from-waste technologies. This section sets out the drivers of the private and external costs and benefits of waste disposal, and provides estimates of those costs and benefits.

Landfill

Most waste that is disposed off-site in Australia is sent to landfills. Landfill management practices have changed over time, and the characteristics of landfills vary according to their location, age and size. Poorly-managed landfills have the potential to cause significant damage to human health and the environment. Properly-located, engineered and managed landfills reduce the risks of these impacts arising. Such landfills typically:

- are located in areas where the risk that they will cause damage to human health and the environment is reduced to acceptable levels;
- incorporate features, such as liners and leachate collection, to reduce the risk of leachate emissions;
- are operated to reduce the risk of damage to human health and the environment while they are being filled; and
- are managed after their closure to reduce the risk that they will damage human health and the environment.

In addition to these features, many larger landfills now incorporate systems to capture landfill gases, which are flared or used to generate electricity. Gas management systems reduce emissions of greenhouse gases from landfills, and can also help to control odours and reduce the risk of gas explosions.

Some inquiry participants claimed that the majority of landfills do not incorporate all of these design and management features. For example, SITA Environmental Solutions stated:

> … most (>80 per cent) of landfills do not meet this specification and are unlikely to do so. (sub. DR143, p. 6)

However, although many landfills may not incorporate all of the design features set out above, other inquiry participants stated that they are found at most of the landfills that handle large amounts of waste. The Waste Management Association of Australia (WMAA) National Landfill Division stated:

> … our national landfill survey shows that 70 per cent of the landfill waste in Australia is disposed of in large urban and large regional landfills which, if not at

best practice, are certainly approaching that. So although there is a large number who do not, they don't handle a lot of the waste. (trans., p. 1130-31)

Furthermore, progressive tightening of landfill regulations means that new landfill proposals must be properly-located and incorporate modern design and management features (chapter 8).

Private costs and benefits

A fee is typically charged to dispose of waste to landfill. The fee is normally based on the mass of the waste, and may be differentiated according to its composition. The fee comprises a 'gate fee' charged by the landfill operator (table 4.1), the goods and services tax (GST) and any applicable state government levy on landfill disposal.

Table 4.1 **Average landfill gate fees in Australian cities, 2003-04**[a]

City	*Average gate fee (per tonne of waste)*[b]
Adelaide	$41
Brisbane	$56
Canberra	$50
Gold Coast	$55
Melbourne	$29
Newcastle	$39
Perth	$27
Sydney	$57

a The most recent data available for Tasmania indicated that in 2001, the average gate fee for landfills in Hobart was $16 per tonne of waste. **b** Gate fee excludes landfill levies and the GST.

Sources: Nolan-ITU (2004b); Nolan-ITU and SKM Economics (2001).

The WMAA National Landfill Division (sub. 28) estimated that the costs of a large 'best-practice' landfill[1] in a capital city would be about $25 per tonne of waste (table 4.2). It also indicated that, in addition to these costs, landfill operators will include management costs and profit margins in gate fees. Differences in management costs, labour costs, profit margins, the price of land and the costs of going through local planning processes would explain some of the difference between the $25 per tonne of waste figure estimated by the WMAA National Landfill Division and the gate fees cited in table 4.1.

1 The WMAA National Landfill Division defined 'best-practice' landfill as one that: is located to reduce the risk of harm to the environment and to reduce the impact on local amenity; is lined and has a leachate management system; incorporates gas collection with energy recovery; is capped after closure; and has provisions for aftercare for up to 30 years.

Table 4.2 **Estimated costs of ‘best-practice’ landfill**

Cost driver	*Cost per tonne of waste*
Land purchase including airspace	$2.00
Approvals and site development	$2.00
Cell development	$6.50
Operation including monitoring and fees	$10.00
Capping and rehabilitation	$2.50
Aftercare	$2.00
Total cost	**$25.00**

Source: WMAA National Landfill Division (sub. 28).

Environmental and other external costs

The main environmental impacts associated with landfills arise from landfill gas and leachate. Landfills can also lead to loss of amenity caused by litter, dust, odour, vermin and visual impacts.

There have been a number of estimates of the total external costs of landfills in Australia and overseas, with some estimates varying widely from others. The New South Wales EPA (1996c) estimated that in 1996, depending on location, the external costs of landfills in New South Wales were between $10.50 and $33.20 per tonne of waste disposed to landfill. The BDA Group and EconSearch (2004) estimated that in 2004 the external costs of Australian metropolitan landfills were between zero and $14.30. They estimated that, because most rural landfills do not incorporate the gas management systems found at large metropolitan landfills, they can impose higher external costs — between zero and $16.10 per tonne of waste. The ACT Government (2002) estimated that in 2000 the ‘environmental costs’ of landfill were $34 per tonne of waste. The OECD estimated that in 1999 the external costs of landfills in the United Kingdom were up to £6 per tonne of waste, depending on the location of the landfill and whether it has systems to recover energy from the waste (Davies and Doble 2004).

These estimates vary markedly from those of consultancy firm Nolan-ITU (now incorporated into Hyder Consulting), that has published a number of estimates of the external costs and benefits of waste management systems that include landfill. Their estimates are much larger than any other published estimates. Hyder Consulting stated that their:

> … best estimate of the environmental externalities of a landfill in Australia compliant with legislation (and including gas extraction systems with conversion to electricity), in the face of all the existing data gaps and inadequacies, without further research to substantiate it is between $100 and $280 per tonne, with the most significant impacts arising from air and water pollution. (sub. DR264, pp. 2–3)

Hyder Consulting's estimate of the external costs of landfill is based on a landfill that is fully compliant with legislation. Such landfills are located to minimise the risk of harm to the environment and incorporate engineering features such as liners and landfill gas management systems to reduce the risk of damage to human health and the environment. This suggests that Hyder Consulting must consider the externalities associated with non-compliant landfills to be still larger than the estimate of $100 to $280 per tonne of waste it cited for compliant landfills. The Commission considers Hyder Consulting's estimate to be unrealistically large and based on incorrect assumptions. The following sections set out the Commission's assessment of the most significant externalities associated with landfill — gas, leachate and amenity loss.

Greenhouse gases

In most estimates, the largest single contribution to the external costs of landfill arises from emissions of methane and carbon dioxide that are produced when organic waste decomposes. Both gases contribute to the greenhouse effect, with methane being 21 times more potent than carbon dioxide as a greenhouse gas.

The Department of the Environment and Heritage (DEH) reported that disposal of solid waste to landfill in Australia was the source of 15 million tonnes of emissions of carbon-dioxide equivalent gas in 2004 (DEH 2006). This equates to 2.7 per cent of the total greenhouse gas emissions from all sectors in Australia. By way of comparison, stationary energy generation was responsible for 49.6 per cent of Australia's greenhouse gas emissions in 2004, agriculture for 16.5 per cent and transport for 13.5 per cent.

The composition of the waste in a landfill, and how it decomposes, determines the volume of greenhouse gases that are generated. Methane and carbon dioxide are generated by the decomposition of organic material, including food waste, garden organics, paper, cardboard and wood. Aerobic decomposition of these materials releases carbon dioxide, and anaerobic decomposition releases both carbon dioxide and methane. Plastics, glass, metals and concrete in landfills do not lead to greenhouse gas emissions (Grant et al. 2001).

Some modern landfills are designed and managed to reduce the quantity of greenhouse gases released. This is done by installing a network of pipes that runs through the waste to capture the landfill gas. The efficiency of landfill gas capture systems varies. For example, the Western Australia Waste Management Board stated that 'the landfill gas capture rate over the life of a landfill has been estimated at around 19 per cent' (sub. DR208, p. 1).

By contrast, Landfill Management Services Pty Ltd stated that it has:

> … developed its own technology to capture landfill gas and has demonstrated to have significantly higher [than 75 per cent] extraction efficiencies that are supported by sub-surface and perimeter monitoring showing zero or minimal release of gases. (sub. DR188, p. 2)

Based on the available evidence, the Commission considers that for the purposes of estimating the external costs of landfill greenhouse gas emissions, it is reasonable to assume collection efficiencies of up to 75 per cent of landfill gases.

The captured methane can be burned, which yields heat, carbon dioxide and water. Because carbon dioxide has a much lower global warming potential than methane, even simply flaring the landfill gas significantly reduces its potential environmental impact. In addition, the heat from burning the gas can be used to generate electricity, which can reduce greenhouse gas emissions by replacing fossil fuels as an energy source. The US EPA (1998) calculated that with 75 per cent collection efficiency and where electricity generation from landfill gas replaces fossil fuels, it is possible to reduce the net greenhouse gas emissions of landfilled municipal waste by as much as 92 per cent.

While the external costs of greenhouse gas emissions are uncertain, some researchers have attempted to estimate the costs imposed by emissions. For illustrative purposes for this report, the Commission has assumed that the external costs of greenhouse gas emissions are between $5 and $20 per tonne of carbon-dioxide equivalent emissions (appendix B). This range was chosen to reflect the uncertainty that exists regarding the effects of greenhouse gas emissions on climate and the environment. Although these estimates should be interpreted with care, it is evident that systems that capture landfill gas and use it as a fuel for electricity generation can substantially reduce the external costs of landfills (table 4.3).

Non-greenhouse gases

Landfill gases are comprised mainly of methane and carbon dioxide. Traces of other gases emitted from landfills can cause damage to human health and to sensitive ecosystems. While the health and environmental impacts of some of these gases are well documented, there is limited research on the pathways through which landfill gases come into contact with people and sensitive ecosystems.

Any potential for non-greenhouse landfill gases to cause significant damage would be greatly reduced at landfills that are separated from homes, business premises and sensitive ecosystems by buffer zones. Where buffer zones exist, the small quantities of gases that are emitted are likely to be dispersed, and diluted to levels that make it unlikely they will cause damage to human health and the environment.

Table 4.3 **Estimated net external costs of greenhouse gas emissions from waste sent to landfill**[a]

	Municipal solid waste		*Commercial and industrial waste*		*Construction and demolition waste*	
	$/tonne of waste		$/tonne of waste		$/tonne of waste	
	Low[b]	High[b]	Low[b]	High[b]	Low[b]	High[b]
Landfill with no gas management	4	15	5	21	1	4
Landfill with gas capture and electricity generation[c]	0	1	0	2	0	1

[a] Based on estimates from AGO (2005) that one tonne of municipal waste generates 0.74 tonnes of carbon-dioxide equivalent; one tonne of commercial and industrial waste generates 1.04 tonnes of carbon-dioxide equivalent; and one tonne of construction and demolition waste generates 0.20 tonnes of carbon-dioxide equivalent. [b] The low estimate assumes that the external cost of greenhouse gas emissions is $5 per tonne of carbon-dioxide equivalent. The high estimate assumes it is $20 per tonne. Details are provided in appendix B. [c] Landfill gas management is assumed to reduce the net greenhouse gas emissions of landfills by 92 per cent (US EPA 1998).

Sources: AGO (2005); BDA Group and EconSearch (2004); Nolan-ITU and SKM Economics (2001); Tol (2005); Productivity Commission estimates.

Published estimates of the external costs of non-greenhouse gas emissions from landfills range from less than $0.01 per tonne (BDA Group and EconSearch 2004), to between $46 and $93 per tonne of mixed municipal waste (Nolan-ITU 2004b, as interpreted by the Commission). These and other estimates are analysed in detail in appendix B.

Approximately 85 per cent of the external costs of landfill gases estimated by Nolan-ITU (2004b) are believed to relate to emissions of benzene and methyl chloroform. The Commission has undertaken some assessment of the risks posed by these gases, and considers it highly unlikely that people or the environment would be exposed to emissions of these gases from landfills in concentrations that would cause any significant damage (appendix B). This leads the Commission to conclude that the external cost of emissions of these gases from properly-located, engineered and managed landfills is likely to be close to zero.

This conclusion for benzene and methyl chloroform causes the Commission to have doubts about the estimates Nolan-ITU (2004b) made for the external costs of other gases emitted from landfills. Estimates of these costs also appear to be based on potential rather than expected costs. Based on other estimates and regulatory standards (appendix B), the Commission concludes that, although uncertain, the external cost of non-greenhouse landfill gases is likely to be less than $1 per tonne of waste over the full life of a properly-located, engineered and managed landfill.

Leachate

Leachate is liquid that has passed through a landfill, and may have become contaminated with metallic, organic, and inorganic compounds including toxins. Leachate can damage human health and the environment if it comes into contact with surface or groundwater and subsequently enters the food chain or comes into contact with sensitive ecosystems. The contaminants in leachate that are thought to pose the greatest risks are heavy metals, such as lead, mercury, cadmium and copper; and metal oxoanions, such as chromate, arsenate and selenate (Scott et al. 2005). Leachate can contain high levels of ammonia and can have high biological oxygen demand, both of which can be harmful to aquatic life.

There is a shortage of scientific evidence regarding the effects of leachate in the short and long term (European Commission 2000a). In particular, there is little research on how leachate is transmitted once it leaves a landfill. Depending on local circumstances, leachate could quickly find its way into the water table and from there into the food chain or sensitive ecosystems where it could do considerable damage. Alternatively, the leachate could remain confined in the landfill indefinitely, or until it was appropriately treated and discharged to sewers, or it could leak through the landfill liner but be confined by impermeable bedrock.

Estimates of the external costs of leachate damage should take into account the risk that leachate will damage human health and the environment. The risks of damage from leachate depend on the location of the landfill, its construction (including the composition of the landfill liner), and how leachate is managed.

The risks associated with leachate from properly-located, engineered and managed landfills appear to be small. The NSW EPA considered that if landfills were operated in compliance with the environmental management guidelines that were in place in 1996, all potential damage caused by leachate would theoretically be prevented, and therefore leachate would impose no external costs on the community (EPA NSW 1996c). The DEH agreed that the potential for leachate and other pollutants from modern landfills to damage human health and the environment is low:

> … the majority of landfills currently servicing major population centres now meet stringent planning and regulatory requirements in relation to location, design, construction and operation. Consequently, such landfills generally do not present significant risks in terms of generating external environmental costs through air and water pollution, noise, dust and the generation and spread of disease. (sub. 103, p. 16)

The Commission has examined a number of published estimates of the external costs of leachate, and of the costs of measures to prevent leachate from escaping from landfills (appendix B). These estimates range from less than $0.01 per tonne of waste (BDA Group and EconSearch 2004), to between $43 and $89 per tonne of mixed municipal waste (Nolan-ITU 2004b, as interpreted by the Commission). Nolan-ITU's estimates appear to be based on the assumption that people and sensitive ecosystems are directly exposed to undiluted leachate, irrespective of whether or not it escapes from the landfill site — that is, they are potential costs. Without addressing the risks of leachate escape, the Nolan-ITU estimates cannot be regarded as a reliable estimate of the expected costs of leachate damage. It is the Commission's assessment that they are not appropriately adjusted for risk and are, therefore, misleading. Based on other estimates and evidence (appendix B), the Commission considers that if landfills incorporate liners and leachate management systems, the risk that leachate will damage human health or the environment is small, and the external cost of leachate is likely to be less than $1 per tonne of waste.

Amenity effects of landfill

Landfills can cause loss of amenity for people who live or work near them. The impact of the amenity loss depends on where the landfill is located. Empirical studies suggest that, if a landfill is located more than five kilometres from residential areas, the costs of lost amenity are likely to be less than $0.01 per tonne of waste (European Commission 2000a; Porter 2002). When a landfill is located in a built-up area and poorly managed, the loss of amenity can impose external costs that have been estimated in the Australian context to be up to $3.70 per tonne of waste (EPA NSW 1996c). It has been assumed that the typical amenity cost of a properly-located, engineered and managed landfill is less than $1.00 per tonne of waste.

The total costs of landfill

The total costs to the community of sending waste to landfill are comprised of the private costs and the external costs. The private costs should be reflected in the gate fees charged by landfill operators. As noted, the average gate fees for landfills in the Australian states and territories range from $27 to $57 per tonne of waste.

Having analysed the available evidence, it is the Commission's view that the risks of damage from leachate, non-greenhouse gases and amenity impacts are small if waste is disposed to a properly-located, engineered and managed landfill. If a landfill incorporates a gas capture system and uses the gas for electricity generation, the external costs of greenhouse gas emissions are unlikely to exceed $2 per tonne of waste (table 4.4). If a landfill is poorly located and does not incorporate modern engineering features and management standards, the external costs could be much higher.

FINDING 4.1

The total external costs of properly-located, engineered and managed landfills that incorporate efficient gas capture (with electricity generation) are likely to be less than $5 per tonne of waste.

Table 4.4 **Estimates of the external costs of properly-located, engineered and managed landfills, per tonne of waste**

	Municipal waste	*Commercial and industrial waste*	*Construction and demolition waste*
Properly-located, engineered and managed landfill			
Leachate	Less than $1	Less than $1	Less than $1
Greenhouse gas emissions	$4 to $15	$5 to $21	$1 to $4
Other gas emissions	Less than $1	Less than $1	Less than $1
Amenity	Less than $1	Less than $1	Less than $1
Total	**$4 to $18**	**$5 to $24**	**$1 to $7**
Properly-located, engineered and managed landfill with efficient methane capture and electricity generation			
Leachate	Less than $1	Less than $1	Less than $1
Greenhouse gas emissions	$0 to $1	$0 to $2	$0 to $1
Other gas emissions	Less than $1	Less than $1	Less than $1
Amenity	Less than $1	Less than $1	Less than $1
Total	**$0 to $4**	**$0 to $5**	**$0 to $4**

Source: Productivity Commission estimates (appendix B).

Energy-from-waste

‘Energy-from-waste’ describes facilities in which waste is burned and used as an energy source. The most common energy-from-waste practice is incineration which, while not widely used to manage municipal waste in Australia, is common in many developed countries where landfill space is limited. Other waste disposal technologies have been proposed, including gasification and pyrolysis, however they are not widely used internationally for waste management, and, therefore, this chapter does not examine the costs and benefits of those technologies. For the purposes of this chapter, ‘energy-from-waste’ refers mainly to properly designed and regulated municipal waste incineration that incorporates electricity generation.

Private costs and benefits

Energy-from-waste facilities are a financially costly waste disposal option. The New South Wales Alternative Waste Management Technologies and Practices Inquiry (Wright 2000) estimated that the net financial cost of such facilities in Australia in 2000 would be between $180 and $260 per tonne of waste. The high cost of these facilities is mainly due to their high capital costs, which are in part due to the pollution controls that are typically required in modern energy-from-waste facilities. These costly technologies reduce the environmental impacts of energy-from-waste, and internalise many of the environmental and human health externalities associated with waste combustion.

Energy-from-waste facilities can recoup some of their costs by selling electricity into the grid. Wright (2000) estimated that the revenue from electricity sales from energy-from-waste facilities in Australia would be between $15 and $25 per tonne of waste. Porter (2002, p. 73) stated that energy-from-waste facilities in the United States 'often recover their entire operating and maintenance costs through the sale of the resulting electricity'. Even where electricity sales are sufficient to cover the operating costs of energy-from-waste plants, it appears likely that the high capital costs mean that in Australia, energy-from-waste will remain a much more costly waste disposal option than landfill for the foreseeable future.

A less expensive energy-from-waste option is to use selected waste materials as an energy source in cement kilns. Cement kilns can use tyres, wood waste, chemicals, lubricants and other industrial byproducts as a source of energy. The Cement Industry Federation stated that in the year 2004-05, 6 per cent of the industry's thermal energy requirements were derived from 'alternative fuels' including waste (sub. 71, p. 2). Because the capital costs of cement kilns are recovered through cement manufacture, and the waste materials can decrease energy costs, they can be a cost effective option for the disposal of some waste materials. Due to the high temperatures and long residence times involved, many cement kilns appear to comply with stringent environmental controls, including when using waste as a fuel.

Environmental and other external costs and benefits

The main external impact of a properly configured energy-from-waste facility is the emission of greenhouse gases. Emissions of other gases, amenity loss and the effects of ash and other solid waste residues disposed to landfill can all be managed in a way that reduces their impacts to low levels (appendix B).

The combustion of one tonne of municipal waste leads to the emission of approximately one tonne of carbon dioxide (appendix B). If the energy from the combustion is used to generate electricity, the demand for other energy sources such as fossil fuels may be reduced. This can offset the emissions of greenhouse gases from waste combustion.

Where energy-from-waste displaces electricity generated by burning fossil fuels, the net external cost of greenhouse gas emissions from waste combustion would be between $1 and $14 per tonne of waste.[2] In such cases, the external costs of greenhouse gas emissions from an energy-from-waste facility would be lower than the external costs of greenhouse gas emissions from a landfill with no gas management system. If waste combustion displaced hydroelectricity — which causes minimal greenhouse gas emissions, the external cost of greenhouse gas emissions would be between $5 and $20 per tonne of waste (appendix B). In these circumstances, landfill, even without gas capture would lead to lower net greenhouse gas emissions than energy-from-waste.

FINDING 4.2

Modern, well-regulated energy-from-waste facilities, while financially costly, can have minimal net negative environmental externalities, particularly where they displace fossil fuels used in electricity generation.

Illegal waste disposal

Illegal disposal includes littering and illegal dumping of waste. Litter is waste that is improperly disposed of in the environment instead of in waste containers. Littering may be deliberate, negligent or accidental. Illegal dumping is deliberate improper disposal of large volumes of waste. Both litter and illegal dumping impose external costs on the community. The Industry Commission (IC 1996) identified four negative impacts of illegal waste disposal:

- loss of aesthetic value
- danger to wildlife
- danger to human health
- the high costs of collection.

It is very difficult to estimate the external cost imposed by litter and illegally dumped waste (for example, see the discussion on plastic bags in chapter 8). However, it is clear that significant volumes of waste are illegally disposed in Australia (chapter 2), and the community is prepared to incur considerable costs to

2 Assuming that the external cost of greenhouse gas emissions is between $5 and $20 per tonne of carbon-dioxide equivalent (appendix B).

combat illegal waste disposal. For example, the Institute for Sustainable Futures (ISF 2001) estimated that NSW local governments spend $92 million on litter collection and management each year. According to the Municipal Association of Victoria, 'Victorian local government annual litter costs, including litter prevention are around $100 million' (sub. DR179, p. 5). These figures suggest that local governments spend between $14 and $20 per person per year on litter control, which equates to as much as $400 million per year nationally.

Non-government organisations and the community also commit significant amounts of time and money to combat illegal waste disposal. KESAB Environmental Solutions stated:

> State-based Keep Australia Beautiful National Association offices jointly budget an estimated $4 million per annum towards litter, waste reduction and environmental education programs across Australia. (sub. 20, p. 8)

Further, KESAB Environmental Solutions (sub. 20) estimated that the community provided 2 to 3 million volunteer hours to KESAB litter reduction programs each year. The public expenditure on illegally disposed waste, and the willingness of the community to donate time and money to reduce its impact, indicate that illegal waste disposal imposes significant external costs on the community.

4.4 Municipal recycling and resource recovery

A range of municipal recycling activities are undertaken in Australia, including kerbside recycling and AWT processing. While municipal recycling is common, only 20 per cent of Australia's recycled materials are recovered from municipal waste (chapter 2).

Kerbside recycling

Approximately 90 per cent of Australian households have access to kerbside recycling for paper and packaging, and many others can drop off their recyclables at depots. Because most recyclables from households are collected through kerbside recycling, this section focuses on the private and external costs and benefits of that system.

Private costs and benefits

After they have been collected, comingled paper, plastics, metals and glass are typically delivered to a materials recovery facility (MRF) where they are sorted for further processing. Operators of MRFs usually charge a gate fee to accept recyclables. The average MRF gate fee in Australian cities is between $30 and $45 per tonne of comingled material (Nolan-ITU 2004b). In one reported case, however, MRFs pay for the recyclables that are delivered to them. Dick Gross said that councils in the western region of Melbourne are being paid '$20 per tonne, $10 a tonne if we need some cartage' (trans., p. 101).

The size of the gate fee charged, or the payment offered, depends on a number of factors, including the:

- cost of sorting the recyclables
- revenue earned by selling the sorted materials
- level of competition in the market.

The cost of sorting depends on the composition of the incoming materials, the level of contamination, and the size of the MRF (table 4.5). In general, the more materials included in the comingled collection system, the higher the average costs of sorting for all materials.

Table 4.5 **Average materials recovery facility (MRF) sorting costs**

Material	*Small MRF (20 000 tonnes per year)*	*Medium MRF (100 000 tonnes per year)*	*Large MRF (180 000 tonnes per year)*
	$/tonne	$/tonne	$/tonne
Paper	60	50	40
Glass	120	105	80
Other containers[a]	300	240	200
Average for comingled materials	**143**	**122**	**95**

[a] Such as metal and plastics.

Source: Nolan-ITU and SKM Economics (2001).

In the case of recycled glass, the figures reported in table 4.5 do not represent the full costs of recovery. If it is to be recycled into new glass packaging, such as bottles and jars, the recovered glass must usually be sorted by colour — green, brown and clear. Standard MRFs can not do this, except with unbroken bottles or large pieces of glass. Most glass that is recycled in a comingled collection system is broken during collection, compaction and transport. Mixed broken glass must be sent to a 'beneficiation' plant if it is to be sorted by colour. There is currently only one such plant in Australia, in Laverton on the outskirts of Melbourne. Gerard van Rijswijk (sub. DR191) reported that because there is no glass beneficiation plant in Sydney or Brisbane, 70 to 80 per cent of the glass collected in those cities cannot be sorted for recycling, and hence would not be recycled into glass packaging. Instead, it may be used to make insulation or road base or simply disposed to landfill.

Glass beneficiation is financially costly due to the advanced technologies applied, and, therefore, if glass is to be recycled into new bottles and jars, the total financial cost of recovery is likely to be more than the $80 to $120 per tonne of glass reported in table 4.5.

Once the recyclables have been separated by material, they can be sold for reprocessing. Depending on the material, resale can offset some or all of the costs of collection and sorting. The price received depends (among other things) on the price of the equivalent virgin materials and the cost of processing recovered materials compared with virgin materials.

If producing a product of a given quality from recovered materials is less costly than producing it from virgin materials (taking into account the costs of collection and sorting) it would be expected that the financial benefits would be sufficient to encourage firms to recycle. This may be the case if extracting, processing and manufacturing a product from virgin materials requires large inputs of valued resources, such as energy, water, labour and capital, and recycling uses less of these inputs. For some materials — such as aluminium and steel — the value of the 'embodied' resources that are saved by recycling is generally sufficient to encourage firms to collect and reprocess the materials for profit. Other materials — such as glass — have far fewer valued resources 'embodied' in them, and are costly to sort and reprocess. In these cases recycling imposes financial costs, and can generally only occur if it is subsidised by the community.

The price paid for recyclable materials will also be influenced by volatility in the market for recovered materials. All of the materials recovered by kerbside collections in Australia are potential substitutes for virgin materials, and the prices of virgin materials fluctuate. For example, prices for iron ore and aluminium are currently high, and it is anticipated that worldwide demand will rise (ABARE 2006). This would be expected to increase the prices paid for recovered steel and aluminium. By contrast, Nolan-ITU and SKM Economics (2001) reported that the price of recovered glass had fallen from $90 per tonne in 1995 to $72 per tonne in 2001, and inquiry participants have predicted that the price of glass is likely to remain at this level for some time (Australian Council of Recyclers, sub. 40, att. prepared by Hyder Consulting). The volatility inherent in commodity markets means that while recovering some materials may currently deliver financial benefits (or impose financial costs), this may not always be the case in the future (box 2.2).

The third factor that could influence MRF gate fees is the level of competition in the market. If MRF operators are not subject to competitive constraints, the gate fee they charge may be higher than would be necessary to cover their costs (including a commercial rate of return).

Downstream external costs and benefits

Some downstream externalities (figure 1.1) can arise directly from the impacts of recycling systems. The downstream externalities associated with kerbside recycling include the impact of the extra trucks that collect the recyclables, the amenity impacts of MRFs, and the benefits of avoided leachate and landfill gas. Because most of the recyclable materials collected are inert, the external benefits of not sending them to landfill are small.

Nolan-ITU and SKM Economics (2001) estimated the size of the downstream externalities arising from kerbside recycling and concluded that the downstream costs and benefits are small and effectively cancel each other out. The Commission agrees that the net downstream externalities associated with recycling are not likely to be significant.

Upstream external costs and benefits

The upstream external benefits of recycling (figure 1.1) are associated with using recovered materials instead of virgin materials. The main upstream benefits of recycling are:

- The extraction of virgin materials can lead to damage to mining land and loss of forest values. If the damages are not accounted for in the costs of using virgin materials, they are externalities. Where virgin materials are replaced with recycled materials, these negative externalities may be avoided.
- Processing virgin materials can lead to greenhouse gas emissions, and air and water pollution, some of which may represent externalities. The process of recycling can also lead to negative environmental externalities. Often where recovered materials are used, however, some processing activities are either not required or may be simplified, and so some negative environmental externalities are avoided.

Upstream impacts are highly variable and depend on how and where virgin materials are extracted, transported and processed (chapter 5). However, not all of the damages arising from the use of virgin materials can be considered to be externalities. Direct policy interventions, such as obligations on firms to minimise or repair damage they cause, undertake offsetting environmental improvements, or pay pollution taxes or penalties serve to internalise some externalities. The costs of these measures will be reflected in the costs of using virgin materials. Nonetheless, the Commission accepts that in some circumstances, kerbside recycling can reduce the damage to human health and the environment that is associated with the extraction, transport and processing of virgin materials.

The Commission is aware of only one attempt to estimate the external costs and benefits of kerbside recycling in Australia. Consultants Nolan-ITU and SKM Economics (2001) estimated that kerbside recycling delivers external benefits of approximately $420 per tonne of mixed recyclables collected, almost all of which arises upstream.

The Commission's assessment of this estimate is that it was made without adequate accounting for risk, uncertainty and the effects of upstream policies. It also counts the depletion of natural resources as an 'externality'. Because industries that extract natural resources generally respond to anticipated future scarcity in their current production decisions, there appears to be no general market failure associated with the extraction of non-renewable resources. Therefore, it is not correct to count resource depletion as an externality (appendix B). The Commission considers it likely that, after appropriate risk adjustment and the exclusion of upstream resource depletion as an externality, the upstream benefits of kerbside recycling would be much less than $420 per tonne of mixed recyclable materials recovered (appendix B).

The Commission has not completed its own overall estimate of the upstream benefits of recycling. This would be a complex task due to the variability of upstream impacts, and the need to comprehensively assess the effects of all the relevant upstream policies. Because upstream policies would be expected to change over time, estimates of upstream benefits would change, and recycling that was once justified on the grounds of upstream benefits may no longer be appropriate. Furthermore, while such estimates may provide some indication of the need for policy intervention, they should not lead to the conclusion that intervention should occur through waste management policy, as discussed in chapters 5 and 6.

Improving kerbside recycling systems

It is likely that the costs of kerbside recycling systems could be reduced and the benefits increased. One important area for improvement is selecting the materials to be collected. This selection should be guided by the ease of sorting and the prices for the recovered materials. In general, aluminium, steel, some paper and cardboard, and some plastics are likely to be the most desirable materials to collect. In many cases, collecting glass and less readily recyclable plastics is not worthwhile.

Reducing the number of materials collected has the added benefit of reducing sorting costs, and contamination, for those materials that are collected. In areas that are distant from markets for recovered materials, the best outcome for the community may be not to have kerbside recycling.

Also, it seems likely that technological developments will reduce the costs of sorting and materials recovery over time. Increases in the demand for recycled materials could further reduce the costs of recycling. This could come about through increased demand by consumers for goods containing recycled materials, or through increased demand for all raw materials, virgin or recycled. However, markets for raw materials are likely to experience ongoing volatility, and when demand and prices for virgin raw materials fall, so will the financial benefits of recycling (box 2.2).

Alternative waste technologies

Alternative waste technologies (AWTs) are technologies that are applied to mixed waste, other than traditional methods such as disposal to landfill. There are currently six AWT facilities operating in Australia, and contracts have been signed for at least three more (WMAA, New South Wales, Alternative Waste Treatment Working Group, sub. 30). Councils in the Western Region of Melbourne have announced their support for an AWT facility that will cost $700 million over its expected 20 year life (Minchin 2006).

All of the existing AWT facilities in Australia use a combination of mechanical and biological treatments, involving manual and mechanical sorting of mixed waste to recover recyclables and non-organic fractions from the waste. The organic fractions are then decomposed to produce biogas for electricity generation. Some of the residue of the organic treatment may be suitable for application as a soil conditioner, and the rest is sent to landfill along with non-organic waste that was not recovered for recycling. Some may also be suitable for application as daily cover — material that is spread over the landfill each day to reduce the impacts of odour, windblown litter and vermin. For example, in the case of the UR-3R (Urban Resource – Reduction, Recovery and Recycling) facility operating at Eastern Creek in the western suburbs of Sydney, around 25 per cent of the waste received is sent to landfill after treatment (WSN Environmental Solutions 2005).

Private costs and benefits

AWT facilities are capital and labour intensive, which makes them costly to build and operate. Some of the costs can be offset by the sale of recyclable materials, soil conditioner and electricity. Inquiry participants have identified a significant oversupply of compost and soil conditioner in Australia, which suggests that the revenue from sales of soil conditioner is likely to be small (WMAA NSW Branch (Commpost NSW) trans., p. 488).

A further revenue source may come from earning Mandatory Renewable Energy Target (MRET) certificates. Firms that generate electricity from renewable sources — including AWT facilities — are allocated certificates that they can sell to firms who have obligations under the MRET to meet a certain proportion of their energy requirements from renewable sources.

The revenue earned from all these sources is much less than the costs of operating an AWT facility, and to cover the difference, AWT facility operators charge a substantial gate fee. The WMAA Alternative Waste Treatment Working Group estimated that AWT facilities in Australia would require gate fees of between $90 and $140 per tonne of waste to be commercially viable (trans., p. 391).

Environmental and other external costs and benefits

Alternative waste technology facilities can have negative impacts on the amenity of nearby residents and firms. They can also have external benefits, such as:

- the waste sent to landfill is more chemically stable, which reduces the volume of landfill gases and leachate that are generated;
- some AWT facilities incorporate renewable energy generation, which reduces greenhouse gas emissions; and
- some additional recyclables are recovered from the municipal waste stream, and as discussed earlier, this can give rise to upstream environmental benefits.

The external benefits of sending waste to an AWT facility depend on the system it is replacing. If the waste would otherwise be sent to a properly-located, engineered and managed landfill that incorporated a gas management system with electricity generation, the expected benefits of avoided landfill gas and leachate would, in the Commission’s estimation, be less than $2 per tonne of waste.

There are some upstream benefits that arise from the recovery of dry recyclables from mixed waste, but typically only about 10 per cent of the incoming waste is recovered for recycling (WSN Environmental Solutions 2005). As noted, the upstream benefits of recycling are highly variable and depend on the factors identified previously.

There may be other small benefits associated with the application of the soil conditioner generated by AWT facilities. Most of these benefits, however, accrue to the owners of the land where the soil conditioner is applied, or to the owner of the AWT facility, and so there are unlikely to be significant external benefits.

Comparing municipal waste management systems

The net community benefits approach provides a framework for identifying the waste management option that is most suitable for particular circumstances. The best outcome from the perspective of the community as a whole is the option that minimises the net costs of waste management, including the private and external costs and benefits. Three options that could be considered are:

- sending all municipal waste to landfill;
- kerbside recycling of paper and packaging with residual garbage sent to landfill; and
- kerbside recycling of paper and packaging with residual garbage processed through an AWT facility.

Energy-from-waste is another option for managing the combustible component of municipal waste (including organic waste and plastics). At the moment, there are no energy-from-waste facilities operating in Australia specifically for municipal waste, and due to their high financial costs, it appears unlikely that any will be established in the near future. Due to this, the Commission has not analysed in detail the costs and benefits of energy-from-waste.

The net financial costs of the three waste management systems under consideration depend on the costs of collection and transport, the costs of landfill disposal, MRF sorting, and AWT processing and revenue from the sale of recovered materials. The financial costs of waste management in a city with high costs of landfill are set out in table 4.6. Landfill levies and the goods and services tax, although they are real costs to waste generators, are not included. This is because the purpose is to compare the costs and benefits to the community as a whole. Transfer payments — such as landfill levies — serve to redistribute some of the community's income, but are not related to the costs of supplying a good, or its value to consumers (Commonwealth of Australia 2006). As such, they change the distribution of the community's income, but do not, in themselves, entail a cost to the community as a whole.

Green waste collection is now a fairly common element of municipal waste management systems. Adding a green waste collection to any of these options would increase the costs of waste collection, probably by around $30 per household per year if the green waste were collected fortnightly. Any gate fees charged by firms accepting the green waste would further increase the costs of this service.[3]

Table 4.6 **Average financial costs of waste management in a major metropolitan centre with high costs of landfill[a]**

	Units	*All waste to landfill*	*Kerbside recycling and waste to landfill*	*Kerbside recycling and waste to AWT*
Collection and transport[b]	$/household/year	59	51	51
Landfill and AWT gate fees[c]	$/household/year	51	39	62 to 97
Recyclables collection and transport to MRF	$/household/year	..	31	31
MRF Gate fee[d]	$/household/year	..	-4 to 10	-4 to 10
Total financial cost	**$/household/year**	**110**	**117 to 131**	**140 to 189**
	$/tonne	**122**	**130 to 145**	**155 to 209**

a Based on 691 kg of garbage and 211 kg of recyclables per household per year (Nolan-ITU 2004b). Also assumes that the value of the time and effort taken by householders to separate recyclables is equivalent to the benefit they derive from recycling. **b** Assumes that the costs of transport to AWT facilities are the same as transport to landfills. **c** Gate fees do not include landfill levies. **d** A negative number indicates that the MRF operator is prepared to pay for recyclable materials. If a MRF operator were prepared to pay $20 per tonne of material, as claimed by Dick Gross (trans., p. 101), the net financial benefit would equate to approximately $4 per household per year. Note that MRF gate fees may overstate the financial costs of sorting recyclables where MRFs are earning above-normal commercial rates of return. **..** Not applicable.

Sources: Nolan-ITU and SKM Economics (2001); Nolan-ITU (2004b); Productivity Commission estimates.

Even where landfill costs are high and MRFs pay for recyclables, sending all waste to landfill has a lower financial cost than a system incorporating kerbside recycling (table 4.6). In some cases, however, where recycling may not be justified on financial grounds, it may be preferred to sending all waste to landfill if it delivers external benefits. The difference between the financial costs of landfill only, and landfill plus recycling systems gives an idea of the magnitude of the external benefits that would be necessary to make recycling the best option for the community.

For example, in a city such as Sydney where landfill gate fees are high — $57 per tonne of waste, not including the landfill levy (table 4.1) — the financial cost of a landfill-only system would be around $122 per tonne of municipal waste. If MRF operators were prepared to pay $20 per tonne for recyclables, the financial

3 The Commission understands that in metropolitan areas, supplies of compost currently exceed demand. This suggests that firms would charge a gate fee to accept green waste. WM Waste Management Services Pty. Ltd. stated that the ‘going rate for green waste processing is around $35 per tonne’ (sub. DR140, p. 3). If demand for compost were to increase, it is possible that firms would be prepared to pay for green waste, which would offset some or all of the costs of collection and processing.

cost of a system with kerbside recycling and garbage to landfill would be around $130 per tonne of municipal waste. If recycling delivered external benefits of more than $8 per tonne of municipal waste — approximately $32 per tonne of recovered materials[4] — then adding a kerbside collection would deliver a net benefit to the community.

In Melbourne, where landfill gate fees are estimated to be $29 per tonne of waste (table 4.1), the financial cost of a landfill-only system would be around $94 per tonne of waste. If MRF gate fees were high — for the sake of illustration assume $45 per tonne — the financial cost of a system with kerbside recycling would be around $124 per tonne of municipal waste. In this case, kerbside recycling would deliver net benefits to the community only if it delivered external benefits worth over $125 per tonne of material recovered.

The Commission agrees with Nolan-ITU and SKM Economics (2001) that the downstream benefits of kerbside recycling are small. The upstream benefits could tip the balance in favour of recycling, but these benefits are highly variable, and depend on the degree to which externalities have already been internalised.

Much of this discussion has been based on the assumption that the benefits that householders gain from participating in kerbside recycling are equal to the costs to them of sorting their waste for separate collection. If householders gain benefits from recycling that exceed the cost of their efforts, and would be prepared to pay to participate in the system, kerbside recycling could become privately cost effective in more circumstances. However, if this assumption is to be used to justify kerbside recycling systems that would otherwise not deliver net benefits to the community, household willingness to pay for recycling should be tested transparently, not just asserted by policy makers.

Currently, there would appear to be no circumstances in Australia under which AWT treatment would be less financially costly than landfill for treating mixed municipal waste. Even in a city that faced high costs of landfill disposal and had access to low cost AWT facilities, sending mixed waste to AWT facilities, rather than to landfill, would increase the total financial costs of the system by at least $25 per tonne of municipal waste. In states and territories where landfill is inexpensive, the difference between the costs of landfill and AWT treatment is much larger.

The external benefits of sending waste to an AWT facility, rather than a properly-located, engineered and managed landfill that incorporates gas capture and

4 Based on the assumption that around one quarter of the material in municipal waste is recyclable.

electricity generation, are considered to be small, and insufficient to justify sending waste to an AWT facility. AWT treatment prior to landfill of residual waste may have some environmental benefits if the waste would otherwise be sent to an unlined landfill that was located in an environmentally sensitive area or close to homes and businesses, and incorporated no gas management system. However, installing a liner and gas management system in the landfill, or transporting the waste further afield to a properly-located, engineered and managed landfill would, in most circumstances, be a more cost-effective way of reducing the external costs of waste disposal than building an expensive AWT facility.

Although they have not been set out in detail in this section, the costs and benefits of energy-from-waste are in many respects similar to the costs and benefits of AWTs. Like AWTs, the financial costs of energy-from-waste are much higher than the financial costs of landfill. And as is the case with AWTs, energy-from-waste has no significant external benefits over properly-located, engineered and managed landfills.

When the financial, environmental and social costs and benefits of the various systems that are available for waste management are compared, properly-located, engineered and managed landfills, combined in some circumstances with appropriate kerbside recycling, appear to impose the lowest net costs on the community.

FINDING 4.3

Taking into account all private and external costs and benefits, properly-located, engineered and managed landfills incorporating gas capture and electricity generation, are likely to be much less costly than 'alternative waste technology' plants or dedicated energy-from-waste facilities, in most, if not all, circumstances.

FINDING 4.4

The financial costs of current kerbside recycling systems exceed the financial benefits. This is particularly the case where the cost of landfill is low. The case for kerbside recycling partly rests on its ability to deliver upstream external benefits, which are highly variable, and/or on the community's willingness to pay for recycling services. Technological progress and changes to the design of recycling systems may reduce the net financial costs of kerbside recycling.

4.5 Business waste recycling

Many firms generate waste that can be recycled. For example, offices create large amounts of paper waste, supermarkets throw away hundreds of cardboard boxes each day, and pubs must dispose of thousands of glass bottles each week. Concrete, bricks and other rubble from construction and demolition projects can be crushed for use as road base. Industrial byproducts are often homogeneous and produced in large volumes, and may be useful as inputs into production for other firms. Recycling of commercial, industrial, construction and demolition waste constitutes the vast majority (80 per cent) of recycling in Australia (chapter 2).

Private costs and benefits

Firms that generate recyclable waste can either send it to landfill or for recycling. If it is less costly to send the waste for recycling, they will usually prefer that option. In some cases, firms will choose to recycle even if it is a more costly option, because of a desire to demonstrate 'green credentials' to the community, or because of the preferences of staff.

The financial costs of recycling depend on the costs of sorting, collection and transport, and the value of the recycled material. If the material is highly valued — for example some scrap metals — and disposed of in large volumes, a recycler may be prepared to pay a firm to collect their waste. If the material is not highly valued, or only a small amount of waste is generated — for example, rubble from small building projects — the costs of collection may exceed the benefits of selling the recycled material, so it will not be sought after by recyclers, and will be sent to landfill.

Recycling will only occur where both the waste generator and the recycler are aware of the potential for mutual benefits. There could be cases where recycling does not occur because waste generators and recyclers lack information about each other's requirements. Waste exchanges have been canvassed as one way of facilitating the development of these markets (chapter 11). Another way would be for a third party to intervene to encourage recycling. An example of where this is occurring is the Kwinana Industrial Area (box 4.2), where firms are acting to exploit industrial synergies including those in waste generation.

Environmental and other external costs and benefits

Like all of the waste management options addressed in this chapter, there are downstream external costs associated with business waste recycling that arise from transport and amenity issues. These costs are probably not large.

The downstream external benefits depend on the composition of the waste. If it is relatively inert — for example steel and concrete from construction and demolition projects — the avoided downstream impacts are probably small. If the waste contributes to toxic leachate or landfill gases — for example some industrial waste — and these emissions are not properly controlled, the external benefits of recycling could be larger. As with kerbside recycling, the upstream benefits of recycling waste generated by firms vary according to circumstances.

Box 4.2 **The Kwinana industrial area**

The Kwinana Industrial Area is located 35 kilometres south of Perth. The area was established in the 1950s, and is home to 40 industries including smelters, chemical producers, refineries, energy generation and port facilities. The Eco-efficiency Committee of the Kwinana Industries Council investigates opportunities for organic and inorganic waste recycling in the area. Currently there are 32 'byproduct synergies' in the area involving the reuse of solid, liquid and gaseous wastes (Chamber of Commerce and Industry Western Australia, sub. 97).

Inquiry participants identified examples of recycling that occur in the Kwinana Industrial Area:

> … a pigment plant supplies waste hydrochloric acid to a nearby chemical manufacturer to produce ammonium chloride for synthetic rutile production by the pigment plant. Previously, the ammonium chloride was imported at considerably higher cost. (Business Roundtable on Sustainable Development, sub. 70, support documents, p. 62)

5 The case for government intervention

Key points

- Markets take many of the costs and benefits of managing waste into account and thereby provide incentives to reduce waste generation and undertake recycling. But ‘market failures’ can result in these incentives not being as strong as they should be.
- Waste management policies that address the environmental and social externalities of waste disposal are warranted where the costs of intervention are less than the benefits.
- Unchecked negative externalities from resource extraction and production processes could result in too much waste being generated, not enough recycling and excessive environmental damage. Policies that target the source of these externalities directly are likely to be the most efficient option. Using waste management policies to address these upstream externalities is indirect and likely to be ineffective.
- The benefits of using direct policies apply also to sustainability concerns. To achieve sustainable development it may be necessary to take specific action on intergenerational equity grounds to preserve certain forms of natural capital, such as biological diversity. But using waste management policies to address upstream threats to such natural capital is not recommended.
- Sustainable development considerations are unlikely to justify using waste policies to slow market-driven rates of extraction of nonrenewable resources.
- The collection and transport of waste from households in a particular area may be most efficiently done by a single firm. This ‘natural monopoly’ characteristic of waste collection, together with the desirability of ensuring waste is collected from all households, can warrant government delivery of the service.
- The ‘public good’ characteristics of some information can cause market failure. Accordingly, there may be a role for governments to provide some general information on waste management. Where governments deliver waste services they should provide information where this improves the overall efficiency of the service.
- The existence of financial subsidies for the use of virgin materials is not a valid argument for extending them to recovered resources, nor for using any other waste management policy to counteract them. The case for subsidising an activity, or removing a subsidy, should be made on its own merits. Besides, it is likely that subsidies to the use of virgin materials have declined in recent years.
- The concerns of some members of the community about waste do not justify a policy response that imposes costs on others, if those concerns are not well founded.

Inquiry participants have articulated various arguments for why governments should take policy action on waste management. This chapter tests the validity and strength of these arguments. Section 5.1 develops a criterion for doing this and the subsequent sections consider the main arguments raised in light of this criterion.

5.1 Government intervention and market failure

Private incentives

Markets create incentives for producers to reduce the quantity of material resources in their products — provided this can be done without compromising the features that consumers and distributors value, such as performance, quality, safety and protection of the product during distribution. Where firms are able to do this, they will save money on materials and their profits will tend to increase. As a consequence, the amount of waste that their products create when they reach the end of their useful lives will decrease. For example, the Australian Food and Grocery Council reported:

> In 1988, the Australian soft drink industry used an average of 453 grams of packaging in the manufacture and distribution of each litre of soft drink. By 1997, the amount of packaging required had been reduced to 150 grams per litre, an average reduction of 67 per cent. The weight of the average glass 'stubby' has been reduced by 25 per cent over the past 15 years. (Australian Food and Grocery Council, sub. 93, p. 24)

Recycling can be a business opportunity for firms that are seeking to reduce the costs of managing their waste, and for firms that collect and sort recyclables or manufacture products that have recycled content. For example, firms that generate large quantities of waste cardboard, such as supermarkets, can often reduce their costs by having the cardboard collected for recycling rather than for disposal.

Consumers also influence waste outcomes. They may choose to purchase products that are more expensive but more durable, or do not have excessive packaging, in part to reduce the hassle and costs of disposal. Some consumers also seek out products that are perceived as environmentally friendly due to their ability to be recycled, inclusion of recycled content, or other factors that relate to waste.

Because there are market incentives to reduce waste and undertake recycling, the scope for effective government intervention is limited mainly to circumstances where these incentives do not reflect the true costs and benefits to the community that are associated with waste. That is, where there is market failure.

Market failure

Market failure refers to circumstances in which markets do not allocate resources to achieve the best returns for the community. Where there is market failure, government intervention may produce net benefits to the community. However, government intervention can be costly and introduce its own distortions. For intervention to be warranted, the benefits that are likely to result must outweigh the costs involved. The various types of market failure are described in box 5.1.

Box 5.1 **Types of market failure**

Public goods exist where provision for one person means the product is available to all people at no additional cost. Public goods are non-rivalrous (that is, consumption by one person will not diminish consumption by others) and non-excludable (that is, it is difficult to exclude anyone from benefiting from the good). Common examples include flood-control dams, national defence and street lights. Given that exclusion would be physically impossible or economically infeasible, the private market is unlikely to provide sufficient quantities of these goods. The nature of public goods makes it difficult to assess the extent of demand for them. It is ultimately a matter of judgement whether demand is sufficient to warrant government provision.

Externalities (or spillovers) occur where an activity or transaction has positive (benefits) or negative (costs) economic welfare effects on others who are not direct parties to the transaction. An example of a positive externality is disease immunisation, which protects the individual, but also lowers the general risk of disease for everyone. Governments often subsidise activities that have significant positive externalities. Examples of negative externalities may include pollution and large buildings that block sunlight to their neighbours. Legal restrictions and/or pricing mechanisms can regulate such activities. Public goods and externalities are similar analytically — externalities have public good characteristics in that they are non-rivalrous and non-excludable.

Information failures occur where there is insufficient or inadequate information about such matters as price, quality and availability for firms, investors and consumers to make well-informed decisions. In some instances, markets can address these problems through intermediary products — for example, consumers purchasing advisory services. But where the issues are highly technical, the government may perceive a role to complement or verify market supplied information — for example, government licensing, registration and labelling regulations for pharmaceuticals.

Natural monopoly occurs where it is more efficient for one firm to supply all of a market’s needs than it would be for two or more firms to do so. It usually arises where there are significant economies of scale resulting from fixed costs which are large relative to the variable costs of supply. It can also arise in network industries (such as mail delivery) where there are strong economies of density. Monopolies may charge excessive prices, so regulation or government ownership is often adopted.

Source: Adapted from PC (2001).

This focus is found in the inquiry terms of reference that states that the ‘objective of this inquiry is to identify policies that will enable Australia to address market failures and externalities associated with the generation and disposal of waste’. Therefore, in assessing arguments for government intervention the Commission has concentrated on opportunities to produce net benefits to the community through addressing market failures. Another valid basis for government intervention might be if it improved intergenerational or intragenerational equity (section 5.4).

5.2 Environmental and social impacts of waste disposal

Until recent years the main argument used to justify government intervention in waste management has been that waste disposal can have negative impacts on the environment and people’s health (chapter 3). As discussed in chapter 4, the existence and severity of these impacts depends on the type of waste and the manner of disposal. Landfills can leak polluted leachate into groundwater, emit greenhouse and other gases, and inconvenience people living nearby by creating odour, traffic noise and attracting feral animals to the site. Odour and traffic noise can also be issues for materials recovery and alternative waste technology facilities. Illegal dumping of waste is potentially hazardous to the environment and can be costly to remove. Littering is a public nuisance that can also kill or injure wildlife. These and other environmental and social impacts of waste disposal have long been the target of waste management policy.

These impacts often represent negative externalities — a type of market failure. That is, there are costs imposed on people other than those disposing of, or legally receiving, the waste. Because those responsible do not bear all of the costs of their actions, these impacts tend to be greater than is desirable. There is, therefore, at least the potential that government intervention could produce net benefits, depending on the costs of the intervention. As it is the collection, sorting, treatment and disposal of the waste that is causing these problems, the most direct and efficient response is generally to use waste management policy. The exception is greenhouse gas emissions, which ideally should be dealt with through broader greenhouse gas abatement policy, as explained in chapter 6.

Developing the case for using waste management policy to address negative externalities from waste disposal requires an assessment of the size of the externalities, which has been provided in chapter 4. This assessment indicates the magnitude of the possible benefits of government intervention, which needs to be considered in light of the effectiveness and costs of any proposed policy to see if net benefits to the community are likely to result.

5.3 Upstream environmental impacts

An argument that has gained prominence recently is that government intervention in waste management is needed to address 'upstream' environmental impacts associated with waste. In this context, 'upstream' means preceding the point at which material becomes waste in the product life cycle (figure 1.1). The main types of upstream impacts that inquiry participants have referred to are:

- environmental damage from extracting mineral resources and producing forest resources;
- air and water pollution, and greenhouse gas emissions that occur during the processing of virgin materials and subsequent manufacturing; and
- resource depletion from extracting natural resources.

The link with waste is that some of these impacts might be avoided if less waste were generated and more recycling undertaken.

A distinction needs to be drawn between environmental impacts and natural resource conservation. Arguments for government intervention to slow the depletion of natural resources (such as minerals) are mainly related to concerns over sustainability, rather than externalities or other types of market failure. This section concentrates on environmental impacts. Resource conservation is addressed in section 5.4, which deals with sustainability.

Participants' views

Many inquiry participants expressed the view that addressing upstream impacts is an important reason for governments to pursue waste management policies. For example, the Australian Council of Recyclers (ACOR) mentioned avoided water and air pollution, and conservation of mineral, forest and water resources as reasons for governments to support resource recovery and recycling (sub. 40). The report *Independent Assessment of Kerbside Recycling in Australia* (Nolan-ITU and SKM Economics 2001) is frequently used to support this argument. For example, in discussing the environmental costs of waste Eco Waste cited findings from this report:

> … the Nolan-ITU report … found that whilst the direct cost to householders for a separate recycling service was some $26/yr, the net economic/environmental benefit was some $68/household/yr. An advantage of some $42/household/yr, or an advantage some 60 per cent greater than the apparent direct costs. (sub. 83, p. 6)

The Nolan-ITU report found that the environmental benefits of kerbside recycling were almost entirely upstream. While the Commission has concluded that the

Nolan-ITU report substantially overstates the upstream environmental benefits, it nevertheless seems that the environmental benefits from kerbside recycling are more likely to occur upstream than downstream (chapter 4).

Some inquiry participants opposed the use of waste management policy to address upstream environmental impacts and resource depletion. For example, the Business Roundtable on Sustainable Development recommended:

> … that waste management policy should focus on downstream waste disposal impacts rather than seeking to drive upstream benefits. (sub. 70, p. 1)

Advantages of using direct policy

Like the impacts of waste disposal (discussed in the previous section), upstream environmental impacts can be negative externalities. For example, if mining caused a deterioration in the quality of water in nearby streams, and the mining company were not required to ameliorate this or pay appropriate compensation, there would be a negative externality. Upstream externalities may result in excessive environmental damage because firms engaged in these activities do not face the full cost of their actions. These externalities may also cause virgin materials to be cheaper than they should be and this may, consequently, result in more waste generation and less recycling than is desirable.

Where there are upstream environmental externalities there may be a case for governments to intervene to address them. In the language used by ACOR (sub. DR197, p. 1), this will help to 'get right the price for the services of nature'. However, unlike the impacts of waste disposal, upstream impacts are not caused by waste but by production and consumption. The association with waste is indirect, which strongly suggests that it would be better to use policies that target the problem directly. For example, if industrial pollution from processing virgin materials is a problem it would be more appropriate to use pollution policy, rather than waste management policy, to address it.

This general principle is recognised in various guides to good regulatory practice, including the Office of Regulation Review guide to regulation, which states that the 'measure adopted should be carefully targeted at the identified problem so that it does not impact unduly on other areas' (ORR 1998, p. D4). Examples of policies that are used to directly address upstream environmental externalities are provided in box 5.2.

Box 5.2 **Examples of policies that can be used to address upstream environmental impacts**

Air and water pollution

- *Regulation of emissions* — industrial and other emissions of air and water pollutants can be regulated in various ways. For example, in Queensland, under the *Environmental Protection Act 1994*, activities that will, or have the potential to, release contaminants into the environment are regulated through licensing and development approvals (PC 2003).
- *Emission targets* — for example, the National Environment Protection (Ambient Air Quality) Measure sets maximum acceptable concentrations for various air pollutants.
- *Pollution fees* — for example, the NSW Environment Protection Authority administers a load-based licensing scheme that sets limits on the pollutant loads emitted by holders of environment protection licences, and links licence fees to pollutant emissions. Firms engaged in a range of industrial and other activities are required to have an environment protection licence (EPA NSW 2003b).

Greenhouse gas emissions

- *Voluntary agreements* — for example, the Australian Government's Greenhouse Challenge Plus program supports and encourages industry to manage greenhouse gas emissions through reporting emissions, and developing and implementing action plans to achieve abatement.
- *Mandatory generation of low emission energy* — for example, the Mandatory Renewable Energy Target places a legal liability on wholesale purchasers of electricity to contribute towards the generation of an additional 9500 gigawatt hours of renewable energy annually by 2010 (AGO 2003).

Mineral extraction

- *Regulation of environmental standards* — in addition to complying with pollution regulations, mining companies are required by regulations and licence conditions to rehabilitate the land after the closure of a mine (appendix B).
- *Mandatory environmental offsets* — for example, in South Australia the Native Vegetation Regulations 2003 require that all mining that involves the clearance of native vegetation must be undertaken in accordance with a management plan that the Native Vegetation Council is confident will result in a significant environmental benefit on the site or elsewhere in the region. This requirement is in addition to on-site rehabilitation requirements (DWLBC 2005).

(Continued on next page)

Box 5.2 (Continued)

Forest production

- *Banning harvesting* — for example, almost 70 per cent of old growth forests in Regional Forest Agreement regions are in conservation reserves (BRS 2003). Regional Forest Agreements cover regions where commercial timber production is a major native forest use.
- *Regulating harvesting* — there is a range of State and Territory Government regulations and other policies designed to limit or ameliorate the environmental impacts of timber harvesting. For example, the Victorian Code of Forest Practices for Timber Production is a regulatory instrument that applies to commercial timber production on both public and private land. It aims to ensure that harvested forest land is adequately regenerated, environmental values are conserved and water supply catchments are protected. The Victorian Environment Protection Authority conducts annual audits of compliance with the code on public land (DSE 2006a).
- *Log pricing that compensates for environmental impacts* — for example, the National Forest Policy Statement (that has been endorsed by Australian, State and Territory Governments) includes the principle that logs from publicly-owned native forests will be priced so as to provide an adequate return to the community from the use of a public resource (DAFF 2002).

The main advantages of using direct policies to address upstream externalities are that they can:

- respond to location-based variability;
- respond to operation-based variability;
- minimise the risk of perverse outcomes;
- address the environmental impacts associated with products irrespective of whether they are exported or used domestically; and
- use negotiations to determine mutually beneficial outcomes.

Location-based variability

There can be a wide variation in the environmental costs of mining a tonne of a mineral, harvesting a tonne of wood fibre or emitting a tonne of a pollutant, depending on the location of these activities. Mining can involve the destruction of a large area of native vegetation with high conservation and recreational values, or affect only a small area of previously cleared or sparsely vegetated land. Forest harvesting can take place in native forest that has high conservation and recreational values, or in forest plantations. Air pollutants can be emitted in areas of high population density that have high existing pollution loads, or in remote areas where the effects on human health and the environment can be much lower.

Direct policy is able to respond to these variations in environmental costs. For example, air pollution policy is able to respond by using pollution charges and other policy instruments that vary by region, enabling the pollution control effort to be tailored to the particular problem. This is a feature of NSW Government policy that allows pollutant load fees that apply to environment protection licence holders to vary by a factor of up to seven, depending on conditions in individual local government areas or catchments (EPA NSW 2005).

By contrast, waste management policy is not generally able to respond to location-based variations in environmental costs. For example, paper recycling might be subsidised in part as a means of reducing the environmental impacts of timber harvesting. However, it is very unlikely that such a subsidy could discriminate between paper made from wood fibre sourced from high conservation value native forests and paper made from plantation grown fibre (or between wood fibre sourced domestically and fibre from overseas). Greenhouse gas emissions appear to be the only significant upstream environmental externality that is not subject to location-based variability (appendix B).

Operation-based variability

The environmental costs of mining, forestry and virgin material processing depend in part on the characteristics of particular operations or facilities. For example:

- mining operations can have good or poor processes for managing impacts on water quality;
- forest harvesting operations vary in the standard of environmental controls that are employed to protect watercourses and prevent soil erosion; and
- facilities that process particular virgin materials vary in the quantity of air and water pollutants, and greenhouse gases they emit due to variations in processing technology, pollution controls, energy efficiency and their source of energy.

Direct policy is well placed to respond to these differences by prescribing minimum environmental standards or by basing pollution charges on the actual performance of individual operations. If waste management policy were to be used instead, all operations of a particular type would end up being treated as if they had equal environmental impacts per unit of output.

Minimising the risk of perverse outcomes

It is generally easier to limit the occurrence of unintended consequences when implementing direct, rather than indirect policies. This is because achieving the intended outcomes by using indirect policies usually relies on uncertain linkages. If waste policy is used to target upstream environmental impacts, unintended perverse consequences can arise. For example, landfill levies have been introduced in part to encourage recycling and, thereby, achieve upstream environmental benefits. They may, however, cause:

- *An increase in illegal dumping of waste* — as people seek to avoid the higher cost of legal disposal.
- *Recycling operations to be less viable* — as the levy often has to be paid on the residual material that can not be recycled. For example, it was reported by the Waste Contractors and Recyclers Association of New South Wales, that the recycling of old cars was now becoming financially unviable in some regional areas because of the requirement to pay an increased levy on the shredder floc waste (trans., p. 406). Such cars may be sent to unlicensed landfills that are not subject to the levy.
- *Waste to be transported long distances* — as people seek to avoid the levy. For example, the Waste Contractors and Recyclers Association of NSW reported that waste was being exported from the Sydney metropolitan area to unlicensed landfills that were not subject to the levy (trans., p. 911).
- *Health risks* — as levies may encourage the improper disposal of hazardous waste. For example, Hanson Landfill Services (DR125) stated that levies on asbestos disposal in Victoria discourage the clean up of asbestos-contaminated sites and encourages people to hide asbestos among other waste.

Addressing the environmental impacts associated with exports

Direct policy is able to respond to environmental impacts when and where they arise. By contrast, waste policy is able to respond only indirectly to impacts that occur upstream of waste. Many production activities undertaken in Australia, particularly mining, produce commodities that are exported (table 5.1). These commodities eventually end up as waste in other countries and, hence, are largely beyond the influence of Australian waste management policy. In addition, measures taken to reduce the waste from Australian consumption of these goods would be largely futile if reduced domestic consumption were made up for by increased exports.

Table 5.1 **Selected Australian commodity statistics, 2004**
'000 tonnes

	Production	*Consumption*[a]	*Exports*
Aluminium	1 894	313	1 534
Iron ore	234 008	9 815	211 359
Lead	674	39	715
Black coal	299 880	66 990	231 310

[a] Production minus exports may not equal consumption due to changes in inventories and other factors.
Source: ABARE (2005a).

Mutually beneficial negotiation

Some negative environmental externalities are overwhelmingly felt by a small and readily defined group of people. Under such circumstances, the firm causing the externality and those affected may be able to negotiate a mutually beneficial agreement. This suggests that the best form of government intervention may simply be to create and/or help enforce property rights.

The type of externality described often arises in the context of mining. In some situations, the environmental impacts of mining may primarily be a local issue. Mining policy can attempt to delineate between such issues and those that require a policy response that protects broader interests and values. Negotiations over local issues could involve modifications to the operation of the mine to protect particular environmental and social values, and/or compensation in the form of financial payments, provision of community infrastructure or a guarantee of employment for local people. Such opportunities to efficiently deal with the environmental impacts of mining at the local level are not available through the use of waste management policies.

Conclusions

Each of the advantages of using direct policy is substantial. When taken together they bring into question not only the efficiency of using waste policy to address upstream environmental externalities, but their capacity to have much effect at all.

The main argument for using waste policy to tackle upstream issues claimed by some inquiry participants is the difficulty, or impracticality, of using more direct approaches. For example, the Department of the Environment and Heritage (DEH) stated:

> It is recognised that, in many cases, targeted policies are preferred to address market failures. However, where difficulties in implementing such targeted policies exist, the

> promotion of recycling and recovery could be a valid and practical mechanism to achieve upstream objectives. (sub. 103, p. 25)

The Municipal Waste Advisory Council (MWAC), a standing committee of the WA Local Government Association, similarly stated:

> [We] argue for intervention on the basis that current levels of waste disposed of straight to landfill are a reflection of market failures which make virgin raw materials cheaper than their full associated costs would suggest. … an intervention seriously tackling externalities in commodity markets is politically unfeasible, so policy makers should take responsibility for setting resource efficiency objectives. (sub. 52, p. 5)

The WA Waste Management Board also argued that direct policy was deficient:

> One reason it has fallen to 'waste policy' areas [to address upstream externalities] is that the issues are not being adequately addressed elsewhere. (sub. DR208, p. 2)

The Commission considers that any case for using waste policy to address upstream externalities would have to be very carefully evaluated and be based on an inability to effectively use more direct policies. It should not be presumed that governments do not intervene upstream. A host of policies are directed at upstream externality issues (box 5.2). Greenhouse gas emissions stand out as an area where there is no comprehensive policy, although there are a variety of greenhouse gas abatement initiatives.

Where a waste policy is proposed due to the failure of upstream policies, it still needs to be assessed as to the likelihood of achieving net benefits to the community. It is unlikely that net benefits would be achieved, given the potential for perverse outcomes and the uncertain linkages between waste policy and desirable upstream changes. If there is an exception, it is likely to be the externalities associated with upstream greenhouse gas emissions. However, using waste policy to address these would need careful analysis and continued review, given the possibility of policy changes in this area in the future, both nationally and internationally.

The Commission considers that, for all the reasons noted above, it is highly unlikely that a waste management policy would be the best way of tackling an upstream environmental externality. This conclusion is consistent with the findings of a number of commentators, including Porter (2002), Palmer, Sigmund and Walls (1997) and BDA Group and EconSearch (2004). In other words, directly targeted policies should be applied at each stage of the product life cycle, where this is warranted, to address environmental externalities and other market failures. Contrary to the interpretation of some inquiry participants (for example, Brisbane City Council, sub. DR154), the Commission advocates tackling problems at their source and cautions against only using 'end-of-pipe' solutions.

FINDING 5.1

Upstream environmental externalities associated with waste are most appropriately addressed through directly-targeted policies. Waste policy should only be used to address upstream issues where more direct policies are not able to be used, and there are reasonable prospects that it would be both effective and produce net benefits to the community. These circumstances are likely to be the exception rather than the norm.

5.4 Sustainability issues

Several participants have argued that governments should intervene because current consumption is unsustainable and this is reflected in excessive waste. Furthermore, they argue that waste management practices are unsustainable, or inconsistent with sustainable development (ACOR, sub. 40; MWAC, sub. 52; NSW Government, sub. 95). Sustainability is a difficult concept and there are many different definitions of what it means. The Commission favours the World Commission on Environment and Development's definition of sustainable development: 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development 1987, p. 43). As this definition implies, sustainable development is about equity, both between and within generations.

In the previous two sections the case for government intervention has been assessed against a net community benefits criterion. It might be argued that this criterion does not give sufficient weight to the interests of future generations as it gives undue consideration to the preferences of people who are currently alive. If this were accepted then addressing the sorts of market failures discussed previously might improve sustainability, but still be insufficient to achieve intergenerational equity. To consider this argument further the concept of sustainable development needs some elaboration.

The capital stock approach

The concept of a stock of capital is central to the idea of maintaining or improving welfare over time. The stock of capital inherited by a generation from the previous generation includes human capital (knowledge and understanding), man-made capital (economic and social infrastructure) and natural capital (biodiversity, renewable and nonrenewable resources, and ecological integrity). Most prescriptions for sustainable development require that the total stock of assets passed on to future generations should be at least as great as that inherited, but the best mix of capital assets is often undefined. Thus, a key issue is the degree of substitutability between these types of capital. There are differing views on the extent to which substitution is possible.

Solow (2005, p. 507) argued that 'what we are obligated to leave behind is a generalized capacity to create wellbeing, not any particular thing or any particular natural resource'. This approach assumes that substitution between different types of capital may be possible and that a decline in natural capital might be acceptable providing this decline were balanced by increases in human or man-made capital. Those that subscribe to this view do not necessarily envisage a general decline in natural capital in the future. To the contrary, these proponents often point out that people's concern for the environment tends to increase with income. Therefore, provided that the political system is responsive to these preferences, environmental protection will tend to rise more than proportionally with economic growth (Neumayer 2003).

Others take a more cautious approach. For example, Pearce, Markandya and Barbier (1989) argued that particular attention should be paid to natural capital because:

- Not all amenities and services provided by the natural environment can be substituted with human or man-made capital.
- Uncertainty in our understanding of the substitutability of natural systems and future technological developments suggests a risk-averse approach to the use of natural capital is needed.
- Environmental damage can be irreversible, affecting all future generations.
- Environmental degradation can lead to price differentials between polluted and non-polluted areas. This can disadvantage those on lower incomes, who are less able to respond to these price changes or choose an area with less pollution, and who might, therefore, bear a disproportionate share of the burden of environmental degradation.

Discounting the future

Another issue in implementing sustainable development is the choice of an appropriate social discount rate. The discount rate allows benefits and costs that occur at different times to be compared. Discounting recognises that costs and benefits incurred in the short term are valued more highly than costs and benefits incurred much later. One of the rationales for discounting is that capital has an opportunity cost. Using a discount rate of, say, 2 per cent per annum would result in a proposal being accepted if it cost $1 million today and provided a benefit of $2.7 million in 50 years time. Setting such a low discount rate would not be sensible if there are alternative investments that would earn a higher rate of return (for example, a $1 million investment that earned 5 per cent per annum would return about $11 million after 50 years).

It has been argued that low discount rates should be used for projects with a significant environmental component to prevent unfair discrimination against future generations (Goodin 1986). However, how the use of natural resources or environment protection will be affected by using low discount rates is ambiguous (Markandya and Pearce 1991). For example, application of a low discount rate to a dam project that has a high capital cost and low annual benefits accruing over many years can inflate the future benefits relative to the costs, and result in a decision to construct the dam rather than conserve the original habitat (IC 1996). With reference to this example, MWAC (sub. DR190) argued that it is unusual for the use of high discount rates to provide superior environmental outcomes. The example, however, highlights a more general issue reported by Markandya and Pearce (1991, pp. 140–1):

> … as the discount rate rises so the level of investment overall falls, slowing the pace of economic development in general. Since natural resources are required for investment, the demand for such resources is lower at higher discount rates.

Most economists reject the idea of using a special (low) discount rate for projects with major environmental impacts. Neumayer (2003) points out that the substitutability of natural capital is the real issue, not discounting. Markandya and Pearce (1991) argue that environmental concerns might be better tackled by developing the concept of sustainability as a specific policy issue that recognises the constraints imposed by the need for sustainability, rather than attempting to adjust the discount rate. For example, one way to meet the condition of sustainability is to require that any environmental damage associated with one project be balanced by projects designed specifically to improve the environment.

Government policy

Many governments have introduced policies on sustainable development that give special attention to natural capital. In Australia, all levels of government adopted the National Strategy for Ecologically Sustainable Development (NSESD) in 1992. The core objectives of this strategy are:

- to enhance individual and community wellbeing and welfare by following a path of economic development that safeguards the welfare of future generations
- to provide for equity within and between generations

- to protect biological diversity and maintain essential ecological processes and life-support systems. (Commonwealth of Australia 1992, p. 8)

The achievement of these objectives is promoted by maintaining (or increasing) the total stock of capital and protecting/maintaining particular aspects of natural capital (biological diversity and ecological processes and life-support systems). Accordingly, additions to (or conservation of) any of the types of capital is likely to contribute to sustainability (or at least improve the endowment we pass on to future generations). Where there are tradeoffs between them, however, the effect on sustainability can be unclear. It should not be automatically assumed that actions taken in the interests of environmental protection will always contribute to sustainability. It is possible that such protection could impose costs that lead to reduced investment in human or man-made capital that would have been more valuable to future generations. Such costs might also reduce the community's capacity to respond to present-day equity issues (such as assisting people who are currently poor). Hence, this is a complex area requiring judgement and careful evaluation, rather than simplistic notions that actions or policies in a particular area must always be supported.

The sustainability of waste disposal

Concerns over the sustainability of waste disposal relate mainly to landfilling, as this is the most common means of disposal in Australia and many other countries. It is a quite common perception that suitable landfill space is running out and hence that landfilling is unsustainable. This perception was, for example, widespread in the United States in the 1980s, and increased pressure for government action on waste and recycling (Ackerman 1997). Over time, however, it has become clear that there is no immediate 'landfill crisis' in the United States (Ackerman 1997). In fact, it has been estimated that all US garbage produced over 1000 years could be contained in landfill occupying less than one-tenth of one per cent of US land (NPRI 1997). With a much lower population density than the United States, the prospect of Australia as a whole running out of suitable landfill space is even more remote and does not constitute a sustainability concern. Indeed, due to mining and quarrying activities, Australia is creating more potential 'airspace' for landfill than it is using.

While landfill space will not run out in an absolute sense, the cost of disposing of waste to landfill may increase due to increasing land prices and transport distances. Increasing environmental standards and other requirements may also cause landfill costs to increase over time. The extent to which these factors are likely to drive up the costs of waste disposal in the future varies between regions. Sydney stands out as the city where costs have increased most in the past. Evidence of this is seen in relatively high landfill gate fees (table 4.1) and the practice of transporting some waste more than 200 kilometres to a landfill at Woodlawn.

Some policy analysts have characterised future increases in landfill costs as an intergenerational externality.[1] In general, it can be assumed that current landfill prices account for the scarcity value of landfill space. Accordingly, prospective future increases in landfill costs are not 'external' to the current market and so should not be regarded as externalities.

In addition, the prospect of increasing costs for disposal to landfill is not a sustainability concern because sustainable development does not require future generations to be provided with low-cost landfill space. Where landfill capacity does become scarce, and gate fees rise, the incentives for waste avoidance and recycling activities will also rise. Increases in landfill costs might also make other waste disposal options, such as alternative waste technology and low emission energy-from-waste facilities, more attractive.

It has also been suggested that the long-term legacy of landfills is a sustainability issue. For example, the Tasmanian Department of Premier and Cabinet stated:

> At best landfills are concentrated sources of environmentally deleterious materials (contaminated sites) on the margins of cities that will be unsuitable for higher value land uses for many years to come. At worst, landfills may be sources of off-site impacts on public health and the environment well beyond their useful life. … the impact of landfill sites are not fully understood. (sub. 114, p. 4)

There are two parts to this issue. First, old landfill sites may only be suitable for a limited range of uses over a long time period and second, old landfill sites may cause serious environmental problems in the distant future.

With respect to land use, it should be noted that landfills are often established on old quarry or mine sites that are already degraded. After they have been used for waste disposal, they are generally required to be rehabilitated and are then often used as sports grounds, public open spaces and golf courses (EPA Victoria 2004b).

1 For example, EPA NSW (1996c, p. 62) estimated that the intergenerational externality costs of landfill were between $3 and $12 per tonne of waste in the Sydney area, and between $1.50 and $6 per tonne in rural areas. These estimates were based on a report by Travers Morgan (1992) that found that government-owned landfills servicing Sydney were failing to incorporate the scarcity value of landfills (which they termed 'landfill user costs') into their prices. Given the increase in the amount of waste going to privately-owned landfills and the application of competitive neutrality principles to government operations in more recent years, such underpricing is unlikely to still be occurring in major urban centres in Australia.

WM Waste Management Services stated:

> The use of landfill to rehabilitate former extractive industry sites is a very effective way of returning a site to its original landform … without the need to import large quantities of virgin soil. The alternatives to rehabilitating former extractive industry sites without landfilling often result in a large unusable hole remaining. (sub. DR140, p. 2)

Accordingly, the range of potential uses for old landfills can be broader than those for old quarries. The use of an old quarry as a landfill can actually improve local amenity in the long term.

The potential for environmental damage from waste disposal can warrant government intervention (section 5.2). The question here is whether any extra, or more stringent, measures are needed to reduce the risks to future generations on equity grounds. O'Leary and Tchobanoglous (2002) report that the potential for emissions of pollutants to occur is generally greatest during the operation of landfills and for a few decades after closure. This suggests that the risks to future generations may be small. However, given that there is some uncertainty and that the environmental values potentially at risk may not be easily substituted for, there may be a case for taking a reasonably cautious approach on intergenerational equity grounds. For example, a slightly more stringent regulatory regime for landfills than that suggested by cost–benefit analysis might be preferred, on equity grounds, if this significantly reduced the risk of future environmental damage. However, it can be costly to further reduce what may already be small risks and the benefits of this can be small (box 5.3). Hence, such considerations need to be carefully evaluated. Investing resources to get only small benefits at very high costs is not in the interests of the current or future generations.

Upstream sustainability issues

Upstream issues feature strongly in arguments for government action on waste (section 5.3). There are two distinct sustainability issues involved: the conservation of material resources (such as minerals); and the environmental impacts of mining, forestry, processing and manufacturing. The objectives of the NSESD suggest that different approaches to each of these may be warranted.

Resource conservation

Natural reserves of nonrenewable resources such as bauxite, iron ore and coal are reduced by their extraction and use. Many resources are, however, in plentiful supply and are likely to remain so for many generations. For example, given proven world coal reserves, the present rate of coal mining could continue for over

200 years (CEC 2003). In Australia, demonstrated resources that are economic to extract have risen over recent decades for some minerals (table 5.2). This may seem paradoxical, given that large quantities of these minerals have been extracted over the last 30 years. It is, however, common for demonstrated resources to remain relatively stable or increase over time because exploration efforts tend to only be stimulated once reserves drop below what is required over the next 20 to 40 years (CEC 2003). The demonstrated resources at any one time are, therefore, not necessarily indicative of any geological shortage.

Some materials that are present in waste and recycling streams are shown in table 5.2. For example, aluminium cans are produced from bauxite. There are some nonrenewable resources not covered, such as sand (used in making glass and concrete) that are available in extremely large quantities relative to their use. Other resources, such as the wood fibre used to make paper, are renewable and so supplies can potentially be maintained indefinitely.

Box 5.3 **Long-term costs and benefits of landfill regulations in the United States**

In the United States in 1991, almost half of the population drew their drinking water from aquifers and other ground water bodies (US EPA 1993). Because of this, the US EPA identified leachate from landfills as a potential risk to human health, and attempted to quantify the risk that leachate would cause cancer in people living near landfills. Its analysis — reported in Porter (2002) — suggested that each year there was less than 1 chance in 10 million that leachate from the average landfill in the United States would cause a cancer death.

The US EPA introduced new regulations on the location, construction and management of landfills in 1991. It estimated that this would prevent 2.4 cancer deaths over the next three centuries. The US EPA also estimated that the new regulations would cost a total of US$450 million per year. Porter (2002) calculated that this equates to a cost of approximately US$32 billion per cancer death prevented (in net present value terms).

Porter (2002, p. 63) also reported that public policy in the United States generally ‘embraces policies that save lives at a cost of less than US$1 million per life saved, rejects policies that save lives at a cost of more than US$5 million, and thinks very carefully about the policies in between’. Rejecting some policies that would have saved lives at a cost of say $6 million per life, but implementing another that costs $32 billion per life saved would not be a sensible use of the community’s resources. Accordingly, the reduced risk of cancer deaths could only go a small way to justifying the new landfill regulations — there would need to be other benefits for them to be warranted.

Table 5.2 **Trends in economic demonstrated resources, Australia**

	Unit	*1975*	*1985*	*1995*	*2005*
Black coal	‘000 million tonnes	19.5	34.0	49.0	39.2
Iron ore	‘000 million tonnes	17.8	16.2	17.8	16.4
Bauxite	‘000 million tonnes	3.0	2.9	2.5	5.8
Nickel	million tonnes	1.9	1.7	3.7	23.9
Copper	million tonnes	5.9	16.1	24.0	41.7
Lead	million tonnes	13.9	14.5	18.2	23.8
Zinc	million tonnes	19.3	21.2	38.8	41.8

Source: Geoscience Australia (unpublished).

The prices of many material resources have declined over the last 50 years or more. For example, even with the ‘resources boom’ of the last few years, the International Monetary Fund price index for metals was lower in real terms (deflated by the US consumer price index) in 2005 than in 1957 (IMF 2006). Technological advances in resource extraction, processing and manufacturing have contributed significantly to lowering prices and easing scarcity constraints.

Where a resource does become increasingly scarce, the world price tends to rise. High prices for a resource:

- encourage exploration for new supplies — higher prices stimulate investment in exploration and make it economic to mine lower-grade mineral deposits;
- encourage more economical use — consumers and firms tend to economise on the use of items that increase in price;
- make recycling more attractive — high value materials, such as copper, steel and aluminium, are profitable to recycle in many instances; and
- promote substitution to other materials — the vast majority of materials can be replaced by others, and technological advances increase the range of possible substitutions over time (for example, copper has been partly replaced by other materials in a range of applications (including domestic water pipes and telecommunication cables) for cost and other reasons).

Such dynamic responses generally mean that it is sensible to leave extraction rates for material resources largely to markets (provided all significant market failures and distortions have been addressed) (appendix B). Doing this can, however, reduce the total stock of resources for future generations. This is clearly the case for fossil fuels that are burnt, but less certain for materials that become solid waste, as these can be recycled (either immediately or through future mining of landfills).

While the sustainability of nonrenewable resources, such as minerals, was regarded as important by some participants, other observers have argued that there are higher priorities and/or that there is no case for policy intervention. For example, the Commission for the European Communities, in considering the sustainable use of natural resources concluded:

> At present the environmental impacts of using nonrenewable resources like metals, minerals and fossil fuels are of greater concern than their possible scarcity. (CEC 2003, p. 4)

Neumayer (2003, p. 4), in discussing sustainable development, argued:

> … a combination of the distinctive features of natural capital with the prevalence of risk, uncertainty and ignorance make a persuasive case for the preservation of certain forms of natural capital that provide basic life-support functions … Conversely, no explicit conservation policy for nonrenewable resources used in the production of consumption goods seems warranted.

These sorts of arguments appear to have informed the development of some sustainability policy in Australia. For example, the objectives of the NSESD do not suggest that particular attention needs to be paid to extraction rates for material resources. Depletion of, for example, the stock of iron ore is unlikely in itself to threaten biological diversity or essential ecological processes and life support systems. Accordingly, the NSESD does not require governments to take specific action to slow market-driven rates of resource extraction.

Any such action would have the potential to leave both the current and future generations worse off. This is because less resource extraction now is likely to reduce investment in human and man-made capital. Future generations, therefore, could be left with greater natural reserves of resources, but this might not be sufficient to compensate them for a reduced endowment of other forms of capital. To put this in historical context, if previous generations had greatly curtailed their use of resources, living standards in Australia today would almost certainly be lower than they are.

If it were decided that some government action to slow the rate of extraction of resources was required on sustainability grounds, the most direct means available would be to use natural resource policy. For example, taxes or quantitative restrictions on the extraction of nonrenewable resource could be used. Given that Australia is, overall, a much larger exporter of mineral resources than a consumer (table 5.1), using waste management policy alone would only have a small effect.

Environmental sustainability

As discussed, upstream environmental impacts raise more significant sustainability concerns than depletion of material resources. Policies that address negative environmental externalities and produce net community benefits assist in addressing these concerns. This should be done in a way that considers private and external (including environmental) costs and benefits, both short and long term. In a report on the implementation of ecologically sustainable development, the Productivity Commission found that many of the observed shortcomings could be traced back to failures to follow such good practice policy making (PC 1999). Nonetheless, meeting the NSESD objective to 'protect biological diversity and maintain essential ecological processes and life support systems' may require action to be taken on intergenerational equity, as well as efficiency, grounds. Any such government intervention, however, is also best done via direct policy. All of the advantages of using direct policy, discussed in section 5.3, apply equally to both efficiency and equity objectives.

FINDING 5.2

The environmental impacts of resource extraction, processing and manufacturing, raise more significant sustainability concerns than the depletion of material resources. However, waste management policies are an indirect, imprecise and generally ineffective means of addressing these issues. Direct policy intervention is strongly preferred.

5.5 Government delivery of waste services

Governments have long intervened in waste management by delivering some waste services. Local governments are typically responsible for waste collection from households, and some operate landfills. Some state governments also deliver waste services. This section looks at the validity of the arguments for these interventions.

Household waste collection

Governments originally became involved in waste collection due to concerns about public health and amenity (chapter 3). The market failure at issue here is the negative externalities created by the improper disposal of waste. For example, a household that piled its garbage in the backyard could affect nearby residents due to the smell and attraction of disease-spreading vermin. These issues can also be seen in terms of public goods. Government intervention may be warranted to ensure that waste does not pose a significant health risk or create odour problems.

There is another potential market failure in that household waste collection may be a natural monopoly. That is, waste collection in an area may be most efficient (and less intrusive) when undertaken by a single firm due to economies of density. These economies relate to the advantages of using one truck to empty all the bins in a street. Under these circumstances, government intervention may be warranted to avoid inefficiencies from a dominant firm overcharging and/or inefficient entry of multiple firms.

The three main possible government responses are to:

- allow competition in the market
- provide the service itself
- manage competition for the market.

Competition in the market

Competition in the market involves allowing households to contract directly with waste service providers. There are few countries that rely on competition in the market for the collection of household waste (OECD 2002). One such country is Finland, which has a long tradition of this practice in some municipalities. A study conducted in Finland in 1997 found that ‘collection costs were 20 to 25 per cent higher in those regions with in-the-market competition compared to those regions with a local monopoly chosen by competitive tendering’ (OECD 2002, p. 127). An earlier US study also found higher costs in cities that allow in-the-market competition (OECD 2002). As well as higher costs, such competition would also be likely to result in more trucks being on the road and, hence, more noise and congestion. These findings tend to add weight to the argument that household waste collection is a natural monopoly requiring some form of government intervention. Ensuring that a service is delivered to all households is also difficult where there is competition in the market.

Government provision

Local government provision of waste collection services was the norm until recent years and is still practiced in some areas. Under this arrangement local governments employ workers, buy or lease trucks and manage the collection of waste. While it allows a universal service to be delivered, it does not allow for competition. Lack of competition may result in excessive costs and inadequate incentives for innovation.

Competition for the market

Governments can manage competition for the market through competitive tendering to select a single service provider for a given waste type in an area (for example, there could be one service provider for garbage and another for recyclables). Under this arrangement, governments are said to 'deliver' the service, but they do not directly 'provide' it. Competition for the market captures the efficiencies of density and the benefits of competition. As indicated by the evidence referred to above, it has been shown to result in lower costs than competition in the market in some places. This form of government delivery also allows for a service to be provided to all households.

Other waste services

Local government waste collection services typically cover some small businesses. The arguments for governments to deliver collection services to households apply equally to these firms. However, for firms that produce large amounts of waste, or have specific requirements as to the frequency of waste collection, economies of density do not apply. Competition for waste collection is, therefore, appropriate and there is no need for governments to deliver these services.

As mentioned, some governments own and operate landfills. This may be a response to concerns over monopoly pricing. That is, that a landfill at significant distance from other landfills may be able to charge excessive prices due to inadequate competition. However, given reasonable planning approval processes for new landfills, the possibility of new entrants can limit opportunities for this to occur. Accordingly, government ownership of landfills does not seem to be warranted. In general, apart from waste collection for households and small businesses, there appears to be little justification for government delivery or provision of other waste services.

5.6 Other arguments for government intervention

Some additional arguments for government intervention on waste that were mentioned, but generally given less prominence, by inquiry participants are considered below.

Community expectations

Some inquiry participants suggested that community expectations alone warrant government intervention on waste management. For example, the NSW Government argued:

> The community clearly supports waste reduction and recycling, and has a right to demand these services from government and industry alike. (sub. DR195, p. 1)

The WA Waste Management Board stated:

> The WA Government is committed to serving its community — governments are elected to implement policies on behalf of the community. Waste and recycling generates a considerable amount of community interest. To assert that this should be given much less weighting, which seems to be implied [by the Productivity Commission], is unrealistic. (sub. DR208, p. 1)

Where governments deliver waste services they should, of course, take community preferences into account. Making information available on the full costs of current services and on what is done with the various types of waste can assist in this process. Where changes to services are contemplated, community input on preferences and willingness to pay should be sought. An important means for testing willingness to pay is to offer households choice over the level and type of service they receive and pay for.

For broader policy making, community expectations and concerns should also be considered and can help to identify waste management issues requiring attention. In the Commission's view, however, the expectations of some community members do not justify a policy response that imposes costs on others (either directly or through the tax system), unless there is a reasonable basis for these expectations. For example, if a community group proposed that landfill levies be introduced because this was the best way to reduce upstream environmental damage, then this reasoning should be carefully tested. If it is found, as the Commission considers is very likely, that environmental protection can be more effectively and efficiently achieved through directly-targeted policies then governments should reject the proposal to intervene through waste policy, and instead, take more direct action.

Governments also have a role in influencing community expectations by promoting well-informed debate on waste issues (chapter 11). As the DEH stated:

> While being mindful of community values and expectations, governments must take responsibility to inform and shape community understanding on issues important to society. Indeed, this is done routinely across a wide suite of policies that relate to

> employment, education, health and welfare, science, transport etc. Waste policy should be no different. (sub. DR214, p. 15)

Information failures

Some inquiry participants argued that information failures relating to waste warranted government intervention. For example, the DEH contended that social welfare could be increased by addressing ‘a lack of complete information on the part of waste generators/consumers and waste managers’ (sub. 103, p. 29).

There are a number of situations in which imperfect information can lead to poor waste outcomes. These include where:

- consumers do not have adequate information on the costs of disposal of a product at the time of purchase and this leads them to make choices they later regret;
- the owner of waste is unaware of opportunities to sell or give it away and so incorrectly believes disposal to be the least-cost option;
- firms generate too much waste, or otherwise manage it poorly, because they do not have the information needed to manage waste well;
- firms, in designing products, do not take environmental damage from disposal into account due to a lack of knowledge; and
- waste is incorrectly disposed of due to a lack of knowledge, leading to the contamination of recyclables or unsafe treatment of hazardous material.

There are three main areas where there may be a case for governments to intervene to address imperfect information. The first is where information has public good characteristics. That is, where information can be used many times over without reducing what is available to others, and it is difficult to exclude people from its use even if they do not pay for it. This can lead to inadequate incentives for private provision of information. This is most likely to occur for information of a general nature, such as waste management tips for households. The second area is where providing information improves the efficiency and effectiveness of government waste services. This is most relevant to education on the correct use of government delivered garbage and recycling services. Finally, suppliers may have greater information than purchasers on the environmental risks posed by disposal of products. That is, there may be information asymmetry that impedes the efficient functioning of markets (chapter 11).

Elsewhere, government intervention to address waste-related imperfections in information is generally not warranted. In some cases, the cost of providing information may outweigh the potential benefits. In other cases, it is more efficient and equitable to rely on markets to provide waste management information. This is most clearly the case for firms that have specific information requirements concerning waste management. Such firms have the incentive to obtain the information they need (chapter 11).

Virgin materials subsidies

Several inquiry participants were concerned about the availability of subsidies for using virgin materials that were not available to firms using recovered materials (Alex Fraser Group, sub. 27; ACOR, sub. 40; DEH, sub. 103, app. A). ACOR argued:

> There are many subsidies available to primary resource producers including (amongst others):
>
> - diesel excise exemption
> - low cost electricity
> - tax breaks
> - accelerated depreciation
> - permission to dispose of materials on-site with no penalty.
>
> These subsidies, [that total] … an estimated $5.7 billion per year, put secondary resources at a competitive disadvantage and should be extended to apply to resource recovery. (sub. 40, pp. 10–11)

Some of the claimed subsidies, however, may not be subsidies at all. For example, applying fewer environmental controls to on-site disposal of mining over-burden might simply be because these activities do not pose significant risks to the environment or human health.

The figure of $5.7 billion is sourced from a study done by the Australian Government’s Department of the Environment, Sport and Territories (DEST 1997). It relates to estimates of financial subsidies to a range of Australian resource activities. The major components of the total subsidy were:

- water — particularly in rural areas ($3.3 billion);
- energy use — transport fuels/roads and other uses, particularly in urban areas ($1.2 billion);
- energy production from primary sources — fossil fuels, renewables and electricity ($0.8 billion);
- natural attractions — management costs (for example, for national parks) that are not recouped through user fees ($0.2 billion); and

- extraction of forest products — public agency costs not recouped through royalties and other charges for forest products ($0.1 billion) (DEST 1997).

While the reported subsidies by no means apply exclusively to firms using virgin materials, they seem likely to apply to such firms to a greater extent than to those using recovered materials. This is because recycling often uses less water and energy. The estimates themselves, however, are uncertain. For example, the study estimates a substantial subsidy to road users, while acknowledging that some Australian studies estimated that road user charges actually exceeded road costs. A recent Productivity Commission draft report found that 'road user charge revenues from heavy vehicles more than cover their attributable infrastructure costs' (PC 2006a, p. 4.31).

Also, the DEST study frequently mentions competitive neutrality policies as a possible instrument for removing subsidies. Under the National Competition Policy agreements that the Australian, State and Territory Governments committed to in 1995, competitive neutrality policies have been pursued in all jurisdictions (PC 2005c). Accordingly, it seems likely that public sector reforms have reduced subsidies since 1994 — the year for which the DEST estimates apply.

More recent evidence is provided by the Commission's regular reviews of the amount by which various Australian industries benefit from government assistance. The Commission's measure of budgetary assistance includes both specific industry budgetary outlays and tax concessions. The Commission found that for 2004-05, budgetary assistance amounted to $0.21 billion for mining and $0.04 billion for forestry and logging. Total budgetary assistance to all industries was $4.55 billion, with most of this falling outside the category of subsidies to the use of virgin materials (PC 2006b). These estimates, however, only include Australian Government assistance.

In summary, there are some financial subsidies that apply to firms using virgin materials, but these are likely to have declined in recent years. Many of these firms also pay royalties to governments and it could be argued that these more than cancel out any subsidies. Royalty expenses incurred by firms in the coal, oil and gas extraction, and metal ore mining industries totalled $3.8 billion in 2003-04 (ABS 2006). There are also subsidies to recycling that do not apply to the use of virgin materials (chapter 9). Accordingly, it is unclear whether the use of virgin materials is subsidised to a greater extent than the use of recovered resources.

If it were the case that the subsidies to the use of virgin materials were higher than those for recovered materials this would tend to promote waste generation and discourage recycling. This issue is similar to the upstream externalities discussed in section 5.3, as reported by the DEH:

> The 1998 OECD report entitled *Improving the Environment Through Reducing Subsidies* concluded that many subsidies damage the environment by encouraging over-production and the wasteful use of inputs. Where environmental externalities are not fully internalised into the price of virgin material, the effect is similar to a subsidy on the virgin material … (sub. 103, p. 31)

There may be a case for governments to remove some subsidies. There may, however, be valid reasons for others. For example, governments often subsidise research and development on the grounds that it provides spillover benefits to the community. The benefits of such subsidies may outweigh the costs, including costs associated with negative distortions. The existence of a subsidy in one area, therefore, is not a valid argument for it to be matched in another area on the grounds that this will counteract the distortion. The case for subsidising an activity, or removing a subsidy, should be carefully assessed on its own merits.

Barriers to waste reduction and resource recovery

Several inquiry participants argued that governments should intervene to address barriers to waste reduction and resource recovery and these issue are also raised in the inquiry terms of reference. The barriers most commonly mentioned are:

- environmental externalities and subsidies that favour the use of virgin materials
- behavioural, cultural and organisational barriers
- regulations that unnecessarily impede resource recovery
- lack of demand for recovered resources.

Environmental externalities and subsidies

The environmental externalities discussed earlier in this chapter can cause barriers to waste reduction and resource recovery. For example, if virgin material prices do not include the environmental costs of their production (or there are financial subsidies) recovered resources may be at a cost disadvantage, creating a barrier to their use. Where such underpricing occurs it would also discourage firms from taking appropriate steps to economise on the use of virgin materials and this could result in excessive waste. There may be a case for government intervention to address these barriers using policies that directly target the problem, as previously discussed.

Behavioural, cultural and organisational barriers

Some inquiry participants argued that firms fail to reduce waste and recover resources even where this is in their own commercial interests. The DEH reported Australian evidence that the barriers responsible for this included:

- a lack of information and expertise, particularly among smaller firms
- a resistance to cultural change on the part of management
- competing business priorities, especially the pressure for short-term profits
- the high initial cost of new, cleaner technology. (sub. 103, pp. 40–1)

Apart from a lack of information (addressed above and in chapter 11) these barriers are behavioural, cultural or organisational in nature. They are not market failures and the case for governments to intervene to address them is weak. The identification by an external party of an unrealised waste management opportunity does not mean that a firm's managers have misplaced priorities. It might just mean that they are using their limited resources to pursue more promising opportunities. (A more detailed account of some of these barriers as they relate to energy efficiency is covered in PC (2005b)).

Government intervention to force firms to consider particular opportunities is often justified by case studies that purport to show how beneficial such interventions can be. The counterfactual of what else firms have left undone by attending to these new government requirements is never studied. A competitive market is the best means of continuing to encourage firms to innovate and capture significant opportunities to improve efficiencies. Those that fail to do so will eventually fail. Governments should restrain their impulse to provide 'guidance' to firms about their priorities unless there are real market failures that justify government intervention.

Regulatory barriers

There may be regulatory barriers to the development of markets for recovered resources. For example, there may be regulations that specify that recovered resources cannot be used for a particular purpose, even when they are able to perform adequately. Such problems are created by governments. Governments can, therefore, seek to find solutions through improved regulation and policy coordination, as discussed in chapter 12.

Lack of demand

The absence of a market for recovered resources can arise simply because of a lack of demand for a recovered resource and/or a lack of supply of a suitably priced recovered resource. A number of participants indicated that they would be prepared to undertake more recycling, but feel frustrated that they are unable to find the necessary customers or obtain feedstock.

These difficulties can arise because of market conditions, or as a result of government policies elsewhere in the economy. As Tech Partners Australia noted, economic conditions prevent recycled wood from being used in particleboard:

> … why isn't wood waste from construction and demolition being used[?] The primary reason is economic/cost. Most manufacturers of particleboard have been established close to their traditional source of raw materials, the forest. Coincidently the forests are generally in regional areas whereas construction and demolition waste is located in the major capital cities of Australia. This creates a major logistical problem and contributes to the financial disincentive for the use of construction and demolition wood waste in particleboard. (sub. 35, p. 2)

In the case of compost, government intervention to divert organic waste from landfill has resulted in an excess supply of compost in Sydney and elsewhere. Commpost NSW (a working group of the NSW Branch of the Waste Management Association of Australia) reported that compost stockpiles in the Sydney metropolitan region had grown from 280 000 tonnes to almost 421 000 tonnes in the twelve months to March 2006 (trans., pp. 488–9).

Lack of market demand is not in itself a valid reason for government intervention, as this represents the ordinary operation of markets. Where another government intervention is responsible for creating an excess of supply over demand, as with compost in Sydney, this brings into question the effectiveness of that intervention.

Wasteful consumption

For a number of commentators and inquiry participants, the generation of waste is symptomatic of a wider social problem — the community's predilection to the wasteful consumption of goods and services. Resourceco argued:

> Waste management in Australia largely reflects the nature of the throw away society in which we live. Marketing strategies have promoted over many years that our lives are incomplete without the latest and greatest and the most up to date gadgets. (sub. 46, p. 2)

ACT NOWaste identified the failure of governments to address consumerism and wasteful consumption as the root cause of the growth in waste generation:

> There is little being done in the ACT, or across Australia, to address waste avoidance and excessively high levels of consumerism and wasteful consumption patterns. Waste agencies are struggling to tackle this issue and there appears to be little strategic action

> by all levels of government to discourage excessive consumption and address product design and life cycle issues. (sub. 36, p. 2)

The Waste Management Association of Australia, Queensland Division saw a need for a waste policy response to wasteful consumption:

> … I believe there is a strong emphasis needed on the wasteful consumption issue. When we see that there are over $5 billion of fresh food waste produced in Australia each year — and we take the Australia Institute's data on that — it highlights the issue. (trans., p. 315)

Generally speaking, it can be presumed that consumers will only buy things they expect to derive some benefit from. On occasions they may end up not using something and throwing it out. In the Commission's view this is not necessarily a public policy concern because consumers are generally best placed to make their own consumption decisions. If there is a role for governments, it would appear to relate more to information and awareness raising rather than waste policy. For example, it might be desirable for schools to develop students' understanding that consumption decisions have environmental consequences and that advertising aims to make products seem as desirable as possible.

Creating jobs

Some inquiry participants suggested that government intervention to promote recycling would have a benefit in providing more jobs (Zero Waste Australia, sub. 4; Brisbane City Council, sub. DR154; Visy Industries, sub. DR177). For example, Zero Waste Australia stated that 'recycling programs … have created many thousands of jobs worldwide' (sub. 4, p. 1). They went on to say:

> When looking at the comparison in balance we should acknowledge that waste to landfill does give the community jobs — but only about a third of the jobs you get with recycling. (sub. 4, p. 2)

The fact that recycling employs a lot of people is evidence only that it can be expensive, not that it is necessarily a worthwhile thing to do. Using labour and other resources on recycling means that they cannot be used to fulfil other goals, such as building schools or hospitals. For this reason, any jobs required for recycling should count as a cost (for wages, superannuation etc), not a benefit. Jobs in the recycling industry would be expected to mainly replace jobs elsewhere in the economy, rather than reduce unemployment.

6 A waste policy framework

Key points

- Waste management policy should be based on maximising net benefits to the community.
  - The financial and non-financial (including environmental and social) costs and benefits associated with waste should be taken into account.
  - Policy should directly address the relevant market failures, the most important being the negative externalities associated with waste disposal.
- The costs and benefits associated with waste management vary significantly between regions and so uniform outcomes throughout Australia for waste disposal and recycling are not desirable.
- The environmental costs of disposal are negligible for some types of waste and high for others. Policy should reflect this.
- Charging for waste services at less than the full cost, and failing to charge according to the quantity of waste disposed, tend to encourage too much waste generation and disposal, and can unnecessarily add to environmental impacts.
- Waste policy assessment would benefit from improved methods for estimating downstream environmental externalities. Improving estimates of the upstream external costs and benefits of waste policies should not be given a high priority as such impacts are best addressed by upstream policies.
- Resource efficiency, as it is usually defined, does not take into account the use of resources/inputs such as capital and labour, is often deficient in the way it treats multiple resources, and can encourage indirect (and ineffective) policy responses. Accordingly, promoting resource efficiency is not a suitable objective for waste policy.
- More policy coordination is not always better. There are benefits from both decentralised government action and uniform policy across jurisdictions and these need to be weighed up on a case-by-case basis.
- In regard to greenhouse gas emissions, a consistent national approach that considers all abatement options is needed. Piecemeal industry-specific approaches, such as using waste policies to tackle greenhouse gas abatement will not deliver the best outcome for the community.
- The Environment Protection and Heritage Council has developed a framework for identifying waste issues for which national collaboration would be appropriate. This framework is generally sound, but could be improved further.

This chapter sets out a waste management policy framework that is used in later chapters in assessing specific policy options. It is also intended to be of direct use to governments in developing policy.

6.1 Policy principles

It is important that waste management policy is consistent with good practice policy principles as promulgated in government publications such as the Office of Regulation Review's *A Guide to Regulation*[1] (ORR 1998) and various Council of Australian Government guidelines (for example, COAG 2004). Box 6.1 sets out policy assessment criteria, based on ORR (1998), that are used in this report. The main body of this section expands on the most important principles for guiding the development of waste management policy.

Focus on the impacts of waste disposal

The objectives of waste management policy should relate primarily to the environmental and social externalities of waste disposal, including those for landfill, energy-from-waste, illegal dumping and littering. The Commission considers that the objective should be to manage waste so as to reduce risks to human health, the environment and social amenity to acceptable levels (that is where the expected benefits of further reducing the risk are less than the costs of doing so). There may also be some information failures that warrant government intervention.

As discussed in chapter 5, upstream environmental externalities associated with waste (figure 1.1) are most appropriately addressed through other, more directly-targeted, policies. In theory, waste policies could be used where more direct policies were not able to be justified or effectively used, there were reasonable prospects of such intervention being effective and net benefits to the community were likely to result. The Commission considers that these circumstances are likely to be the exception rather than the norm.

It is also important that policy objectives do not confuse means with ends. For example, reducing the quantity of waste going to landfill could be one means for achieving the objective of reducing the environmental impacts of waste disposal. This *means* should not be elevated to the status of an *objective*. If this were done, reducing quantities of waste that do not cause environmental problems (inert waste) could be seen as desirable, even though this would not contribute to the real

1 This guide is to be updated in a new Office of Best Practice Regulation publication titled *Best Practice Regulation Handbook*, due out in late 2006.

objective. Similarly, increasing recycling rates, or achieving recycling targets, are not appropriate objectives because they are not legitimate ends in themselves.

Box 6.1 **Policy assessment criteria**

1. Does the policy directly target a market failure? — As government intervention is not costless, it is important that there is a valid reason for it. The existence of market failure indicates there may be a role for government action. Measures that directly target the problem are generally preferable. If a measure is indirect, the reason for not using more direct policy should be made explicit and rigorously tested.

2. Is there a clear objective? — The objective should be clear, concise and as specific as possible, but specified broadly enough to allow consideration of all relevant solutions.

3. How effective is the policy likely to be? — This involves assessing the extent to which the policy is likely to achieve its objective. Reviews of past performance of the policy, or similar measures, in Australia and internationally can be useful in making this assessment.

4. Is the policy likely to deliver net benefits? — This requires comprehensively assessing the costs and benefits from a communitywide perspective (including private and external costs and benefits, both short and long term). Costs to the community include those to government, firms and consumers. In the first instance, costs and benefits must be estimated before the policy is introduced and some uncertainty is inevitable. However, this uncertainty can be reduced over time by conducting *ex post* policy evaluations. Such evaluations are critical to the ongoing improvement of policy.

5. Are the distributional outcomes acceptable? — Policies have different impacts on different groups and some may be left worse off. Costs and benefits accruing to particular groups in society should therefore be assessed and considered by policymakers. The acceptability of outcomes from an intergenerational equity perspective may also need to be considered to ensure consistency with the National Strategy for Ecologically Sustainable Development. However, taking a net community benefits approach greatly assists in achieving the objectives of ecologically sustainable development and it is unlikely to be necessary to go beyond measures suggested by this approach.

6. Is the policy better than the alternatives? — It is important that all feasible policy options are considered during the policy making process to ensure that the best option is identified. The best option is generally the one that delivers the largest net benefits. If no policy delivers net benefits, government intervention is not warranted. This simple prescription becomes more subjective if there are items that cannot be valued. In these cases, the concept of 'cost effectiveness' may be useful for determining the best option. That is, if two options are equally effective in meeting an objective, the one that imposes the least cost should generally be preferred. Distributional considerations are also relevant to identifying the best policy option.

Chapter 3 outlined the objects of various national, state and territory waste legislation and related strategies. In general, these objects are poorly aligned with the policy-relevant market failures. In particular, they tend to focus strongly on resource conservation and upstream environmental protection. Resource conservation is a questionable objective, but if it is pursued this is best done via direct policy, rather than waste policy. Upstream environmental externalities are important, but again should be (and often are) pursued by directly-targeted policies. Addressing resource conservation and upstream environmental protection through waste policy is generally inconsistent with maximising net benefits to the community.

Most of the waste legislation and strategies also include an objective of reducing or minimising waste. Reducing waste is sometimes a means for achieving legitimate policy objectives, such as reducing the externalities from waste disposal, but is not an end in itself.

The only possible market failure that reducing waste could be said to be closely aligned with is information failure. That is, the notion that some households and firms generate and/or dispose of too much waste because they do not have access to information that would allow them to reduce waste. However, as discussed in chapter 5, many of the reasons put forward for why waste-reduction opportunities are not always taken up do not amount to market failures. Further, information failures, where they exist, only warrant government intervention in narrowly-defined circumstances. The prominence given to waste reduction in much of the legislation and strategies is out of proportion to the size of any possible market failure.

FINDING 6.1

Australian, State and Territory waste legislation and strategies often:

- *are not sufficiently focused on reducing risks to human health, the environment and social amenity from waste to acceptable levels;*
- *include objects relating to resource conservation and upstream environmental protection, even though these issues are more appropriately dealt with through directly-targeted policies; and*
- *give a high priority to waste reduction as an end in itself, even though there is no market failure that would justify this.*

RECOMMENDATION 6.1

Australian, State and Territory waste legislation and strategies should be reformulated to focus on reducing risks — to human health, the environment and social amenity — from waste to acceptable levels. Objects that detract from this focus, such as those relating to resource conservation and upstream environmental protection, should be removed.

Make all costs and benefits count

Leaving waste management outcomes entirely to the market would be likely to result in some important environmental and social costs being ignored. By contrast, a waste hierarchy approach to policy tends to overlook the financial and other costs associated with collecting, transporting, sorting and processing waste. Taking a net-benefits approach to policy, as advocated by the Commission, requires that all of these costs and benefits be considered by policy makers.

Taking all costs and benefits into account promotes the overall efficiency with which labour, capital and material resources are used. High costs (such as for sorting the recyclables from a particular waste stream) indicate that valuable resources are being used — whatever type of resources these may be. It is important that policy makers are cognisant of this and only support waste management options that increase net financial costs (after any recoveries) where they have rigorously established that there are more than commensurate environmental or social benefits.

Such an approach supports recycling where the benefits exceed the costs. In determining whether there are net benefits from recycling, it is not appropriate to regard materials in the waste stream as always having an inherent value (as suggested by some inquiry participants, such as Eco Waste, sub. 83). Value depends on factors such as the quantity of a material, the degree to which it is mixed with other wastes, the distance to markets and the market price. In many cases these factors result in waste materials having a negative value. As suggested by the Business Roundtable on Sustainable Development:

> … the aim is to identify opportunities for efficiency gains through the recovery and reuse of resources, but only where it will contribute to an improvement in overall economic efficiency, including avoiding external costs such as pollution. (sub. 70, p. 11)

Getting prices right

Getting prices right for waste services is a powerful means for ensuring that costs and benefits are taken into account. The ‘right’ price being one that reflects both the private and external costs associated with providing the service. Achieving this ensures that the incentives for waste generation and disposal, resource recovery and environmental protection, are appropriate.

Private costs

In general, private providers of waste services must build private costs into their prices or risk going out of business. For government-delivered waste services, however, there is sometimes evidence of undercharging, with unrecovered costs being made up through general taxation or rates. Rectifying undercharging can improve incentives, as discussed. Efficient pricing can also promote competition between government and private service providers.

Landfills and waste collection are both areas where prices are important. Landfill charges should be sufficient to cover the full cost of the service, including complying with all licence conditions, site remediation, aftercare and a return on the investment in the landfill (chapter 12 discusses this further). Waste collection should also be charged for on a full cost basis, or at least the full costs be made transparent to ratepayers. There are also some advantages in each household being charged according to the quantity of waste they put out for collection. This approach, sometimes referred to as ‘pay-as-you-throw’, is discussed in chapter 9.

External costs

Chapter 4 discusses the environmental and other external costs and benefits that can arise from waste management practices. Where external costs exist, the incentives for environmental protection, waste avoidance and recycling may not be as strong as they should be. This is because the costs are imposed on people who are not involved in creating them. Where government intervention to address external costs is warranted, there are three possible options:

1. *Preventing them from occurring* — for example, waste facilities could be subject to regulations to reduce the risks that emissions from them will cause environmental problems.
2. *Making private agents pay for amelioration* — for example, the owners of waste facilities could be required to pay for cleaning up any pollution they cause.

3. *Introducing commensurate taxes or levies* — for example, a levy on material going to a waste facility could be introduced and set at a level equivalent to the external cost.

These options essentially lead to external costs becoming private costs, either directly or indirectly. The externality is said to be internalised. In the process, the environmental or other harm is either prevented or discouraged. The aim is generally to reduce the risks of harm to the level at which the cost of further reductions begins to exceed the benefit. The best option for addressing external costs depends on the circumstances — an issue explored in later chapters.

Assessing costs and benefits

Commonwealth, State and Territory Governments have acknowledged the principle that all relevant costs and benefits should be considered when deciding whether government intervention is necessary, and the most efficient form of intervention. This principle is formalised in the regulation impact assessment processes used by most governments and in the Council of Australian Government's guidelines for national standard-setting bodies (COAG 2004). Cost–benefit analysis is a tool that is commonly used for this purpose. Cost–benefit analysis is not restricted to financial items. When correctly applied, it also considers any changes in community wellbeing arising from changes in environmental amenity, health and safety outcomes and other less tangible outcomes (ORR 1998).

In a practical sense, some costs and benefits are too small or too tenuously linked with the policy to be worth estimating. Accordingly, it is necessary to set a 'boundary' for the analysis based on the materiality of less direct costs and benefits. This raises the question as to whether upstream costs and benefits should be estimated for cost–benefit analyses of waste management policies. Life-cycle assessment has been used for this purpose, but the Commission's view is that some of these attempts have been flawed in a number of respects (chapter 4; appendix B).

It may be possible to overcome these flaws. However, it is not clear that this would be worth the effort because upstream market failure should not drive waste management policy. If genuine upstream benefits were found through life-cycle assessment, and this resulted in a proposed waste management policy meeting the cost–benefit test, the best course of action would generally be to intervene directly upstream to address the market failure and then to reassess the waste policy cost–benefit analysis. Accordingly, improving techniques to estimate the upstream costs and benefits for the purpose of waste management policy assessment does not warrant being given a high priority. Government attention to address market failures throughout the product life cycle is, of course, an important role for relevant policy makers in those areas.

Valuing environmental externalities

The Commission has found a range of shortcomings with past attempts at valuing both downstream and upstream environmental externalities of waste management activities (chapter 4; appendix B). While some problems are inevitable given the complexity of the task, policy assessment could be improved by:

- *Calculating expected values* — some methods for estimating environmental costs produce ‘potential costs’. Such costs can be converted to ‘expected costs’ by accounting for the probability of their occurrence. In cases where risk is a major consideration, more sophisticated risk analysis may also be useful. Such analysis could consider whether the proposal under consideration is the least-cost means of abating the risk to acceptable levels. It may also be worth compiling more detailed information on the different levels of damage that could occur, but which are uncertain. This information could be used in sensitivity analyses to examine the effects on cost–benefit outcomes of changes in assumptions.
- *Discounting future costs and benefits* — costs and benefits that occur in future years should be discounted to present values. This is consistent with government guidelines for cost–benefit analysis that apply in some jurisdictions (for example, Commonwealth of Australia 2006).
- *Describing impacts in physical as well as dollar terms* — including concise physical descriptions of the environmental impacts (including the pathways through which damage can occur) alongside dollar estimates could help policy makers and other stakeholders interpret them and better subject them to rigorous analysis.
- *Utilising appropriate methodology* — appropriate use of government guides, such as the Australian Government’s *Handbook of Cost–Benefit Analysis* (Commonwealth of Australia 2006), can improve the accuracy and consistency of estimates.

As discussed above, it may not be worthwhile estimating the upstream costs and benefits of proposed waste management policies. If they are estimated, this should be done cautiously. In particular it would be important to:

- *Recognise that many potential upstream benefits are influenced by upstream policies* — upstream policies (for example, forest policy) may act to internalise upstream externalities (chapter 4). This internalisation is sometimes not accounted for in life-cycle assessment. Where full internalisation has been achieved by an upstream policy (for example, through taxes or environmental offsets) no net upstream benefit or cost should be included in a waste management policy assessment.

- *Not include depletion of mineral resources as an externality* — the depletion of nonrenewable resources, such as minerals, does not in itself constitute an externality (appendix B).

Acknowledge that variations in waste outcomes are desirable

As explained in chapter 4, the costs and benefits of waste management vary greatly according to location. Waste disposal might be much more costly in one city than another, due to differences in the availability and proximity of suitable landfill space. Distance to markets for recyclables, and therefore the financial and environmental costs of transport, is much higher in some areas than others. It is desirable that these differences flow through to regional variations in recycling rates and other waste outcomes in order to achieve the best results for the Australian community.

Costs and benefits also vary with the type of waste. This is particularly so for the environmental costs of waste disposal, as indicated in table 6.1. The Tellus Institute in the United States, for example, found that half of landfill externalities was from ‘the handful of potentially-hazardous products in the waste stream, such as oil-based paints and batteries’ (Ackerman 1997, p. 39). This suggests that waste policy should pay particular attention to the potentially-hazardous waste that forms a small part of the waste streams under consideration in this inquiry. The benefits of reducing the generation, increasing the recycling, or ensuring the safe disposal of such waste may be substantial and outweigh the gains that could be made from influencing waste outcomes for much larger quantities of non-hazardous waste.

Table 6.1 **Potential environmental impacts of different types of waste in landfill**

Type of waste	*Examples*	*Main potential impacts when disposed to landfill*[a]
Inert waste	Glass, most plastic, concrete, soil.	None.
Putrescible waste	Food scraps, green garden waste.	Greenhouse gas emissions; and release of organic compounds to leachate that can increase the mobilisation of heavy metals and other toxic compounds contained in other waste.
Potentially hazardous waste	Some batteries, solvents, pesticides.	Source of heavy metals and other toxic compounds that can be mobilised in leachate.

[a] The existence and severity of actual environmental impacts depends on the siting, construction and management of landfills.

Respond appropriately to community preferences

The rationale for government delivery of waste collection services rests partly on the desirability of having a universal service (chapter 5). Accordingly, it is important that at least a basic level of service is provided to all households for public health and amenity reasons. Beyond this, however, the preferences of households should inform the design of the services that are offered.

A high proportion of Australians indicate that they support recycling, but less is known about the strength of this support (chapter 2). To help gauge this, local governments could provide ratepayers with information on the costs of providing services and what is done with the various types of waste. As indicated in chapter 4, this would generally show that kerbside recycling is currently somewhat more financially costly than sending all waste to landfill. If information on the extra amount being paid for recycling were provided, the community would be able to make more informed decisions about this service. Options could include: continuing with it unchanged; modifying it (for example, collecting only higher-value materials); or discontinuing the service. Similarly, if a change from landfilling to use of an alternative waste technology facility were proposed it would be important for the community to be provided with information on the cost and other implications of this change.

Decisions also need to be made on which elements of waste services are common to all households and which are optional. Offering appropriately priced choices can result in a better match with the needs of individual households and improve the price signals for waste avoidance and recycling. For example, there are advantages in the provision of a separate bin for green waste being optional. Some households do not generate much green waste and others deal with it on-site (for example, by composting). Having a compulsory green-waste bin would force these households to pay for a service they do not need and reduce the incentive for others to move to home composting.

What about resource efficiency?

The principles outlined above focus on an assessment of all costs and benefits rather than just resource efficiency. While this was foreshadowed in chapter 1, the Commission's approach to resource efficiency may require further explanation, particularly as some inquiry participants were of the view that the draft report did not adequately deal with this issue (Victorian Government, sub. DR 187; Tasmanian Government, sub. DR164; WMAA NSW Branch, sub. DR150).

Inquiry participants offered various definitions of the term 'resource efficiency', as shown in box 6.2. While the definitions vary somewhat, most of them imply that the returns from using one or more raw materials (and sometimes also energy) should be maximised. For the purposes of this report, resource efficiency is taken to mean 'the value added per unit of resource input', as suggested by the Commission of the European Communities (CEC 2003, p. 9).

Box 6.2 **Definitions of resource efficiency**

Several inquiry participants interpreted resource efficiency as maximising the return to be achieved from use of one or more raw materials (and sometimes also energy). For example, the Department of Premier and Cabinet Tasmania stated:

> If resource efficiency were measured as the dollar value of goods and services produced per tonne of raw materials consumed, then disposal to landfill would represent a negative impact on resource efficiency. (sub. 114, p. 1)

The Municipal Waste Advisory Council stated that resource efficiency was:

> The relative quantity of natural resources required by a particular process per unit of output. (sub. 119, p. 5)

The Waste Management Association of Australia, NSW Branch quoted a European Commission definition of resource efficiency:

> … the efficiency with which we use energy and material throughout the economy, i.e. the value added per unit of resource input. (sub. DR150, p. 12)

Resource efficiency and waste management policy

Resource efficiency is a partial measure in that it considers some inputs to production (one or more raw materials) and not others (including labour and capital). Consequently it is not always desirable to increase resource efficiency. This is because doing so can involve using labour and/or capital with a high value in order to save raw materials with a relatively low value.

The partial nature of resource efficiency, however, does not prevent it from having some useful applications. For example, many people find it useful to compare the fuel efficiency of cars, while still recognising that other attributes of the car, such as safety and price, are important. Similarly, there may be advantages in analysing some production processes according to a partial metric, such as how much of a raw material is used per unit of output. In the end, however, the question of whether a more resource-efficient process provides overall benefits (after considering the costs of all inputs/resources) needs to be considered. The potential value of using measures of resource efficiency also relate more to firms interested in improving their specific production processes, rather than to waste policy makers.

Resource efficiency can also be measured for more complex systems where there are many different material inputs and many outputs. For example, the quantity of materials used per unit of gross domestic product has been calculated for some countries (Neumayer 2003). It is not clear, however, that anything is gained by adding up the number of tonnes used of different materials, given that each material has a different value and the environmental consequences of extracting, producing and using each are different. Because of this (and because other inputs are not considered) such measures do not indicate whether one country's economic or environmental performance is better than another's. Differences between countries on this measure are likely to relate more to the structure of their economies than the efficiency with which they use resources.

Several inquiry participants suggested that waste management policy should be used to promote resource efficiency. The main argument for this seems to relate to sustainability. For example, the Municipal Waste Advisory Council acknowledged that resource efficiency had some limitations, but argued:

> … a role exists for policy makers to scrutinise outcomes and make determinations about what is required to make systems sustainable. In performing this role, a measure like resource efficiency, narrowly defined as the ratio of natural resource inputs to economic output, provides policy makers with an important tool to use in making these determinations. (sub. 52, p. 18)

There are two ways that promoting resource efficiency might be argued to lead to improvements in sustainability. First, increasing resource efficiency could lead to a slowing of the rate of depletion of natural resources, such as minerals. It is the Commission's view, however, that no specific waste management policy measures to conserve such natural resources are warranted, either on efficiency or intergenerational equity grounds. Provided the market failures and distortions associated with resource extraction and processing are appropriately dealt with, markets provide the best way of handling the scarcity of these resources. These issues were considered in more detail in chapter 5.

Second, resource efficiency might be taken as an inverse proxy for the environmental externalities occurring throughout the product life cycle. Accordingly, it might be postulated that action is needed to reduce material flows through the economy (and thereby increase resource efficiency) in order to reduce environmental damage. While there may be a crude relationship between material flows and environmental damage, this does not suggest that action to reduce material flows is the best way of addressing environmental externalities.

As argued by Neumayer (2003, p. 181):

> The call for general reductions in material flows is not guaranteed to be ecologically effective, but is guaranteed to be highly economically inefficient with respect to whatever reduction in environmental damage might be achieved.

The argument for increasing resource efficiency in order to reduce environmental damage has much in common with the argument for using waste management policy to address upstream environmental impacts. In fact, for some purposes they amount to the same thing. Accordingly, conclusions reached in chapter 5 are relevant here — environmental externalities and sustainability concerns are most appropriately addressed by directly-targeted policies. Indirect means, such as through influencing resource efficiency, are likely to be at best inefficient and quite probably ineffective.

RECOMMENDATION 6.2

Waste management policy should not be used to promote resource efficiency (defined as the value added per unit of resource input). This is because measures of resource efficiency:

- ***do not take into account the use of all resources; and***
- ***often involve aggregating quantities of different materials in a way that does not take into account their individual market values or environmental impacts.***

Taking a net community benefits approach to resource use

While maximising resource efficiency is not in the community's best interests, it is desirable that raw materials and other inputs are used in a way that maximises net benefits to the community. Among other things, this requires:

- production of raw materials (for example, by mining or forest harvesting) to only proceed where the benefits outweigh the costs (including environmental costs);
- that opportunities to use less of a raw material be taken where this can be done while keeping the quantity of all other inputs (including labour and capital), and the quality of the product, the same;
- product design to be appropriately influenced by the costs of all inputs and the cost of waste disposal; and
- the least-cost (including all environmental, social and financial costs) means of dealing with waste be used, whether this be through reuse, recycling or disposal.

Government policy can promote these outcomes by addressing market failures where they occur throughout the product life cycle. This is likely to involve policies for mining, forestry, agriculture, transport, manufacturing and waste management activities that address environmental externalities and other market failures. Accordingly, waste management policy has a role to play, together with a whole range of other directly-targeted policies, to promote the judicious use of raw materials.

Where appropriate government interventions have been made, markets would normally be expected to respond in ways that best promote community wellbeing. For example, if a raw material becomes more expensive because the environmental externalities associated with its production are internalised, firms will look for ways to economise on its use. This might, among other things, result in less waste generation and/or more recycling.

6.2 Policy coordination

Waste management policy has traditionally been seen as a local issue, requiring action mainly at the local government level. Several trends have, however, changed this situation, including the:

- increasing size and sophistication of waste recycling and disposal facilities;
- challenge of planning for fewer but larger waste facilities in or near large urban centres;
- greater interest by State and Territory Governments in influencing waste outcomes; and
- burgeoning interest in policies, such as product stewardship schemes, that may require a national approach.

These trends increasingly require that attention be given to coordinating policies between the different levels of government. In addition, there is a need for waste management policy to be coordinated with other policies.

General principles of coordination

Achieving appropriate policy coordination requires balancing the benefits of decentralised government action against the benefits of having uniform policy within a region, state or within Australia (box 6.3).

The principle of subsidiarity, which recognises that decisions whose impact is restricted to a local area should be made at the local level, can be useful in determining the best approach to policy coordination. The European Community makes use of this principle to require that actions be left to member states unless ‘by reason of the scale or effects of the proposed action, [it] be better achieved by the Community’ (van den Bergh 1996, p. 363).

Box 6.3 **Benefits of decentralised versus uniform government action**

Benefits of decentralised government action

- *Development of more effective policies* — different approaches in different jurisdictions can allow for greater innovation and opportunities for learning from the experiences of others.
- *Reduced information asymmetries* — it may be easier for local agencies to obtain accurate information about the firms and communities who are to be regulated or provided with services.
- *Closer matching with community needs* — regional variations in community needs may justify differences in government objectives, policies and services.
- *Greater responsiveness* — local agencies may be able to respond more quickly to community needs.

Benefits from having uniform policy across a region or broader area

- *Scale economies for government* — costs of policy development, planning, implementation and service delivery may be lower when undertaken centrally or collectively.
- *Scale economies for firms* — costs may be lower because one product or service can be supplied across a region, or across Australia, rather than having variations to meet local requirements.
- *Reduced transaction costs* — compliance costs may be lower where uniform information requirements and administrative procedures apply in different jurisdictions.
- *Enhanced competition* — uniform regulation may encourage Australian firms to expand their operations across jurisdictions and encourage foreign firms to supply the Australian market.
- *More effective treatment of externalities* — where government action is required to address externalities, it may be more effective when taken at a level that can ‘internalise’ the effects of the externality. For example, greenhouse gas emissions are believed to have a global impact, which suggests that a national response that is coordinated with international abatement efforts is required.

The applicability of the principle of subsidiarity to some waste management policies is evident in several submissions to this inquiry. For example, the Local Government Association of the Northern Territory stated:

> The 'Best Practice' model of integrated waste management is often difficult to achieve for remote underdeveloped communities. In these types of communities initiatives that are promoted or imposed by the State/Territory and Australian Governments can be uneconomical and difficult to achieve. (sub. 19, p. 3)

Some of the benefits of coordination can be achieved without having uniform policies across jurisdictions. For example, harmonisation (agreement on common policy elements) can be used to embed common data definitions, measurement systems and product standards within waste management policies that differ in other respects. Another aspect of policy coordination is consistency — that is, ensuring that policies do not contradict one another. For example, each government should make sure that its waste management policies are consistent with broader policy settings.

Applying coordination principles

These principles of coordination have been used in a number of contexts in other chapters. In particular, in determining whether:

- government delivery of waste services in large urban centres is best done by individual local governments, regional groupings of local governments or fully constituted regional bodies (chapter 12);
- there are policies in other areas that should be better coordinated with waste management policies (in order to, for example, not inappropriately impede resource recovery) (chapter 12);
- there is value in having common data definitions for waste across all jurisdictions (chapter 13); and
- particular waste policies are consistent with the broader policy objective of promoting community wellbeing (chapters 7–10).

Two further coordination issues are considered below.

Coordination with greenhouse gas abatement policy

There are some greenhouse gas abatement policies that affect waste management. AGL, a firm that, among other things, develops landfill gas generation facilities, reported that commercially-valuable certificates can be earned from:

- flaring methane at landfill sites under the Greenhouse Challenge Plus program;

- producing electricity from landfill gas under the Mandatory Renewable Energy Target scheme; and
- avoiding methane emissions through electricity generation at landfills under the NSW Greenhouse Gas Abatement scheme (sub. 62).

In addition, there are some state-based waste management policies that address greenhouse gas emissions. For example, gas capture systems are sometimes required to be installed at new landfills for greenhouse gas abatement and other reasons. Some governments have also justified landfill levies partly on the basis of greenhouse gas emissions (BDA Group and EconSearch 2004).

Addressing greenhouse gas emissions through waste management policy has the disadvantage that some of the abatement measures pursued may have a higher cost (per unit of carbon dioxide equivalent gases) than for some other abatement options (unrelated to waste) that are not currently being pursued.

Improving policy coordination in this area would best be pursued through a comprehensive national approach to greenhouse gas abatement. As well as promoting least-cost abatement, this would allow Australia's greenhouse response to be considered in light of international efforts to address what is a global issue. The Commission's review of National Competition Policy addressed this issue and recommended:

> The Australian Government, in consultation with State and Territory Governments, should as a matter of urgency develop a more effective process for achieving a national approach to greenhouse gas abatement. (PC 2005c, p. 349)

Following a meeting on 3 June 2005, the Council of Australian Governments announced that it had:

> … agreed to set up a Senior Officials' group to examine the scope for national cooperation on climate change policy, focusing on areas of common ground between jurisdictions where practical progress can be made. (COAG 2005, p. 7)

Existing arrangements for national coordination

Some inquiry participants argued for national coordination of some waste management policies. For example, the NSW Government stated:

> There are some areas of waste policy where a national approach could result in a more efficient and effective approach. Examples include product stewardship and extended producer responsibility. (sub. 95, p. 13)

The *National Environment Protection Council Act 1994* (NEPC Act) assigns to the NEPC the function of making National Environment Protection Measures

(NEPMs). NEPMs may relate to a range of matters, including environmental impacts associated with hazardous waste, and the reuse and recycling of used materials. As discussed in chapter 10, a NEPM for product stewardship schemes is being developed.

The Environment Protection and Heritage Council (EPHC) (a body related to the NEPC, having similar but wider membership) has also developed a National Waste Framework (included in appendix D). This framework is used to determine waste issues upon which national collaboration would be appropriate.

The Commission considers that this framework is sound in most respects. Indeed, it includes many principles of good policy design and accordingly some parts of it could be useful for State and Territory Governments in guiding the development of their own waste management policies. That said, there are some improvements that could be made to the EPHC framework as outlined in box 6.4.

Box 6.4 **Suggested changes to the EPHC National Waste Framework**

- ‘Resource use efficiency’ is included as a factor to consider. Because ‘resource efficiency’ and ‘resource use efficiency’, as commonly defined, can imply that raw materials should be conserved even where this is not in the community’s best interests, these terms should not be used.
- In considering the significance of a waste problem the framework requires that the ‘potential for resource recovery’ be considered. This should either be deleted or replaced by the ‘potential for efficient resource recovery’. This is because resource recovery should not be promoted where the costs of recovery outweigh the benefits.
- While there is mention of ‘benefits and costs’ there should be a more explicit acknowledgement that government intervention is only warranted where this has been carefully evaluated and is considered likely to deliver net benefits to the community.
- ‘The level of social and community concerns’ is listed as a primary consideration in assessing the priority of an issue for national cooperation. In the Commission’s view this is a secondary consideration to the others listed (that is, ‘significance of impact or harm’ and ‘analysis of the cost and associated benefits of any action’). The concerns of some community members do not justify a policy response that imposes costs on others if there is no reasonable basis for these concerns. Accordingly, community concerns should be considered, but they do not in themselves justify a policy response. Furthermore, community concerns are able to be, and should be, influenced by informed debate about risks, costs and benefits. Community concerns that exist in the absence of such debate are not a good basis for policy making.

7 The waste hierarchy and target setting

Key points

- The waste hierarchy should be regarded only as a simplified, indicative list of priorities intended to guide waste management policies.
- The waste hierarchy does not take into account the range of costs and benefits associated with different waste management options.
- Strict adherence to the waste hierarchy can lead to waste management outcomes that are unsuitable for the circumstances, and costly to the community. While it offers the appeal of 'easy' answers, it risks circumventing the study of all relevant costs and benefits which is required in order to develop sound policy.
- The waste hierarchy features in each state and territory's waste management legislation. This has resulted in policy makers tending to focus on achieving outcomes that are consistent with the waste hierarchy rather than on providing net benefits to the community.
- Targets are commonly used throughout Australia to guide waste management planning. They include landfill diversion targets, recycling targets and targets for individual industries.
- Targets can be useful where they are consistent with sound policy objectives and set using rigorous analysis. However, existing waste diversion targets used by waste policy makers appear to have been based more on the priorities suggested by the waste hierarchy and what is technically achievable rather than on rigorous cost–benefit analysis. Such target setting can impose net costs on the community.
- Waste diversion targets set at the jurisdiction level do not recognise important differences within a jurisdiction. They also do not recognise that different types of waste have different environmental impacts. More disaggregated targets tailored to particular waste types and location could be set, but would require considerably more information.
- Zero waste targets are particularly problematic because they are inherently unachievable.
- Governments should not use the waste hierarchy nor targets derived from it to develop or monitor waste management policy. They should instead address relevant market failures, and use policy instruments that would most efficiently and effectively address these failures.

The waste hierarchy and targets derived from it are common tools used in waste management policy. While it is claimed they are used in an overarching and strategic manner, governments have tended to apply the waste hierarchy literally in setting priorities for waste management, and as a basis for setting targets for particular waste management options, such as greater diversion from landfill or increased recycling (waste diversion targets). Policies such as regulation, extended producer responsibility schemes, landfill levies and subsidies for resource recovery are commonly used to assist in achieving waste diversion targets and other outcomes consistent with the waste hierarchy. The waste hierarchy (first discussed in chapter 3) is considered in section 7.1. Target setting is discussed in section 7.2.

7.1 The waste hierarchy

The waste hierarchy is a simplified list of priorities (Rasmussen and Vigsø 2005), that favours some waste management options over others, for example, reuse over recycling, recycling over disposal, and so on. The presumption underpinning the waste hierarchy is that the environmental costs are generally lower if waste is avoided altogether and higher when waste is disposed to landfill (Ackerman 2005).

The waste hierarchy is a standard feature in every State and Territory Government environment protection and waste minimisation legislation. It has the advantage of being simple to communicate to policy makers, the waste management industry and the public. As the Municipal Waste Advisory Council (MWAC) noted:

> The Waste Hierarchy is extensively used by waste educators as a means of communicating to individuals the different strategies they can use to reduce their negative environmental impacts. (sub. 119, p. 9)

Some participants have suggested that the waste hierarchy is used in a manner consistent with good policy making, avoiding imposing costs on the community. For example, the MWAC contended:

> Mindful of its limits, waste policy practitioners apply the waste hierarchy mindful of the economic and political compromises which will be demanded in the broader policy context in which they operate. (sub. 119, p. 9)

The Local Government and Shires Associations of New South Wales also noted:

> The Associations are strongly supportive of the Waste Hierarchy, however it is acknowledged that it is not an exact law of physics that can be applied to all situations. It is a guide to assist with the decision-making process. (sub. 98, p. 3)

Application of the waste hierarchy can impose costs

Problems can arise, however, when governments intervene to move the management of a waste 'up the hierarchy' without having regard to the costs and benefits to the wider community of doing so. The fact that the waste hierarchy features in all state and territory waste management legislation heightens this risk.

Location of waste

The waste hierarchy does not take into account that the cost of resource recovery relative to disposal can vary significantly depending on location, as explained in chapter 4. Waste can be costly to transport from remote areas, and government intervention that leads to an increase in resource recovery of such remotely located waste — even where it has relatively high inherent value, such as some metals — may impose net costs on the community. The Plastics and Chemicals Industry Association noted this problem:

> The inherent simplicity of the waste hierarchy can also be one of its major disadvantages. If literally and inflexibly applied the waste hierarchy can lead to inappropriate and inefficient waste options being mandated. Where it is used as a guide it should produce best results. An example is the management of waste in regional and remote locations where prohibitive costs of recycling infrastructure and technology would require inordinately high transport costs to take the waste to the technology in urban centres. (sub. 120, p. 8)

The Waste Reduction Group also noted the costs to the community of resource recovery in regional and remote areas:

> Our member Councils are faced with the situation that the populous are continually educated via government that 'recycling is environmentally beneficial regardless of location'. There is no reference [to] or consideration of the actual cost to the community. Councils consequently find it extremely difficult and would be seen as being anti 'Green' if they did not provide recycling services for small communities …
>
> This is applicable in Victoria, and although rural areas do not have to comply to the same degree as their urban counterparts, the cost of supporting this requirement is prohibitive and is an additional burden on rural communities due to small volumes and large travel distances involved. (sub. DR206, p. 1)

Types of waste

The costs and benefits of waste disposal options are also influenced by the type of waste being disposed. As set out in chapter 4, waste that does not biodegrade in landfill does not lead to greenhouse gas emissions. Glass, plastics, aluminium and ferrous metals are largely inert in landfills and are not significant contributors to leachate (appendix B). Similarly, most construction and demolition waste, such as concrete, is inert and produces few or no externalities in landfill. Seeking to move such waste ‘up the hierarchy’ would impose net costs on the community if additional costs incurred by disposers are not offset by the benefits of reduced environmental externalities.

As discussed in section 5.3, some participants to the inquiry suggested that government intervention through waste management policies signalled by the waste hierarchy is necessary to address the ‘upstream’ environmental impacts associated with the generation of waste. These include environmental damage from extracting virgin material, air and water pollution associated with materials processing and manufacturing, and resource depletion. The Commission does not dispute that there can be externalities in these upstream areas. However, it considers that such issues are best addressed by direct policy intervention close to the externality concerned (and often already are), rather than using broad, indirect policy such as adherence to the waste hierarchy.

Application of the waste hierarchy can lead to poor policy outcomes

There is a concern among some participants that the waste hierarchy is not being used just as a general guide to waste management priorities, but rather is influencing waste management decisions in a more direct and distortionary way. Applying the waste hierarchy can lead to poor policy outcomes if it circumvents good policy practice (chapter 6). This was noted by the Business Roundtable on Sustainable Development:

> … good policy and regulatory process has been compromised in much recent waste policy development that has been dominated by the waste hierarchy and waste minimisation objectives … (sub. 70, p. 8)

The Waste Management Association of Australia (WMAA), National Landfill Division also noted:

> When logical arguments are put forward by the Landfill Industry about the direction of waste policy and regulation, they are often dismissed because of the rigid application of the waste hierarchy. It has been used as a convenient escape clause to avoid more rigorous policy analysis. (sub. DR159, p. 2)

Some inquiry participants suggested that any decision using the waste hierarchy must have regard to the specific issues. As noted by the Cement Industry Federation:

> Decisions made on a ‘waste hierarchy’ basis must be made with full knowledge of technically available and commercially available options and through end-product market testing. (sub. 71, p. 5)

The Commission considers that the influence of the waste hierarchy on policy development and waste management decisions is likely to have resulted in net costs to the community. The choice of waste management activity for a particular individual or organisation should depend on the costs and benefits of each waste management option, including the external costs to the environment. The waste management option with the highest net benefit to the community will not always be consistent with the preferred option suggested by the waste hierarchy. Subsequent chapters describe various instances where current waste management policies do not follow good policy practice principles. Adherence to the waste hierarchy appears to be a major contributing reason for this.

RECOMMENDATION 7.1

To maximise net benefits to the community, waste management policy should be guided by rigorous analysis of the financial, environmental and social costs and benefits, not by the simple priorities suggested by the waste hierarchy.

7.2 Targets

Targets can be an important component of performance management. Many targets are aspirational, designed to assist in determining priorities, defining agreed directions and motivating staff (UK Audit Commission 2005). The Commission considers that targets are useful for setting goals for policies that are genuinely based on addressing market failures where it can be demonstrated that the benefit of meeting the target outweighs the cost. Targets that specify the outcome, but not how it is to be achieved, allow those accountable for meeting targets to meet them at lowest cost.

In waste management policy, targets for waste diversion are widely used. In some instances they are used as a motivational tool and to educate the public. As noted by the City of Whitehorse, having a waste target to aspire to:

> … can be most beneficial in that it provides scope to trigger lateral approaches and thinking outside the square by participants. Council uses targets to assist its strategy direction and Council’s community education programs can be enhanced by using targets as a reference point. (sub. 26, p. 8)

However, problems can arise when waste diversion targets become the focus of policy. Setting waste diversion targets, and making the appropriate parties accountable, can be difficult. If waste diversion targets have been set without rigorous and transparent analysis of the costs and benefits, their achievement is likely to impose net costs on the community. When they have been set too high, not achieving targets can be demotivating, and when they have been set too low, they can lead to complacency.

Setting a target for the amount of waste diverted from landfill or recovered does not take into account that there might be financial and environmental costs of achieving the target that outweigh environmental and social benefits. Depending on the circumstances, such as the size and location of a landfill, the costs of diverting some types of waste may be greater than the benefits.

In most cases in Australia, waste diversion targets set by governments are not mandatory. This means that in order to be effective they need to be supported by other policies such as landfill levies, subsidies and educational programs. For example, in Victoria, non-mandatory targets are underpinned by 'product stewardship arrangements, engagement and education partnerships with industry and government, funding and support, and regulatory tools' (Victorian Government 2005). Such policy instruments can result in net costs to the community unless they are addressing a relevant market failure. Even in the absence of clearly defined incentives to meet targets, government pressure can result in changed behaviour that may lead to net costs to the community.

The City of Whitehorse noted:

> The waste management needs of the Whitehorse community must be set within the obligations of Commonwealth and State Government legislation, and the initiatives necessary to meet statutory waste minimisation policies and targets. (sub. 26, p. 1)

Moreover, Councillor Dick Gross, City of Port Phillip, said:

> We're interested in [alternative waste technology] because (a) the [Victorian Government's] Towards Zero Waste policy tells us that we have to and (b) other tiers of government are interested in subsidising it … We are getting assistance, so because of that assistance I can then go to councils and say that it actually makes economic sense, financial sense, from the local government perspective …
>
> Now, of course Towards Zero Waste has an uncertain legal consequence because it's policy, not law. Councils don't deny policy though; they might whinge about it but they generally comply because we're a tier of government and we're expected to, and we will. (trans., pp. 104–5)

Using targets as an overarching guide runs the risk that policy objectives will be set according to the need to meet targets, rather than to address market failures or other social and environmental issues. Moreover, policies may be evaluated on whether targets have been met, rather than on whether they have provided net benefits to the community. Meeting targets may become an end in itself, rather than the means of achieving particular objectives.

There are problems with broad targets

Location of waste

Some broad targets set at a national or jurisdictional level do not take into account the different costs of dealing with waste in different regions. For example, recycling materials collected from rural and remote areas imposes additional financial cost, as well as possible additional traffic congestion and emissions from trucks (known as external costs, discussed in chapter 4). In order to be consistent with a net benefits to the community approach, waste diversion targets would need to be established for different regions within jurisdictions. While there appears to have been some recognition of regional differences by some governments in setting waste diversion targets, jurisdiction-wide programs generally impose additional, inconsistent obligations on local governments. For example, the WMAA, National Landfill Division noted:

> There has also been limited analysis on the implications of location on the targets. The cost–benefit [ratio] of recycling one tonne of material depends on proximity to markets. The State Governments are expecting the targets to be exceeded in metropolitan areas to compensate for below target performance in non-metropolitan areas. (sub. DR159, p. 3)

Types of waste

Waste diversion targets also do not take into account that different types of waste have different environmental impacts in landfill. This is analogous to the issue of moving inert waste ‘up the waste hierarchy’, discussed above. Using such targets to override normal market signals about the merits of recycling and to divert inert waste from landfill, is likely to impose unnecessary costs on landfill users in a futile attempt to reduce the cost of externalities that do not exist.

There are particular problems with zero waste targets

A number of jurisdictions have recently adopted zero waste targets (chapter 3). The proliferation of zero waste targets has particular disadvantages. First, many materials cannot be continually recycled. The Packaging Council of Australia (PCA) noted:

> Degradation is a feature common to many materials that are repeatedly recycled. While technology improvements continue to extend the capacity to reuse many materials, for some materials there are practical limits to their reuse and recycling. The natural fibres that make up paper and cardboard can be reused around five times before they are too degraded to be reused except as pulp. (sub. 67, p. 14)

This suggests that some materials will not be able to be further recycled from a technical perspective and will need to be disposed of.

Second, there are diminishing marginal returns to resource recovery, including recycling, suggesting that the optimal level of recycling is less that 100 per cent. Porter (2002) noted that recycling gets more expensive the more types of materials that are recycled. He also observed that while too little recycling will lead to wasted resources, too much recycling may also lead to wasted resources by trying to recycle unsuitable types of material. This was noted by Mr Adrian Vlok:

> Because local governments and regional councils are being driven to follow the waste hierarchy and all matters 'zero waste', the arbitrary targets … can only be achieved by recovering this organic component of the waste stream.
>
> In Australia the evidence shows chasing this waste fraction has a very high cost, little or no environmental benefit and is technically, financially and administratively complex. (sub. DR259, p. 5)

The PCA also noted the increasing costs of higher levels of resource recovery:

> The relatively obvious problem with zero waste targets is that the marginal cost of diversion or avoidance increases as the rate of waste generation approaches zero. The resources spent eliminating the diminishing remnants of waste would almost certainly be better allocated to other initiatives.
>
> While any object or material can be recycled or recovered if money is no object, recycling is an industrial process with its own environmental impacts, and it is worth doing only if there is a net environmental gain …
>
> Recycling has environmental impacts like any other industrial process. To meet an 80 per cent recycling rate, Australia would either have to waste resources recycling packaging not suited to recycling, or use thicker and heavier recyclable packaging where it is not necessary, or try to eliminate packaging in some cases, with a consequent increase in food wastage. (sub. 67, pp. 28–9)

This suggests that the pursuit of zero waste will incur additional financial and environmental costs from pursuing resource recovery beyond a level that maximises net benefits to the community. It may also result in unintended consequences of losing some features of products that consumers value.

There are problems with the way existing targets are set

Waste diversion targets are inherently difficult to set. They presume that market forces are insufficient to achieve the appropriate balance between resource recovery and waste disposal that will maximise net benefits to the community, and that somehow governments can impute what the optimal outcome should be. Yet to do so would require a good deal of information that would be impossible or very costly to collect. As a result, much target setting tends to be undertaken following incomplete technical and economic analysis or on an arbitrary basis.

Numerous participants expressed concern that targets are not set on the basis of rigorous cost–benefit analysis, but rather are motivated by aspirations to reduce waste and increase recycling. The WMAA, National Landfill Division observed how targets appear to be set:

> State Government representatives … have stated that the targets are not arbitrary, but are the results of careful analysis. That analysis is at best to look at the potentially recyclable and reusable materials still going to landfill and basing the target on that figure. There has been very limited analysis of the marginal costs of the potential recycling or reuse and cost–benefit analysis of results. (sub. DR159, p. 3)

The PCA also considered that the setting of the National Packaging Covenant recycling target was not soundly based. It concluded:

> … the use of targets in this policy area tends to be politically motivated and symbolic rather than strategic and comprehensive. For recycling, the underlying approach often seems to be no more scientific than 'recycling is good, more recycling is better and 100 per cent recycling is environmental heaven.' (sub. 67, p. 28)

Similarly, the Australian Food and Grocery Council (sub. 93, p. 13) stated that 'the setting of targets (in the Covenant) without adequate data or robust impact [analysis] is questionable'. The National Packaging Covenant Industry Association (NPCIA) also noted:

> … the NPCIA cautions against the use of targets based on less than a full consideration of social, economic and environmental costs and benefits, and against failure to understand practical realities of what can be achieved. (sub. 92, p. 19)

Some targets can risk regulatory capture

Target setting can risk being unduly influenced by particular sectors of the industry or advocacy groups to suit themselves rather than the broader public good. This is known as regulatory capture. This occurs when political pressure is applied to governments to set targets consistent with a particular group's objectives, rather than to maximise net benefits to the community. The NPCIA suggested that this occurred in the setting of the targets under the National Packaging Covenant:

> The NPCIA was fully involved in the development of targets, in close consultation with jurisdictional and Commonwealth representatives. The process was disruptive and disjointed, with advocacy groups seeking target proposals based on unrealistic, unsubstantiated and inaccurate representations of the current state of packaging recovery in Australia and inappropriate comparisons against other programs, especially those in Europe. (sub. 92, p. 19)

Setting targets at the right level is difficult

Policy makers can run into difficulties even when attempts are made to set targets using rigorous analysis. Any cost–benefit analysis would require good information about the potential costs and benefits of reaching the target, including how those costs and benefits may change over time. However, there are difficulties generalising the costs and benefits of waste disposal or resource recovery activities, and reliable data are generally not available.

Good data are needed to set sensible targets in the first place, and to monitor progress against those targets. Target setting associated with resource recovery requires information to be available about the amount of waste being disposed to landfill and being recycled. Although such data are available, there are problems with data quality (chapters 2 and 13). But rigorous cost–benefit analysis also requires information about numerous other variables, including the cost of diverting recyclable waste from landfill and the environmental benefits of doing so. There is also information asymmetry between waste generators and governments about the current costs of waste diversion.

The difficulties associated with waste diversion target setting are exacerbated over time. Future costs are difficult to predict because of technological developments and various social factors that influence waste generation. The costs can also be affected by market conditions that are difficult to predict. For example, the prices of recyclables and commodities, and currencies constantly change, influencing the cost of recycling. Waste diversion targets are not sensitive to such changes and hence, over time, will lead to net costs to the community.

The Commission is not aware of any study that sought to quantify the costs and benefits of adopting the original National Waste Minimisation and Recycling Strategy (NWMRS) target. The reasoning behind the choice of the target is not transparent. Nor does it appear that some states and territories have given much consideration to transparently quantifying the costs and benefits of setting their current targets. For example, the targets adopted in the NSW Waste Avoidance and Resource Recovery Strategy were based on an option proposed by the NSW Independent Inquiry into Alternative Waste Management Technologies and Practices (Resource NSW 2003). This option represents the ‘aggressive’ scenario that seeks to maximise the diversion of waste from landfill. It appears that little weight was placed on the financial costs[1] and too much weight was placed on factors favourable to maximising waste reduction (box 7.1).

[1] Wright (2000) uses the term ‘economic’ to describe one of the criteria. This use of ‘economic’ is consistent with the Commission’s use of the term ‘financial’ to describe private, financial costs.

Box 7.1 The NSW Independent Inquiry into Alternative Waste Management Technologies and Practices

In 2000, the NSW Government commissioned an Independent Inquiry into Alternative Waste Management Technologies and Practices ('the Wright Committee') to recommend the range of waste reduction scenarios the Government would use in meeting its waste management goals.

To arrive at its recommendations, the Wright Committee used a technique known as multi-criteria analysis. Multi-criteria analysis is an alternative to cost–benefit analysis as a method of ranking projects. The technique is most commonly used when information about the costs and benefits of each option is unavailable or when it is difficult to express certain impacts in monetary terms. In using multi-criteria analysis, the decision maker ranks each option by scoring it against a number of subjective criteria.

The Wright Committee used four criteria (technical, environmental, social and economic) and gave them equal weighting. The Wright Committee justified the equal weighting on the grounds of the uncertainty associated with valuing environmental costs and benefits.

It is not clear why this approach was used over cost–benefit analysis, particularly when at least some of the information was readily available to make a partial cost–benefit analysis possible — such as the capital and operating costs and at least some of the environmental benefits of each technology.

This suggests that the Wright Committee under-weighted some criteria (such as 'economic') and over-weighted others (such as 'social' and 'technical'). The effect of this approach was to give the highest ratings to those technologies that best met the waste hierarchy (for example, alternative waste technologies) and the lowest ratings to those technologies that least met the waste hierarchy (such as bioreactor landfills).

Sources: Wright (2000); Office of the Deputy Prime Minister (UK) (nd).

Some participants to the inquiry have claimed that their waste management targets *are* set using rigorous cost–benefit analysis. The Victorian Government, for example, noted:

> … Victoria's *Towards Zero Waste* strategy and its targets has been supported by economic modelling and analysis that show net economic benefits to Victoria in addition to the resource efficiency benefits. (sub. DR187, p. 17)

The modelling referred to above is a cost–benefit analysis undertaken by the Allen Consulting Group (2003). While it is commendable that cost–benefit analysis has been attempted, the Commission is of the view that this work is fundamentally flawed because of some of the underlying assumptions made in this economic modelling. The 'environmental benefits' of reprocessing used by the Allen Consulting Group (2003) were derived from SKM (2003), that in turn based its estimates of the environmental benefits of reprocessing on Nolan-ITU and SKM

Economics (2001). Chapter 4 and appendix B explain why the Commission believes that the estimates of the environmental benefits in Nolan-ITU and SKM Economics (2001) are significantly overstated. This leads the Commission to conclude that the environmental benefits of the Victorian *Towards Zero Waste Strategy* are likely to be much lower than was assumed by the Allen Consulting Group (2003).[2]

The Commission also considers that the Allen Consulting Group (2003, p. 14) has overstated the true costs of landfill. Landfill levies appear to be included in the landfill prices per tonne (p. 13) used in the analysis and, therefore, inappropriately inflate the cost of landfill. As noted in chapter 4, levies are transfer payments to government, and should not be counted as a cost in cost–benefit analysis.

Furthermore, it is likely that the Allen Consulting Group has overstated the financial benefits of the *Towards Zero Waste Strategy*, because the analysis assumes that there will be ‘no net financial impact for businesses’ from the Strategy (p. 14). Rather than giving a net benefit to the community, the Commission considers it more likely that a correct analysis of this Victorian Government policy would demonstrate that it will lead to a net cost to the community.

A better approach is for governments to intervene on the basis of market failure and allow market forces to reveal the level of waste disposal and resource recovery that maximises net benefits to the community. Rigorous cost–benefit analysis is required to evaluate the options for intervention, and to identify the option with the highest net benefit to the community.

Assigning accountability is difficult

If it is important that targets are met, rather than being simply aspirational, accountability for their achievement must be assigned to suitable parties, including consequences for targets not being met. However, achieving targets may be subject to a number of factors that are beyond the control of those accountable. A close link between the efforts of those accountable and outcomes needs to be demonstrated in order for targets to be achievable. Otherwise, undue costs may be incurred trying to meet targets that have been set without regard to external factors, and consequences may be imposed that are out of step with the intentions of the targets. In these instances, the cost of the target is likely to outweigh the benefit.

2 For example, the Allen Consulting Group (2003, p. vi) report noted ‘The only instance in which the net economic benefits are (slightly) negative is when the future costs of landfill are assumed to be low and when the environmental benefits from reprocessing are also assumed to be low’. It later noted ‘The [net present value] of the net economic benefits [of] the Strategy … is slightly negative for the low value scenario (-$16 million to -$30 million)’ (p. 24).

An example of the potential for this can be seen in the National Packaging Covenant, which includes three overarching targets (box 10.3) that signatories are expected to achieve.[3] Signatories to the Covenant have indicated that there is significant pressure, in the form of the threat of a more prescriptive regulatory regime, to meet targets. For example, Amcor Australasia noted that it:

> … is concerned … that any perceived lack of progress towards meeting the Covenant's arbitrary targets by the mid-term 2008 review may trigger a strict regulatory approach at the expense of taking a broader, more balanced and longer-term policy response. (sub. DR167, p. 3)

This suggests that there may be significant consequences for not meeting the targets in the Covenant. However, chapter 10 notes that the targets are arbitrary and the benefits are yet to be substantiated. Moreover, factors beyond the signatories' control, such as the price of recyclables and kerbside recycling recovery rates, will impact on their ability to cost effectively meet the targets, especially the recycling targets. Trying to achieve a target that is subject to external influences is likely to impose net costs on the community.

Targets are often not met in practice

The difficulty in setting suitable waste diversion targets is demonstrated by the results in meeting such targets to date. The targets set under the NWMRS proved to be unattainable for many jurisdictions. For example, the amount of waste landfilled for the Sydney metropolitan region increased from 1.0 tonne per person in 1992 to almost 1.2 tonnes per person in 2000, instead of falling to the targeted 0.5 tonnes per person (EPA NSW 2003c).

According to ACT NOWaste, the final target of zero waste to landfill is proving difficult to achieve. While 554 000 tonnes of materials were recovered in the ACT in 2004-05 (up from 136 000 tonnes in 1994-95), 204 000 tonnes continued to be landfilled:

> While levels of resource recovery have steadily increased, overall waste consumption and generation rates [are] also increasing, making it difficult to achieve substantial reductions in levels of waste disposal to landfill. (ACT NOWaste - ACT Department of Urban Services, sub. 36, p. 1)

3 Those who do not sign up to the Covenant will be subject to the supporting National Environmental Protection Measure (Used Packaging Materials), which includes provisions for jurisdictions to impose financial penalties on brand owners who fail to demonstrate that they have undertaken to recover consumer paper and packaging in which their products are sold.

A different approach to target setting

There is an alternative to setting waste diversion targets. This is to identify targets that relate directly to policy objectives that are consistent with the Commission's preferred approach of intervening on the basis of market failure and allowing market forces to reveal the level of waste disposal and resource recovery that maximises net benefits to the community.

Targets that directly relate to a legitimate policy objective, such as reducing externalities, may be effective in assisting policy makers communicate their priorities and allocate resources. For example, the Commission has found that compliance with landfill licensing conditions is relatively poor, and enforcement is variable (section 8.5). Assuming that landfill licenses are appropriately configured to account for relevant risks and externalities involved, a target of full compliance by all licence holders might not be an unreasonable goal for governments to aspire to.

In conclusion

By setting waste diversion targets in the absence of reliable data and rigorous assessment of the costs and benefits, policy makers seem to be hoping for the best — that the benefits will follow or that the costs will not be insurmountable. This is evident in the recent announcement that the landfill levy in New South Wales will be set in accordance with the need to achieve the landfill diversion target rather than in accordance with the overall financial, social and environmental costs associated with landfilling (chapter 9).

Setting appropriate waste diversion targets is a complex and ultimately futile task. It is unrealistic to expect governments to be able to determine what the optimal level of diversion should be. This would be better determined by allowing market forces to find this level once all relevant externalities are priced into goods and waste disposal options. The Commission considers that the preferred policy approach would be for governments to intervene only on the basis of market failure (or regulatory failure). Waste management decisions should be based on the costs and benefits of each waste management option, including all external costs. The waste management option with the highest net benefit to the community will seldom, and then only accidentally, be consistent with a particular waste diversion target set using technical or arbitrary criteria.

FINDING 7.1

Targets for waste diversion are virtually impossible to set at an optimal level. Broad targets do not account for regional differences in waste diversion costs or the *external costs of different types of waste. Nor are they sensitive to changes in market or institutional settings. While they might be argued to have some aspirational virtues, targets such as zero waste to landfill lack credibility and are unachievable. More importantly, excessive resource recovery can be costly to the community and result in perverse outcomes.*

A better approach than using waste diversion targets, would be to directly address relevant market failures and distortions throughout product life cycles, thus assisting markets to achieve the right balance between waste avoidance, resource recovery and disposal.

RECOMMENDATION 7.2

Governments should not directly or indirectly impose waste diversion targets as part of waste management policy.

8 Regulation

Key points

- The regulatory principles developed by the Council of Australian Governments and others should be followed when designing waste management regulation. In particular, policy makers must demonstrate that government intervention is justified and regulation is the best option.
- Landfill regulation appears to have the capacity to be effective in addressing potential downstream externalities. However, it appears that the enforcement of landfill licensing requirements should be tightened.
- In theory, there are few regulatory constraints on energy-from-waste processes but, in practice, they are constrained by negative community and political perceptions. With current regulation, energy-from-waste facilities can effectively dispose of some waste at little risk to human health or the environment.
- In other countries, take-back regulations have increased recycling, yet have been very costly and not necessarily more effective than other options. Self-regulated labelling schemes, on the other hand, can be relatively low cost and effective.
- Recycled content standards are likely to be less cost-effective than options that target policy objectives more directly.
- Littering and illegal dumping are best addressed by combining regulation with other measures, such as education, community involvement and moral suasion.
- A cost–benefit study commissioned by the Commonwealth, State and Territory Governments shows that their planned phase out of plastic shopping bags would impose a large net cost on the community, even when the total environmental benefit is assumed to be much greater than available analysis suggests. Governments should consider alternative policies that more directly address the real issue of concern — the small proportion of bags that are littered.

This chapter outlines principles for good regulatory practice and assesses current and potential forms of waste management regulation in Australia. The focus of this chapter is on regulation that addresses externalities — primarily, regulation associated with putrescible waste. Hence, most of the regulation examined is related to municipal waste, and some aspects of commercial and industrial waste. The regulatory impediments associated with commercial and industrial, and construction and demolition waste are discussed in chapter 12.

For the purpose of this chapter, regulation covers a ‘spectrum ranging from self-regulation where there is no [direct] government involvement, through various regulatory arrangements with increasing degrees of government influence and involvement, to explicit government regulation’ (IDCQR 1997, p. IX).

Regulation can be divided into two categories:

- prescriptive-based regulation that specifies the technical means for attaining a particular outcome; and
- performance-based regulation that specifies the desired outcome in particular terms, but allows individuals to determine how to achieve that outcome (ORR 1998).

Both forms of regulation are considered in this chapter.

8.1 Principles of good regulation

The Council of Australian Governments (COAG 2004, p. 5) has noted that ‘the burden of proof that a regulation is necessary remains with the proponents of regulatory action’. This condition is more likely to be satisfied if policy makers follow the general policy principles developed in chapter 6 and the specific regulatory principles developed by COAG and others (COAG 2004; ORR 1998; Regulation Taskforce 2006). The latter principles require policy makers to consider options, conduct a thorough cost–benefit assessment and consult with interested parties (box 8.1).

In a regulation impact statement (RIS) or as part of good regulatory practice, policy makers identify which of three possible regulatory forms is likely to be the most effective and efficient in the circumstances: self-regulation, co-regulation or explicit government regulation (box 8.2). In choosing the regulatory form, policy makers should weigh up a variety of factors including: the extent of the risk; the severity of the problem; the nature of the relevant industry; the need for flexibility or certainty in regulatory arrangements; and the availability of resources (ORR 1998, p. E15).

All three regulatory forms are evident in the waste management policy arena. For example, the plastics industry self-regulates the plastics coding system, whereas explicit government regulation is the approach taken in regulating waste disposal. Co-regulatory approaches are also used, especially for extended producer responsibility (EPR) and product stewardship (PS) schemes (chapter 10).

Box 8.1 General principles for designing and assessing regulation

The recent report of the Regulation Taskforce (2006, p. v) noted good regulatory process requires governments to apply the following six principles:

- Governments should not act to address 'problems' through regulation unless a case for action has been clearly established. This should include evaluating and explaining why existing measures are not sufficient to deal with the issue.
- A range of feasible policy options — including self-regulatory and co-regulatory approaches — need to be assessed within a cost–benefit framework (including analysis of compliance costs and, where relevant, risk).
- Only the option that generates the greatest net benefit for the community, taking into account all the impacts, should be adopted.
- Effective guidance should be provided to regulators and regulated parties to ensure that the policy intent of the regulation is clear, as well as what is needed to be compliant.
- Mechanisms such as sunset clauses or periodic reviews need to be built in to legislation to ensure that regulation remains relevant and effective over time.
- There needs to be effective consultation with regulated parties at the key stages of regulation-making and administration.

Some inquiry participants claimed that governments had not followed good regulatory practices in designing waste management regulation. For example, the Business Roundtable on Sustainable Development (BRSD) stated 'the failure of … [government] agencies to follow principles of good practice policy, which were designed to deliver productive outcomes and agreed to at COAG' was a significant shortcoming in the current approach to waste management policy (sub. 70, p. 1). Similarly, Collex (sub. 80, p. 2) alleged that, despite the adoption of the COAG principles, 'there is still room for significant advance in regulatory processes'.

This chapter considers all costs and benefits, whether financial, environmental or social in nature, to assess the efficiency and effectiveness of regulation covering the following components of waste management:

- waste avoidance and resource recovery
- collection and transport
- sorting, treatment and processing
- disposal
- litter and illegal dumping.

Box 8.2 **Advantages and disadvantages of different regulatory forms**

Compared with explicit government regulation, self-regulation and co-regulation can provide a number of advantages including:

- lower government administration costs, because such regulations are developed and often administered by business;
- lower compliance costs for business;
- innovative inducements for compliance;
- rules that are tailored to specific needs and thus better targeted;
- improved information flows, using clearer terms;
- enhanced flexibility, responsiveness and speed of implementation and modification; and
- greater responsiveness to consumer demands based on additional information gained from, for example, the complaints mechanism.

Potential disadvantages of self-regulation and co-regulation include:

- restrictions on competition (such as increased barriers to entry);
- some businesses not complying with minimum standards (such as 'free-rider' problems);
- ineffective sanctions for non-compliance;
- reductions in consumer choice, by imposing minimum standards that do not allow consumers to choose lower cost/quality products or services; and
- business may not have the resources and capacity to develop or administer a quasi-regulatory or co-regulatory scheme.

Explicit government regulation is often considered to offer more certainty, industry-wide coverage, and greater effectiveness compared with other forms of regulation because of the availability of legal sanctions. Thus, it is often preferred in dealing with high risk/high impact public issues. However, explicit government regulation also has the following drawbacks:

- it is standardised and inflexible, and cannot easily change over time and with conditions. It may also impede technological progress and innovation;
- there are time lags between making and amending legislation;
- it is not well suited to driving continual improvements in the quality of services; and
- compliance costs may be high.

Source: Adapted from ORR (1998).

8.2 Waste avoidance and resource recovery

This section focuses on regulations that promote waste avoidance and resource recovery, which include recycled-content standards and take-back regulations. Other policy instruments that could promote this objective, including landfill levies, deposit-refund schemes, subsidies and various forms of information provision are covered in chapters 9 and 11.

Recycled-content standards

Recycled-content standards require products to be manufactured with a certain minimum amount of recycled materials. Such standards are prescriptive.

There are no known examples of recycled-content standards for the manufacture of products in Australia. There are, however, examples of minimum standards that require the use of certain products in various construction projects and these are discussed in chapter 12. Other countries, including the United States, currently impose recycled-content legislation on the manufacture of some products (box 8.3).

Some inquiry participants (for example, Brisbane City Council, sub. DR154) proposed that recycled-content standards be introduced in Australia. The Australian Council of Recyclers (ACOR) stated:

> A minimum target could be set for all manufacturers and importers for the use of recycled content material in their products. Manufacturers and importers using virgin material and no recycled content material in their products would have to purchase certificates from manufacturers exceeding the minimum usage target, that is, recyclers/reprocessors holding surplus certificates … (ACOR, sub. 40, att. 1, p. 27)

Such standards were claimed to provide both a direct benefit through ‘additional cash flow to the recycling industry’ and an indirect benefit through ‘recycled materials becoming more competitive’ (ACOR, sub. 40, att. 1, p. 27). They were also seen as being beneficial because they can conserve virgin materials.

On the other hand, Amcor (sub. DR167) did not support the introduction of recycled-content standards and argued that there were many factors (in particular, consumer preferences) that could affect the appropriate level of recycled content.

Recycled-content standards may reduce landfill externalities by decreasing the waste disposed to landfill. However, this benefit is likely to be small, as most of the likely standards would relate to materials that are relatively inert in landfills and have only low environmental impacts, such as plastics, paper and glass.

Given there may not be significant downstream externalities from landfilling recyclable products, the argument from some parties for recycled-content standards largely depends on whether recycling materials produces significant upstream benefits. However, as argued in chapter 5, upstream externalities vary according to circumstances and are best addressed through a more direct policy.

Box 8.3 **Recycled-content legislation — the US experience**

Around 12 US states have recycled-content legislation for newsprint, while another 13 have 'quasi-regulated' standards. In 2000, the required recycled content ranged from 33 to 50 per cent of total input materials. The standards typically require newsprint manufacturers to produce newsprint with around one third recycled fibre. Manufacturers that fail to comply with the particular standard may be subject to civil penalties, such as fines. However, producers may be exempt from liability if recycled fibre is unavailable within a reasonable time or in sufficient quantity.

There are also recycled-content standards for glass and plastic products. In California, there are recycled-content laws for glass, plastic garbage bags and rigid plastic containers. For example, rigid plastic containers must: (1) contain 25 per cent recycled content or (2) be made of material that is recycled at a rate of 25 per cent or (3) be reusable.

It is unclear whether US recycled-content legislation has been successful. One study attempted to measure the effectiveness of the legislation but found there were large estimation problems (Worley 1992). Another study concluded that effectiveness depends on whether the producers can find end markets for products with recycled content, and this was not yet known (Hendren 1992).

However, what is clear is that Australia's voluntary scheme for recycling newsprint (detailed in appendix C) has achieved the world's highest rate of newsprint recycling (around 75 per cent) and has consistently exceeded its targets over the past 15 years (PNEB, sub. 2). The Publishers National Environment Bureau stated that newsprint made at the Norske Skog newsprint mill in Albury contained 40 per cent recycled fibre made up of approximately 60 per cent recovered newspaper and 40 per cent recovered magazine paper (Kelett, F., pers. comm., 27 April 2006).

In addition, any upstream benefits of recycled-content standards may be small after accounting for the costs. Recycled-content standards can reduce the flexibility and innovation in the manufacturing process and may sometimes increase processing costs. As a result, there may be a net environmental cost. They may also be difficult to enforce, because it can be difficult to identify whether a product contains recycled material. In addition, such standards effectively require producers to provide an end-use market for recycled materials, regardless of cost. Targeting an input in this way is an indirect, distortionary policy approach (chapter 9), and not likely to deliver a net benefit for the community.

The Commission, therefore, does not support recycled-content standards. Likewise, the Commission does not support policies that require products to be made with 100 per cent virgin materials. Instead, the amount of recycled content or virgin material in a product should be based on cost, availability and performance. If including recycled content adds to a product's performance at a reasonable cost, it is likely to be included by a manufacturer with no need for regulation. For example, the newsprint industry in Australia has found it commercially worthwhile to recycle a large amount of newsprint without the need for recycled content-standards to be imposed (box 8.3).

RECOMMENDATION 8.1

Mandatory standards for including recycled content in products should not be implemented, as they are unlikely to produce net benefits for the community.

Take-back regulations

Take-back regulations require suppliers to retrieve their products from final consumers for the purpose of materials recovery, recycling and/or disposal. Such regulations have been a prominent feature of waste management policies in European countries.

One of the earliest, and most well known, examples is an ordinance that Germany introduced in the early 1990s requiring producers to take back and recycle used packaging. The ordinance gives suppliers the option of either collecting and processing their used packaging themselves, or doing it collectively through an industry body. Businesses adopted the latter option by establishing a body called the German Dual System (Duales System Deutschland).

Packaging suppliers that choose to participate in the Dual System have to pay a licence fee that allows them to use a registered trademark — the Green Dot logo — on their products. The fee is meant to cover the collection and processing costs incurred by the Dual System, and so varies between suppliers according to the type of packaging and its weight and volume (Emergo Group 2004). Having the Green Dot logo on packaging enables consumers to identify which products can be returned through the Dual System's collection infrastructure.

The Dual System has the advantage that fixed collection and processing costs can be shared among firms, thus enabling economies of scale to be achieved. However, it literally creates a dual system that to a large extent duplicates established waste collection services.

Research indicates that the German take-back requirement for used packaging has been effective in reducing waste and increasing recycling (Quoden 2004). However, it also appears to have been very costly and not necessarily more effective than other policy options:

> Germany's celebrated take-back program for packaging has a mixed record, with high costs for performance achieved. Under its Green Dot EPR [extended producer responsibility] program, Germany exceeded its waste-recovery targets. But over [the] same time period, with no EPR system in place, the US experienced even greater reductions in total packaging used per unit of output. Canadian packaging manufacturers, who set a voluntary reduction target of 50 percent in packaging sent for disposal, achieved that goal four years ahead of schedule with no EPR and at lower costs than Germany. (Schwartz and Gattuso 2002, p. iii)

Nevertheless, Germany's take-back arrangements for used packaging have inspired other European countries to adopt policies to reduce packaging waste, including use of the Green Dot logo. The European Union has issued a Directive on Packaging and Packaging Waste to harmonise the different countries' approaches, and EU Member States have established an umbrella organisation of national compliance schemes — Packaging Recovery Organisation Europe — for this purpose. European countries have also introduced take-back requirements for other products, including electronics and electrical equipment, motor vehicles, waste oil, and batteries.

Given the high cost of Germany's arrangements for packaging, the Commission is not convinced that take-back regulations are appropriate. The case for take-back regulations is especially weak when the environmental costs of disposal are likely to be small, as is the case for most packaging. This view is reinforced by the Commission's assessment in chapter 9 of a special type of take-back scheme known as container deposit legislation.

8.3 Waste collection and transport

This section addresses regulation relating to the collection and transport of municipal waste.

Collection

Local governments are responsible for regulating municipal waste collection services, including kerbside recycling, green and hard waste collections.

Regulation typically aims for effective collection that 'minimises the impact on community health and the environment' (Local Government Association of Queensland nd). In addition, some jurisdictions have argued that regulation of collection is beneficial because it can play a role in ‘reducing the amount of waste going to landfill’ (Municipal Association of Victoria 2006).

Collection regulation differs across each local government area, but typically includes restrictions on what can be disposed and recycled. Hazardous materials are banned from disposal in household waste bins for health and safety reasons. These include: car batteries; asbestos; and hazardous chemicals. Other materials are banned because they are large or potentially hazardous and include: car parts; industrial hard waste; and waste from construction sites.

Local governments also stipulate what items can be placed in recycling bins. These usually include: all paper-related products; steel and aluminium cans; most types of glass; and some plastics (usually only codes 1, 2 and 3). Items such as chemical containers, appliances and some cartons (for example, long-life milk containers) are typically not suitable for recycling collections. In addition, other materials should not be placed in a recycling bin as they may contaminate the recycling stream. These include general rubbish, garden organics, oil, food, light globes, nappies, ceramics and crockery.

There are also restrictions on green waste collections. Householders can use this service, where available, to dispose of: leaves; branches and small logs; grass clippings and weeds; and flowers. Items such as plastic bags; sand; soil; household rubbish; food scraps and paper-related products are banned.

Restricting what can be placed in a ‘general waste’ or a recycling bin provides a benefit to collectors, landfill operators and recyclers because it reduces the risk of harm from contact with potentially hazardous waste. In addition, restricting what can be placed in recycling bins or disposed as green waste provides a direct benefit to both sorters and processors by decreasing contamination. Non-contaminated waste streams lead to lower costs and higher recovery rates, as less sorting and processing is required. Restrictions may also alleviate specific processing issues. For example, if undetected, crockery incorrectly placed in a recycling bin can cause recovered glass to be unsuitable for recycling.

However, requiring householders to separate waste into a number of bins involves time and effort. This cost varies across systems, and will be higher when multiple bins are used. This cost may be partially or fully offset if householders gain satisfaction from the act of recycling (chapter 4).

Banning certain types of waste and recyclables from collection and disposal could inconvenience householders and impose additional costs on them by, for example, requiring a trip to a transfer station or a chemicals disposal facility.

Collection requirements could also raise collection costs. For example, systems with more than one bin require additional collection trucks and labour requirements (chapter 4).

In conclusion, collection restrictions can be effective in reducing the external impact on the community and increasing recycling. Providing householders with convenient options to correctly dispose of common prohibited waste might reduce the risk of inappropriate disposal. These restrictions currently appear to be frequently disregarded by householders (see, for example, GRD Ltd, trans., pp. 564-5) and are only likely to be effective when coupled with other measures, such as information guides, and convenient and acceptable alternatives.

Transport

In general, waste transport is only regulated by state or territory environmental authorities if ‘it has the potential to cause environmental harm’ (EPA Queensland 2004c, p. 1). Accordingly, in all jurisdictions, transporting hazardous waste, such as asbestos, is a licensed activity under environmental protection legislation (NEPC 2004). However, in most jurisdictions, transporting non-hazardous, solid waste is not a licensed activity. Instead, it is regulated through other forms of legislation (such as occupational, health and safety (OH&S) legislation and road and rail transport legislation), and relevant local government rules relating to noise and litter.

South Australia is an exception — it requires the transport of non-hazardous solid waste to be licensed. Specifically, transporters taking waste from domestic premises on behalf of a council and/or taking solid waste from any commercial or industrial premises are required to be licensed under Schedule 1 of the *Environment Protection Act 1993*.

Given most jurisdictions do not regulate the transport of non-hazardous solid waste, it is unclear why such regulation is needed in South Australia. The transport of solid waste may not pose significant additional environmental externalities over transport generally. While the transport of solid waste may create external costs due to noise and litter, these are best dealt with by local governments, either directly or through contractual arrangements with service providers.

8.4 Waste sorting, treatment and processing

This section addresses regulations relating to the sorting of waste at waste transfer stations and materials recovery facilities and regulations governing compost production.

Sorting

Sorting regulation applies to waste transfer stations and materials recovery facilities. A waste transfer station is a facility where waste is received from householders and separated for subsequent transportation to a recycling facility or landfill. A materials recovery facility (MRF) is a facility where recyclables are sorted. Once sorted, recyclables are ready to be processed at recycling plants. For example, plastics can be separated and sent to a plastics processing plant.

In some states and territories, a waste transfer station must be licensed to receive waste. In Queensland, licences require operators ‘to take all reasonable and practicable measures to minimise the likelihood of environmental harm’ and comply with ‘any other legislative obligations’, such as planning and OH&S legislation (EPA Queensland 2004b, p. 1). Similarly, in South Australia, waste transfer stations (or ‘waste depots’) must be licensed under the *Environment Protection Act 1993*. In other jurisdictions, such as Victoria, transfer stations do not have to be licensed, and only have to comply with general legislative requirements such as the provisions in environmental protection legislation governing pollution and various local government planning rules.

Unlike waste transfer stations, materials recovery facilities are not typically required to have ‘waste-related’ licences for the receipt of recyclables. This is due to the small environmental and social impacts likely to arise from sorting recyclables (Leverenz et al. 2002). Instead, such facilities must operate in accordance with other legislation and local government requirements. Operators of these facilities will typically be required to:

- contain litter and dust — for example, by the use of buffer zones and fencing;
- keep records — for example, at materials recovery facilities, loads may need to be weighed and the data reported to the relevant authority; and
- manage the receipt of waste — for example, at transfer stations, particular types of waste (such as tyres and car batteries) may need to be separated into designated areas (EPA Queensland 2004b).

In addition to state and territory licensing and/or local government requirements, three jurisdictions — Tasmania, Queensland and Victoria — have voluntary guidelines for the construction and/or operation of waste transfer stations. In Victoria and Tasmania, the guidelines apply to every transfer station (EcoRecycle Victoria 2004, DPIWE 1996). The Queensland guidelines, however, only apply if a transfer station receives 20 000 tonnes or more of waste per year (EPA Queensland 2004b).

Regulation for waste transfer stations or materials recovery facilities can reduce the negative social impacts associated with waste and recyclables, particularly, litter, odour and dust. For example, siting a facility away from residential areas means the community is less likely to be affected (chapter 4). However, if the externalities associated with sorting are small, such that the negative social impacts can be reduced with existing general regulation, there is no clear case for specific regulation of waste transfer stations or materials recovery facilities.

Composting

Compost is a mixture of decayed organic matter used to fertilise soil. It can be produced from two different sources:

- green waste (such as leaves and grass clippings); or
- general waste (excluding dry recyclables) by using mechanical and biological processes in an alternative waste technology (AWT) plant.

Composting can be regulated in two respects — how composting facilities are operated, and compost standards.

Regulation of composting facilities

Currently, large-scale composting facilities have to be licensed under state or territory environmental protection legislation. For example, in South Australia, composting works must be licensed under the *Environment Protection Act 1993* when production capacity exceeds 200 tonnes per year.

Licenses requirements typically require:

- facilities to be appropriately sited — for example, buffer distances between the facility and other sensitive land uses;
- groundwater and surface water to be protected from contamination — for example, compost heaps and other material stockpiles could be required to be set up on a non-permeable base to prevent leachate contamination; and
- aspects such as noise, pests, birds, litter and odour and other amenity impacts to be contained to acceptable levels.

Some jurisdictions have developed 'best practice' guidelines for the siting, operation and management of composting facilities (EPA Victoria 1996, DEC 2004a). The relevant authorities can use these when assessing licence applications and can require that particular measures recommended in the guidelines are included in the licence conditions.

National guidelines have also been developed by the WMAA, Compost Australia Division (WMAA NTCOR 2004). The guidelines were designed to assist composters to plan composting facilities that process source-separated organic waste (WMAA NTCOR 2004, p. 3).

The BRSD (sub. 70, att. 5) argued that current requirements for some composting facilities were too prescriptive, and that classification of compost as a waste can lead to excessive regulation. In most states and territories, regulations governing composting facilities do not distinguish between different waste sources (for example, New South Wales) (DEC 2004a). One notable exception is Victoria. In that jurisdiction, where an operator can demonstrate that the facility will be processing relatively uncontaminated organic waste, and there are no unacceptable environmental risks, lesser requirements are imposed so operators only have to comply with planning requirements (EPA Victoria 1996). This seems to be an appropriate distinction.

Compost standards

Generally, the composition of compost is not subject to mandatory standards. Instead, some operators may choose to comply with voluntary Australian standards or guidelines.

Voluntary Australian standards provide a baseline level of protection for human health and the environment. The standards contain specified limits for pathogen levels and these limits differ according to product type.[1]

In Victoria, the EPA 'best practice' guidelines suggest that product should not contain harmful pathogens, and should be tested to prove batches meet claimed specifications (EPA Victoria 1996). The national WMAA guidelines require compost to be 'fit for purpose' (WMAA NTCOR 2004, p. 12). In this regard, the guidelines encourage operators to comply with the relevant Australian standard.

1 Relevant Australian standards include: AS 4454 (2003) for composts, mulches and soil conditioners; AS 3743 (2003) for potting mixes; AS 4419 (2003) for soils for landscaping and garden use; and AS 4422 (1998) for playground surfacing.

One regulation in New South Wales — Protection of the Environment Operations (Waste) Regulation 2005 — prohibits some types of waste from being applied to agricultural land. These include fly ash, waste residues from any industrial or chemical process, industrial and hazardous waste, or waste containing traces of the above. Healthy Soils (trans., p. 50) suggested that the regulation was motivated by concern that materials containing heavy metals could be applied to the soil. The blanket prohibition can be overturned by individual exemptions from the NSW EPA. However, Healthy Soils claimed that the only way to obtain an exemption was by following a series of prescriptive requirements that discouraged innovation in developing new compost products and could often destroy the organic value of compost. It argued that a blanket prohibition combined with a conservative and unduly prescriptive approach to issuing exemptions, imposed high compliance costs on compost producers (trans., p. 50).

The WMAA, Compost Australia Division (sub. 55) advised the Commission that most compost does not meet the minimum Australian standard. Such compost is typically used in agriculture or viticulture, for example, as a soil conditioner, or in urban applications, for example, as fill for sports grounds. It noted, however, that compost sold at retail outlets typically does meet the Australian standard.

SITA Environmental Solutions (trans., p. 499) explained that most compost is of poor quality because there is no market incentive to produce high quality compost. That is, compost that meets the voluntary Australian standard does not receive a price premium over non-compliant compost.

Inquiry participants generally supported the introduction of a minimum standard for compost (for example, Custom Composts, sub. 96; WA Department of Agriculture, sub. 81). However, there were many different views about how this standard should be implemented — from self-regulation, through industry-led co-regulation, to legislation or mandatory licensing requirements.

The issue of quality appears to have prompted a series of industry developments. The WMAA, Compost Australia Division reported that the Australian standard for compost (AS 4454 (2003)) was in the process of being updated, and there are discussions about making it mandatory across the whole compost industry. It also noted that minimum standards are currently being developed by government departments and agencies in New South Wales and Victoria.

Further, a recent industry review supported the introduction of a marketing campaign that focused on quality:

> A standard or 'fit-for-purpose' label needs to be developed to address end-user needs and promote the idea of different quality products. Quality assurance strategies need to be pursued to ensure compliance and quality products. A code of practice (or other

> quality initiative) could be called for. (Resource Consulting Services Pty Ltd 2006, p. v)

The Commission accepts that there may be a case for mandatory minimum standards for compost on health and safety grounds. That is, if there is a significant risk that compost will contain harmful pathogens and/or toxic contaminants, then it may be appropriate for the product to meet a minimum standard to reduce the risk that it will cause damage to human health or the environment. However, the Commission has not been given any evidence of major health and safety problems. Beyond a minimum level of safety, there may be a case for a voluntary, industry-led accreditation scheme for higher quality compost products (similar to the Heart Foundation’s tick for food products).

FINDING 8.1

There may be a case for adopting mandatory minimum standards for compost to address potential risks to human health or the environment, but this would need to be assessed after voluntary industry approaches have been tried and evaluated.

8.5 Waste disposal

Waste disposal regulations include: the design and management of, and restrictions relating to, landfills; and the limits placed on incineration and energy-from-waste processes.

Landfill

Over the past few decades, landfill regulation has tightened considerably. To a large extent these changes appear to be the product of an improved understanding of the potential environmental and social impacts of landfills, shifts in community values and technological progress. As a result, the design and management of landfills in Australia has progressed significantly (appendix B). While older landfills had little or no controls over leachate, landfill gases and other environmental problems, modern landfills are often required to include containment and monitoring processes.

Nonetheless, some of the recent changes in landfill regulation appear to have been driven by waste hierarchy considerations as well as by the objective of reducing greenhouse gas emissions from landfill disposal.

Institutional background

Currently, landfill regulation is administered by state or territory government authorities (table 8.1).[2] Each jurisdiction has environment protection legislation that provides the broad regulatory framework for environmental measures. Under this legislation, the relevant state or territory government authority can design and implement regulations, policies and guidelines that target more specific issues such as landfills.

Objectives

The objectives of landfill regulation vary from one jurisdiction to another, but are expressed along similar lines of reducing risk to the community and the environment. The degree to which landfill regulation aims to reduce risks also varies. In Victoria, landfill regulation is designed to provide 'the highest practicable level of protection for the community and environment, including local amenity and aesthetic enjoyment' (EPA Victoria 2004c, s. 9(1)). In New South Wales, landfill regulation has been set so that operators manage 'the risks landfilling poses to the quality of air, water, land and community amenity … in the most effective way possible' (EPA NSW 1996b, p. 1). Similar objectives are pursued in other jurisdictions (for example, EPA Queensland 2004a).

These statements imply that the risks from landfills should be reduced to very low levels. But risk can never be entirely eliminated, meaning that regulation should aim to reduce landfill risks (and hence expected environmental impacts) to 'acceptable' levels. More stringent regulation might reduce risks further but that would require additional resources, and those resources might achieve a better return to the community if devoted to other policy options, whether in waste management or elsewhere in the economy. There are also the consequences to future generations to consider. Landfilling regulation might need to make tradeoffs between current and future generations according to the risks that a landfill poses throughout its working life and during its post-closure phase.

2 In some jurisdictions, local governments regulate smaller-sized landfills. For example, in New South Wales, landfills receiving waste from just one local government area or taking less than 75 000 tonnes of waste per year, or taking less than 650 000 tonnes of total waste over the life of the site, are regulated by the relevant local council (DUAP 1995, p. 7).

Table 8.1 **Legislation, regulations and guidelines relating to landfills**[a]

State / Territory	*Acts and regulations*	*Landfill guidelines*	*Government authorities*
NSW	*Protection of the Environment Operations Act 1997* *Protection of the Environment Operations (Waste) Regulation 2005* *State Environmental Planning Policy No. 48 — Major Putrescible Landfill Sites 1995*	Environmental impact statement (EIS) guideline: Landfilling 1995 Environmental guidelines: Solid waste landfills 1996	Department of Environment and Conservation; Department of Planning
Victoria	*Environment Protection Act 1970* *Waste management policy (WMP) (Siting, design and management of landfills) 2004*	BPEM[b] — siting, design, operation & rehabilitation of landfills 2001	Environment Protection Authority
Qld	*Environmental Protection Act 1994* *Environmental Protection (Waste Management) Regulation 2000* *Environmental Protection (Waste Management) Policy 2000*	Landfill siting, design, operation and rehabilitation 2004 — environmentally relevant activity 75	Environmental Protection Agency
WA	*Environmental Protection Act 1986* *Environmental Protection Regulations 1987* *Environmental Protection (Rural Landfill) Regulations 2002*	Siting, design, operation and rehabilitation of landfills 2005[c]	Department of Environment; Waste Management Board
SA	*Environment Protection Act 1993* *Environment Protection (General) Regulations 1994* *Environment Protection (Waste Management) Policy 1994*	Landfill facility guidelines 2005[c] Guidelines for major solid waste landfill depots 1998	Environment Protection Authority; Zero Waste SA
Tasmania	*Environmental Management and Pollution Control Act 1994* *Environmental Management and Pollution Control (Waste Management) Regulations 2000*	Landfill sustainability guide 2004	Department of Primary Industries, Water and Environment
NT	*Waste Management and Pollution Control Act 1998* *Waste Management and Pollution Control (Administration) Regulations 1998*	Guidelines for the siting, design and management of solid waste disposal sites in the Northern Territory 2003	Environment Protection Agency
ACT	*Environment Protection Act 1997* *Environment Protection Regulation 2005* *Waste Minimisation Act 2001* *Waste Minimisation Regulation 2001*	None	Environment ACT; ACT NOWaste, Department of Urban Services

a Regulations relating to landfill levies are not included. **b** Best practice environmental management. **c** These are draft guidelines only.

Sources: DUAP (1995); DPIWE (2004); EPA NSW (1996b); EPA NT (2003); EPA Victoria (2001a); EPA Queensland (2004a); EPA SA (1998, 2005b); Department of Environment WA (2005c).

Risk assessment is best placed within the context of good regulatory practice, such that: 'decision making is transparent, consistent and accountable; … it utilises all relevant information; … costs, benefits and risks are identified, assessed and compared; and … measures are targeted at, and proportionate to, the problem' (Peterson 2006, p. 30). Yet there is little evidence that risk assessment has been adequately considered in regulatory assessment processes to date (see below and also chapter 4 and appendix B).

Landfill regulations in detail

There are three common landfill types — landfills taking:

- only solid inert waste and fill material;
- putrescible waste, solid inert waste, fill material and some forms of prescribed industrial waste; and
- hazardous and prescribed (liquid and solid) waste (EPA Victoria 2004c).

This chapter focuses on the first two types of landfills — that is, solid, non-hazardous waste landfills. These landfills are typically regulated through licence conditions pertaining to construction and operation.

However, not all non-hazardous landfills are licensed. In most jurisdictions, landfills serving a small population (typically fewer than 1000–5000 people) and/or receiving a small volume of waste (typically less than 20 000 tonnes per year) are not required to obtain licences (for example, EPA Victoria 2001a; EPA Queensland 2004a; Department of Environment WA 2005c). Nevertheless, even these would still be subject to general planning regulations, as well as legislative provisions governing actions that cause pollution.

Each landfill site has different environmental characteristics and, hence, the requirements attached to a particular licence can vary. Requirements may differ according to:

- hydrogeological, geological and other localised conditions — these conditions have a critical bearing on the need for, and nature of, environmental protection measures. For example, one landfill may be located in an impermeable area of rock or clay and will, therefore, require less stringent measures for leachate control, compared with a landfill located in a more sensitive area (such as near a water course);
- waste disposed — the type and amount of waste is a relevant consideration when examining the extent of the environmental and social impacts. For example,

solid inert landfills have only minor environmental impacts and, thus, for example, do not require liners; and

- size and location — regional variation in population density and the assimilative capacity of the environment are factors that influence the degree of potential environmental damage. For example, other things being the same, small, remote rural landfills will pose different risks to humans compared with larger landfills in metropolitan areas.

Landfill licensing conditions consist of a mix of prescriptive and performance-based measures. Most states and territories have adopted a broad performance-based framework that requires landfill operators to achieve certain environmental outcomes. For example, Victoria's Waste Management Policy (Siting, Design and Management of Landfills) requires licence holders to 'meet the objectives … and … each required outcome' of the 'best practice' guidelines (EPA Victoria 2004c, s. 15(3)). Regulators may negotiate with applicants the measures that will be needed to achieve those outcomes. These measures may be lifted from the 'best practice' guidelines, but alternatives that provide at least as good an environmental outcome can be considered. In Queensland, licence conditions are set to achieve certain outcomes, and guidelines provide optional (but not exhaustive) means for achieving those outcomes (EPA Queensland 2001, 2004f). Similar approaches are used in other states and territories (DPIWE 2004; EPA NT 2003; EPA SA 2005c; Department of Environment WA 2005c; DUAP 1995; EPA NSW 1996b).

Licensing requirements apply to the four main stages of a landfill's life:

- siting
- design
- operation and management
- closure and post-closure.

These are discussed below.

Siting

The location of a landfill is a major determinant of the extent to which it poses environmental and social risks (EPA SA 2005c). Siting requirements for 'best practice' landfills generally cover:

- location restrictions — such as buffer distances, meeting local community concerns, distances to waste sources and site access;
- available land area — such as existing infrastructure and land use patterns;

- soil characteristics and topography — such as proposed landfill type and potential ultimate uses of the closed site; and
- local conditions — such as environmental, climatic, geologic, hydrogeologic and hydrological conditions (DUAP 1995; EPA NT 2003; EPA Victoria 2001a, 2004c; DPIWE 2004; EPA SA 2005b; Department of Environment WA 2005c).

Various siting requirements must be met before the construction of a landfill site is approved, with some jurisdictions imposing stricter requirements than others. For example, in New South Wales, the planning authority (DUAP) must consider whether a landfill taking more than 75 000 tonnes of waste per year complies with the many 'locational principles' in that State's Environmental Planning Policy (SEPP 48, cl. 12; DUAP 1995, p. 7). In comparison, in the Northern Territory, operators of a similar sized landfill may 'deviate from the minimum level of performance' if justification for doing so is provided to, and approved by, the Environment Protection Agency (EPA NT 2006).

Some aspects of siting are prescriptive. For example, all states and territories except New South Wales specify a minimum buffer distance between the landfill site and other sensitive land uses, such as residential dwellings (average minimum is 500 metres) and surface waters (100 metres) (for example, DPIWE 2004; EPA NT 2003; EPA Victoria 2001a; EPA Queensland 2004a). Victoria, Western Australia, Queensland and Tasmania also specify a minimum distance between the bottom of the landfill and the groundwater level — typically 2 metres above the top aquifer for landfills accepting putrescible waste. In New South Wales, buffer distances are not prescriptive. That is, the State's policy and guidelines note that the distance must be the 'minimum required' to ensure environmental objectives are met (DUAP 1995, p. 17). This issue is discussed further below.

Design

After a site has been selected, the landfill must be designed to protect the environment to an acceptable level. Design requirements can include:

- installation of engineering systems — such as liners, leachate collection and cell containment;
- environmental resource management — such as surface water, groundwater and air quality monitoring;
- logistics management — such as noise and traffic, site security and fencing; and
- other layout requirements — such as the location of access roads and weighbridges (DPIWE 2004; EPA NSW 1996b; EPA NT 2003;

EPA Victoria 2001a; EPA SA 2005b; Department of Environment WA 2005c; EPA Queensland 2004a).

Large, modern landfills taking putrescible waste are almost invariably required to install liners and systems to collect or contain leachate (figure 8.1). For example, in Queensland, large landfills are required to install systems with the equivalent performance capability of the following:

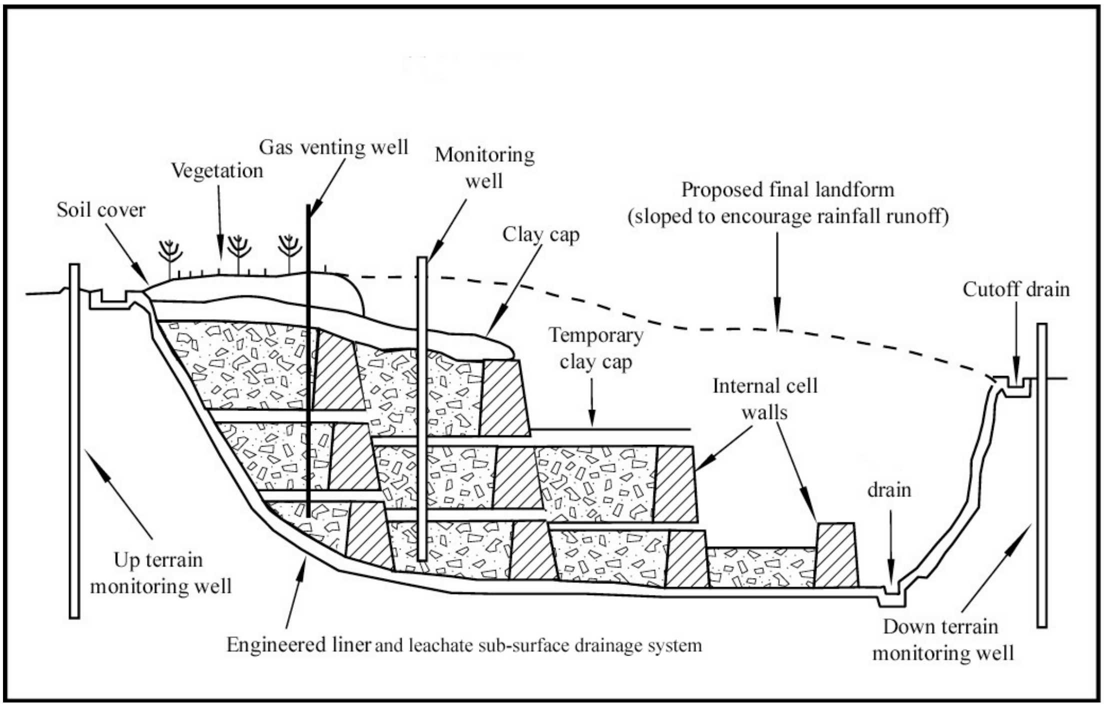
- an engineered earthen (clay) liner (0.6 metres thick) placed directly above a flexible membrane liner made of high density polyethylene (HDPE) (0.0015 metres thick);
- a leachate collection system capable of limiting the level of leachate to ensure that the pooling depth for leachate in the bottom of the landfill never exceeds a height of 0.3 metres; and
- water quality monitoring (surface water and groundwater) that allows for periodic assessment of the system performance during both operation and post-closure care (EPA Queensland 2004g).

In Tasmania, landfills 'must be designed to contain leachate over the time that the waste poses a risk to protected environmental values for groundwater' (DPIWE 2004, p. 28). The guidelines recommend 'an engineered clay liner as the minimum control required for putrescible landfills', and state that landfills taking some prescribed waste should install artificial materials such as geomembranes (DPIWE 2004, p. 28). Similar provisions exist in other jurisdictions (EPA Victoria 2001a; EPA NSW 1996a; EPA SA 2005b; Department of Environment WA 2005c).

Landfills are typically divided into a series of cells (figure 8.1). In some jurisdictions, operating landfills on a cellular basis is a design requirement (for example, EPA Victoria 2001a). In others, operators sometimes use a cellular approach voluntarily, because of the practical benefits it can provide. Filling waste cell by cell minimises the size of the active tipping face, therefore minimising daily cover requirements and the negative effects associated with litter and odour (EPA NT 2003).

Regulators may also require that gas capture systems be installed. For example, in Queensland, new, large landfills (those taking more than 75 000 tonnes per year) are required to install a landfill gas system 'for the recovery, collection and management (including beneficial use) of landfill gases' (EPA Queensland 2004g, p. 2).

Figure 8.1 **Elements of landfill design**



Source: DPIWE (2004).

Operation and management

After a landfill has been sited, designed and constructed, a landfill must operate in accordance with its licensing conditions. Most jurisdictions impose prescriptive requirements on technical issues such as: the availability of access roads; litter control; burning of refuse; pest and animal control; fire management; and staffing (EPA Victoria 2001a; EPA NSW 1996b; DPIWE 2004; EPA SA 2005b; Department of Environment WA 2005c).

All jurisdictions impose standards relating to contamination of groundwater by leachate. For example, in New South Wales, leachate must be controlled to ensure 'neither groundwater nor surface water is polluted' to unacceptable levels (EPA NSW 1996b, p. 4). Controlling leachate in this way requires effective mechanisms for early detection of pollution, such as the regular monitoring of groundwater through wells/bores (EPA NSW 1996b; figure 8.1).

Closure and post-closure

Closure and post-closure regulations are designed to ensure that long-term environmental impacts are acceptable. Landfill aftercare practices can be required up to 30 years after the site has closed (DPIWE 2004). To guard against long-term environmental risk, closure and post-closure requirements can include:

- rehabilitation practices — a financial assurance may be required from the original operator to cover potential problems;
- restrictions on afteruse — permitted uses may include sports grounds and golf courses;
- landfill caps — caps should divert surface water to avoid the formation of leachate. Caps may contain plastic and/or clay products and may be similar in nature to landfill liners (figure 8.1); and
- environmental monitoring and management — groundwater, surface water, leachate and landfill gases may be required to be monitored and managed until the long-term risk is deemed acceptable (for example, DPIWE 2004; EPA NSW 1996b; EPA NT 2003; EPA Victoria 2001a; EPA Queensland 2004a).

Financial assurances

In most states and territories, environment protection legislation allows the relevant authority to require upfront financial assurances from landfill operators. Financial assurances can guarantee that the future costs of addressing the negative impacts of a landfill are borne by its operator, even if the operator becomes insolvent or leaves the country. There are two potential applications for financial assurances in landfill regulation. They can be used to cover liabilities that are certain to occur in the future, such as post-closure rehabilitation of landfills. When used in this manner, assurances act as a performance bond imposed on the landfill operator. Another potential use of assurances is as insurance to cover potential liabilities that may or may not arise — for example, remediation of the consequences of pollution.

The distinction between the two potential applications of assurances is important in the context of selecting the financial instrument that would most effectively achieve the desired outcome. Thus, in the case of performance-bond type assurances, the major issue is that the landfill operator funds their known liabilities and the most appropriate instrument for achieving that objective is some form of financial guarantee. When the assurance covers liabilities that may or may not occur, an additional objective is to efficiently manage the risks of those liabilities arising. An insurance policy may be the most appropriate form of assurance in that instance.

In Victoria, both private and local government operators of licensed landfills are required to provide financial assurances addressing different aspects of operator liability, including: remedial action in the event of pollution during the landfill's life and after its closure; site rehabilitation; and post-closure care of the site (box 8.4).

Box 8.4 Financial assurances for landfills in Victoria

Sections 19A(2A) and 21 of the *Environment Protection Act 1970* allow financial assurance to be required from a landfill operator. The assurance must be provided in addition to the compulsory third party liability insurance.

Financial assurances consist of three components:

- Remedial action — this covers potential costs of addressing pollution during the landfill's operation and after its closure. The funds for this component of the assurance can be sourced either by individual operators or through an approved mutual fund. The size of the assurance can be determined using a default formula based on annual waste tonnage and a fixed cost component, or by a risk assessment of potential remedial action costs at the 95 per cent confidence limit.
- Site rehabilitation — this covers the cost of works required to close the landfill. The calculation is made for each landfill based on the worst case scenario of a third party closing the landfill and assuming the largest area of the landfill that may be open at any time.
- Site aftercare — this covers the cost of maintaining the cap and pollution prevention infrastructure, and environmental monitoring. The costing is based on a default period of 30 years after the closure of the landfill or a shorter period if the operator can demonstrate that the waste has stabilised or decomposed.

Typically, the remedial component of assurance is provided via an insurance policy, while the remaining components are financed through bank guarantees or similar measures.

Assurances are reviewed every five years and can be amended or discharged on the basis of an environmental risk assessment by the Environment Protection Agency. Landfill operators can also apply to amend or discharge the assurance at any time.

Source: EPA Victoria (2001b).

The guidelines on financial assurances for Victorian landfills (EPA Victoria 2001b) include a sample calculation of financial assurance for a hypothetical landfill covering a total area of 26 hectares and accepting 150 000 tonnes of waste per year. The assurance was estimated to be around $5.1 million, comprising a $2.6 million remedial action component, a $1.5 million site rehabilitation component and a $1 million site aftercare component.

The WMAA, National Landfill Division supported the use of financial assurances:

> Application of financial assurances to landfills for closure cost and remediation of environmental pollution are an effective way of forcing landfill operators to meet environmental and operational standards. The risk based analysis involved to quantify the size of the financial assurance provides an incentive for improvement of operational standards. (sub. DR159, p. 2)

Financial assurances have been widely used in US environmental regulation, including the regulation of landfills. Some commentators (for example, Hickman 1998; Lee and Jones-Lee 1993; US EPA 2001) suggested using financial assurances in US landfill regulation was problematic. Common problems included underestimating the post-closure period and size of operator liability and accepting as assurance financial instruments, such as self-insurance or insurance by a subsidiary, that did not provide the requisite level of financial security. However, the former issue is not unique to financial assurances, while the latter could be addressed through instrument design.

Boyd (2001) identified several implementation challenges with using financial assurances in US environmental regulation. In particular, calculation of the size of assurances was often difficult, especially in the case of long-term environmental issues applying to landfills. Regular monitoring and review is typically required for the duration of the assurance to ensure its size reflects the potential liabilities. Further, in the United States, disputes over whether the firm had met its obligations and could discharge the assurance, have sometimes resulted in litigation. The issue of allowing flexibility in the choice of financial instruments (to reduce compliance costs) without jeopardising the security of the resulting assurance also posed challenges. Nonetheless, he suggested:

> In every regulatory context to date, private financial markets have developed to provide the insurance, bonds, and other financial instruments necessary to demonstrate assurance, and they provide these products at reasonable cost. (Boyd 2001, p. 30)

Boyd concluded that, compared to the alternative of taxpayer-funded remediation and rehabilitation of landfills, financial assurances were a relatively low-cost and effective way of improving environmental outcomes.

The Commission considers that appropriate use of financial assurances to complement landfill regulation could deliver a number of benefits. First, they have equity advantages in providing security that the external costs of landfill would be covered by landfill operators rather than future taxpayers. Second, they force the operators to include these costs in their current balance sheets, and discourages the entry into the market of operators with insufficient resources to cover potential future liabilities. Third, financial assurances provided in advance of potential breaches, and easily accessible by the relevant authority, could serve as an additional compliance enforcement mechanism. Finally, if the size of the assurance reflects the true remediation and post-closure costs of landfills, landfill operators would have an incentive to reduce those costs through improving landfill design and operations. To the extent that these improvements are cost effective, this would lead to a net benefit for the community. Hence, when used in conjunction with other landfill regulation, financial assurances could act as a mechanism for efficiently managing the risks that remain after landfill regulation.

Thus, the Commission supports the use of financial assurances in principle. Assurances would need to be underpinned by a robust and transparent assessment of the potential remediation and rehabilitation costs and be subject to regular review. Further, assurances should be designed and applied in a way that minimizes compliance costs. This could involve a requirement to release components of the assurance as soon as the relevant obligation has been satisfied by the landfill operator. Allowing flexibility in the choice of assurance instruments (subject to an assessment of their financial risk), would improve accessibility to assurance and also improve cost-effectiveness by allowing operators to tailor the instrument to minimise the relevant risks.[3] Finally, it is important that the application of assurances is not restricted to privately-operated licensed landfills. For example, in Victoria all landfills are potentially subject to the requirement to provide assurances (EPA Victoria 2001b). Ensuring that assurances apply to all landfills would promote full cost recovery by all operators, improve competitive neutrality, and promote intergenerational equity.

Benefits and costs

The key benefit of landfill regulation is that it facilitates the safe disposal of solid waste. It also can lead to an improvement in neighbourhood amenity in the long term, for example, by rehabilitating quarries. As noted in chapter 4, the total external costs of properly located, engineered and managed landfills that incorporate gas capture (with electricity generation) are likely to be less than $5 per tonne of waste. Without these features the externalities could be substantial, depending on location. Therefore, it would appear that waste management policy — of which regulation appears to have been by far the most potent instrument[4] — has had a marked effect in reducing landfill externalities in recent times.

3 For example, a feature of the remedial (insurance) component is the high uncertainty of an event requiring remediation occurring. This uncertainty (and hence the required size of the assurance) could be reduced by allowing landfill operators to pool their risks by joining mutual funds. A hypothetical calculation of the aggregate remedial assurance required from 12 Victorian landfills joining a mutual fund showed that it was likely to be 36–45 per cent lower than if separate assurances were provided by each landfill (Sarjeant 2006).

4 The other main instrument that may influence disposal externalities is landfill levies, but as discussed in chapter 9, these are not based on externalities, and have practical problems that limit their effectiveness and efficiency.

The effectiveness of the current regulatory approach was noted by several inquiry participants. For example, the Department of the Environment and Heritage (DEH) noted:

> … regulation has in recent decades addressed many of the negative externalities directly associated with disposal of waste to landfill … (sub. 103, p. i)

BDA Group and McLennan Magasanik Associates (2003, p. 7) also contended that stringent environmental regulation has led to a reduction in externalities from landfills.

Several participants (for example, WMAA, NSW Division, sub. DR150) argued that early results of a national landfill survey conducted by WMAA, National Landfill Division showed that 80 per cent of Australian landfills did not have the features of a properly located, engineered and managed landfill specified in chapter 4. However, WMAA, National Landfill Division stated that most of those landfills were small rural landfills, while the larger municipal and regional landfills accepting around 70 per cent of all waste were already achieving or approaching that level of performance (trans., pp. 1130-31).

The apparent discrepancy between the standards of small rural landfills and large metropolitan landfills (whether due to the differences in licence conditions or due to the fact that some landfills are not licensed) may be appropriate, if it reflects the differences between the social and environmental risks posed by those landfills. The external costs of small remote landfills are likely to be lower and may not justify the imposition of the same controls as those that apply to large municipal landfills (particularly, in view of the costs to governments of monitoring and enforcing compliance). The Tasmanian Department of Premier and Cabinet (sub. 114) also suggested it was difficult to impose stringent requirements on small landfills because, in the absence of the economies of scale that can be achieved by large metropolitan landfills, this would raise the costs of landfill disposal to prohibitive levels. A cost–benefit analysis of the NSW Landfill Management Guidelines (discussed below) supported the contention that it was appropriate to impose less stringent requirements on smaller landfills. Nonetheless, the NSW Department of Environment and Conservation (trans., p. 888) indicated that it received criticism that the current threshold levels at which a landfill would need to be licensed were too high, and that it was currently reviewing those thresholds.

Features of the regulations that appear to have been particularly effective in reducing externalities include: location constraints; requirements to install liners and caps; gas collection systems; measures to reduce amenity impacts; and post-closure rehabilitation. One participant claimed that the combination of covers and liners has been effective in reducing leachate emissions to more or less negligible levels

(WMAA, National Landfill Division, trans., p. 155). And gas management systems appear to be effective in capturing up to 75 per cent of the methane in a landfill (appendix B).

The costs of compliance with landfill regulation do not appear to be inordinately high. As noted in chapter 4, the WMAA has advised that the financial costs of operating a large modern landfill are of the order of $25 per tonne of waste. Recognising that some costs would be incurred in the absence of regulation, the costs of compliance are likely to be substantially less than $25 per tonne. Even the cost of introducing some additional control measures may not be great. For example, as noted in appendix B, the cost of introducing a liner and leachate control system suitable for landfilling of hazardous waste may only be around $3 per tonne greater than that of a liner and leachate control system of a non-hazardous landfill. (However, until the incremental benefits of further reducing risks associated with landfilling non-hazardous waste are known, such a move could not be recommended).

The WMAA, National Landfill Division (sub. 28) warned that the costs of enforcing the full suite of regulations on older landfills might lead to their closure. This might, nevertheless, be an appropriate outcome, if it leads to a net benefit to the community.

While it appears that many of the features of landfill regulation could reduce external costs of landfills to low levels without imposing high compliance costs, there has been little research on whether the regulations lead to a net community benefit. A study of the costs and benefits of the Landfill Management Guidelines in New South Wales (Travers Morgan 1995) looked at the impact of landfill regulations for a range of scenarios (box 8.5). It concluded that implementation of the guidelines was likely to generate significant benefits for large putrescible waste landfills. On the other hand, for small landfills, implementation of the guidelines — particularly the requirements relating to leachate and landfill gas management — was likely to result in a net cost to the community.

It is difficult to make generalisations about the net benefit of landfill regulations. The regulations differ from jurisdiction to jurisdiction and can be tailored to the circumstances of an individual landfill, and hence the costs and benefits will vary. Further, as discussed in chapter 4, little ex post analysis of existing regulation has been carried out, which precludes an assessment of whether the current level of stringency is one that would result in the most beneficial outcomes for the community.

Box 8.5 Key results of the cost–benefit analysis of NSW Landfill Management Guidelines

Impact of regulating a putrescible landfill accepting 250 000 tonnes of waste per annum

- The net community benefit over 50 years of introducing leachate controls, in addition to location requirements, was in the range of -$0.9 million to $6.2 million, depending on whether the landfill was in an area of low or high risk of groundwater pollution.
- The net community benefit over 50 years of introducing gas control measures (excluding greenhouse gas abatement benefits) was around $5.8 million.
- The net community benefit over 50 years of introducing amenity protection measures, including compaction, covering of waste, waste acceptance and screening, litter and fire controls, was around $22.3 million.

Impact of regulating a putrescible landfill accepting 5000 tonnes of waste per annum

- The net cost to the community over 50 years of introducing leachate controls, in addition to location requirements, was around $1 million.
- The net cost to the community over 50 years of introducing gas control measures (excluding greenhouse gas abatement benefits) was around $0.3 million.
- The net benefit to the community over 50 years of introducing amenity protection measures was around $0.1 million.

Source: Travers Morgan (1995).

Overall, it appears that many of the features of the regulatory regime focus on the relevant objectives. What is at issue, however, is whether all features of the regulations are necessary or appropriate.

Are there some unnecessary features?

In chapter 6, the Commission recommended that waste management policy should focus primarily on externalities from waste disposal. Furthermore, it was stressed that to be most effective and efficient, policy instruments (such as regulation) should be aimed as directly as possible at the relevant problem, and intervention should produce net benefits, after due consideration is given to risk.

This framework allows consideration of the degree to which landfill regulation is achieving good policy outcomes. Two questionable features that are sometimes required in the current regulatory regime are:

- the requirement to collect and (as a minimum) flare landfill gases; and
- requirements to divert waste from landfill (which is sometimes imposed, presumably to achieve waste hierarchy related objectives).

Gas collection systems appear to be reasonably effective ways of reducing greenhouse gas emissions. However, as discussed in chapter 6, greenhouse gas abatement would be best addressed through a comprehensive national approach, not through landfill regulation. Several participants (for example, WMAA, National Landfill Division, sub. DR159; Victorian Government, sub. DR187) also argued that landfill gas collection could provide other benefits such as lower odour, lower on-site risk of fire and explosion, and improved growth of revegetation on landfill caps.

However, it is unclear whether non-greenhouse gas abatement benefits would justify the prescriptive requirement to install a gas collection system. First, some of the above benefits may already be targeted by other regulatory requirements. For example, the buffer and cover requirements of landfill regulations may address most of the odour problems and occupational health and safety legislation would already require landfill operators to minimise the risk of fire or explosion. Second, in some cases, landfill operators may have a financial incentive to install a gas collection system. Landfill gas can be used for electricity generation, providing the operator with some supplementary income. And, in many cases, operators have received additional incentives through other government policies, including the Australian Government's Mandatory Renewable Energy Target scheme (ORER 2006).

The Eastern Metropolitan Regional Council (sub. DR155, p. 7) argued that adoption of gas collection systems 'has largely occurred without the prompting of regulators', and the WMAA, National Landfill Division (sub. DR159) stated that this practice was generally supported by the industry. Hence, if the objective is to target the non-greenhouse abatement benefits of such systems, it is unclear that separate regulation mandating their installation is needed. If the objective is to pursue the benefits of greenhouse gas abatement, the requirement to install gas collection systems may be warranted. However, the costs and benefits of such regulation would need to be assessed against all other greenhouse gas abatement options. Given that the requirement (as it currently applies) does not appear to impose high compliance costs, this assessment can be made whenever a comprehensive national response to greenhouse gas abatement is introduced.

The second questionable feature of some regulatory regimes involves requirements to divert non-hazardous materials from landfill disposal. For instance, under Victorian and Western Australian landfill regulation, waste must be sorted on-site, or at a transfer station, to achieve diversion of recyclable materials (EPA Victoria

2004c, s. 16(3); Department of Environment WA 2005c). Similarly, in Tasmania, the relevant outcome is to divert 'waste materials that can be reused or recycled from landfills to minimise the loss of capacity' (DPIWE 2004, p. 5). Suggested measures include the installation of 'hardstand' areas to recover stockpiles of material, and designing waste acceptance practices so sorting can occur on-site.[5]

It is unclear how the imposition of mandatory diversion requirements would lead to a benefit to the community. Such requirements appear to do little to address external costs of landfill disposal, and seem to be motivated by the objective of capturing upstream benefits. Using landfill regulation to address these upstream benefits is an indirect, and probably ineffective approach (chapter 5). Further, there are private incentives for landfill operators to divert some waste from landfill. For example, some materials sent to landfill can be economically recycled after full consideration of all the relevant costs. Also, since landfill disposal costs relate primarily to the volume of the waste, there may be an incentive to divert some low density waste out of landfills (Eastern Metropolitan Regional Council, sub. DR155). Where there are private incentives to divert materials, regulation would appear unnecessary.

Is landfill regulation too prescriptive?

As discussed earlier, some aspects of regulation — in particular those relating to landfill siting — are prescriptive. Prescription can have several advantages over performance-based approaches. It offers greater clarity and transparency for both the regulator and the landfill operator. Also, compliance with prescriptive requirements can be less costly to demonstrate and monitor. Hence prescription may offer greater certainty of compliance for the regulator and the operator.

Nonetheless, the use of prescriptive requirements carries a number of costs. One drawback of prescriptive requirements is that they are often generic. There is a risk that such requirements would not reflect the variability in the circumstances applying to different locations and, hence, that the outcomes actually achieved would not deliver a net benefit to the community. Ipswich City Council (trans., p. 928) argued that generic licence conditions were a common problem in Queensland. It gave an example of one of their landfills being required to comply with stringent leachate controls, when the quality of the groundwater in the area was worse than that of leachate, due to mining operations in the district.

[5] A further regulatory measure that has been implemented at landfills overseas is banning particular non-hazardous waste from being disposed to landfill. SITA Environmental Solutions (sub. 42) indicated that such bans have been implemented in Europe. It cited regulations requiring pre-stabilisation of putrescible waste prior to landfill and bans on e-waste (such as computers).

Further, requiring the use of a particular method of achieving the outcome could impose high compliance costs and prevent innovation and adoption of other more cost-effective approaches. For example, in a number of jurisdictions (including Victoria, Queensland, Western Australia and Tasmania), there is a prescriptive requirement to locate landfills a certain minimum distance above groundwater levels. In Victoria, the Waste Management Policy (Siting, Design and Management of Landfills), specifies a minimum distance of two metres (EPA Victoria 2004c). WMAA, National Landfill Division stated that strict interpretation of this requirement would prevent the location of landfills in disused basalt quarries, because the basalt was typically mined 10–15 metres below the top groundwater aquifer. It claimed that this requirement would produce little environmental benefit:

> … that regulation will mean that there will never be another basalt quarry landfill in the northern part of Melbourne … The last cell that we built at Wollert cost us $3.5 million, and we spent $1 million just filling the bottom, before we even built any of the liner. That's a few metres deep. Can you imagine the cost of making it 12 or 15 metres deep, and will you have enough material to do that? … you can't dump any old material in there. It's got to be engineered, it's got to be stable, otherwise the liner is very susceptible to rupture … But in terms of the aquifer … the upper aquifer is fairly inactive … If you drill a hole in it and put a pipe in it, you'll get water sitting in it, but it doesn't move around very much. So whether the impact on that aquifer will be very great is doubtful … (trans., pp. 1135–37)

In justifying the requirement to site landfills two metres above the watertable, EPA Victoria suggested that, while the current lining and leachate management requirements reduced the risks of groundwater pollution to low levels, the buffer requirement provided an important additional contingency. It argued that while compliance with this requirement could be costly, the costs of remedying groundwater pollution could also be very high and that it was often impossible to restore groundwater quality (EPA Victoria 2004b).

However, the use of prescriptive rules to manage the risk of landfill operations will not always result in a net benefit to the community. The benefits of the separation requirement will vary between different locations. For example, the risk of groundwater pollution would vary depending on the hydrogeologic characteristics of the area, while the social and environmental cost of leachate entering the groundwater would depend on the migration pathways of that groundwater, its current and future beneficial uses, and the eco-systems in the areas potentially affected. It is also likely that the costs of complying with the requirement would be substantial. It is, therefore, important that the prescriptive requirement is supplemented with an alternative performance-based method of compliance.

In Victoria, landfills that do not comply with the above requirement may potentially be licensed if:

- this is warranted by the regional circumstances; and
- the operator satisfies the EPA via a separate environmental audit that sufficient additional design and management practices will be implemented (EPA Victoria 2004b).

WMAA, National Landfill Division was concerned that this option was unviable. It argued that because environmental auditors were personally liable for their statements, they were unlikely to certify at the design stage that any alternative measures were guaranteed to provide the same groundwater protection as the buffer requirement. The new Victorian policy has just come into effect and the practical effect of these provisions is still unclear. However, it is important that there is a thorough risk assessment of the costs and benefits of any proposed performance-based method of compliance and that this is incorporated into a full cost–benefit assessment of the application for the landfill licence.

Concerns about the regulation focusing on inappropriate objectives and being too prescriptive have led the Commission to suggest a model of landfill regulation (box 8.6).

Box 8.6 **The Commission's suggested model of landfill regulation**

The Commission considers that regulation of non-hazardous landfills should contain measures to address policy-relevant externalities associated with waste disposal, and reduce risks of damage from these externalities to *acceptable* levels (that is where the expected benefits of further reducing the risk are less than the costs of doing so). Policy-relevant externalities include pollution of air, surface waters and groundwater, and amenity losses, both during the operational life of landfills and after their closure. The regulatory approach should focus on ways of achieving these outcomes and hence would require site-by-site assessment of the measures that might be needed to reduce risk to acceptable levels. These might include requirements relating to:

- *siting,* such as locating landfills away from built-up areas, groundwater reserves, rivers and other water courses and sensitive ecosystems;
- *design,* such as impermeable liners, drains and leachate treatment systems;
- *operation and management,* such as might be necessary to contain litter, vermin, odour, noise, fire and other negative impacts; and
- *closure and post-closure,* such as capping landfills with impermeable materials to prevent water ingress, post-closure monitoring of groundwater and rehabilitation.

In the Commission's view, landfill regulation should not be driven by greenhouse gas abatement objectives nor by waste hierarchy goals that include arbitrary requirements to divert non-hazardous materials from landfill.

Compliance with and enforcement of regulation

The environmental performance of landfills will depend on the nature of landfill licence conditions, the degree to which operators comply with those conditions, and enforcement. Several participants (for example WMAA, NSW Branch, sub. DR150) argued that while, in theory, regulations could reduce externalities to low levels, in practice, a lot of landfills did not achieve that environmental standard.

To some extent, this outcome could be explained by the variability of licence conditions due to location and the risks posed by particular landfills. However, some participants (for example, SITA Environmental Solutions, sub. DR143) also suggested that poor compliance with landfill licence conditions contributed to this outcome.

While it is difficult to determine the extent to which non-compliance impacts on environmental performance, it appears that compliance is variable.

Audit reports for New South Wales (EPA NSW 2000, 2002) show poor compliance by rural and municipal landfill operators (box 8.7).

An audit of 17 rural landfills in South Australia in 2001 identified problems with compliance in areas such as: provision of fencing around the site; provision of daily cover of waste; litter control; site supervision during disposal; and control of asbestos disposal (EPA SA 2002).

The Western Australian Waste Management Board also indicated that landfill compliance required improvement, particularly in rural areas (sub. DR208).

Several inquiry participants raised concerns about the lack of enforcement of landfill regulation (WMAA, New South Wales, AWT Working Group, sub. 30; Collex, sub. 80). SITA Environmental Solutions (sub. DR143) argued that poor enforcement allowed non-compliant landfill operators to operate at lower cost and thus undermine compliant landfill operators.

Currently, monitoring of compliance typically involves the regulators conducting annual site inspections, and responding to complaints. In addition, the operator is required to submit information to the regulator on the landfill’s ongoing environmental performance. If a landfill is found to be in breach of its licensing conditions, the relevant authority may either issue an infringement notice for a minor breach, or commence prosecution proceedings for a substantial breach.

Box 8.7 **NSW landfill audit results**

In 2000, the NSW Environment Protection Authority (EPA) conducted compliance audits of 15 landfills in the Sydney South Coast and Hunter Regions. The major findings were:

- Seven landfills had failed to meet their waste cover licence conditions.
- Three landfills had inadequate waste screening processes.
- Five landfills had not complied with their waste cover obligations, including not covering the working face of the landfill and using incorrect cover materials.
- Five landfills had not complied with their obligations to prevent litter from escaping the site.
- Three landfills had failed to provide adequate capping and revegetation of filled areas.

In 2000-01, the NSW EPA conducted compliance audits of 30 rural landfills. The major findings were:

- Twenty four landfills had not complied with their air pollution control obligations. Major issues included the absence of fire prevention and control measures and poor control of odour and gas emissions due to inadequate daily cover of waste.
- Twenty eight landfills had not complied with their surface water and groundwater pollution control obligations. Major issues included inadequate measures to control leachate (22 landfills) and groundwater (24 landfills) and five instances each of actual groundwater and surface water pollution.
- Fifteen landfills had inadequate waste screening and acceptance procedures and at fifteen landfills waste storage practices created a risk of water pollution.
- Twenty five landfills had inadequate pest, weed and vermin controls and twenty five landfills had inadequate controls to prevent litter escaping the site.

Source: EPA NSW (2000, 2002).

Generally, it appears that the relevant state authorities have carried out few prosecutions for breaches of landfill licence conditions and pollution. For example, in New South Wales, between July 2003 and July 2006, there were only two prosecutions of landfill operators (Lawlink NSW 2006). In May 2006, Ballina Shire Council was fined $35 000 for breaching their landfill licence condition by failing to monitor leachate levels between January 2002 and May 2005. In July 2006, the Waste Recycling and Processing Corporation was fined $75 000 for accidentally discharging between 116 000 and 124 000 litres of leachate from the Lucas Heights landfill into an adjacent creek. In South Australia, between 1999 and July 2006, there were four prosecutions of landfill operators (EPA SA 2006).

Examination of the relevant authorities' annual reports shows that in 2004-05, there were no reported instances of major prosecutions and infringements at landfills in Australian states (DEC 2005; EPA Queensland 2005; EPA Victoria 2005a; Department of Environment WA 2005a; DPIWE 2005 and EPA SA 2005a). This can be contrasted with major prosecutions and infringements made by environmental authorities in other non-waste management areas. For example, in New South Wales, there were eight major prosecutions against commercial companies for licence breaches, and in Victoria, there were five (DEC 2005; EPA Victoria 2005a).

The NSW Department of Environment and Conservation suggested that looking solely at prosecutions provided a misleading picture of enforcement activity because it deployed a suite of enforcement measures (trans., p. 889). For example, in 2004-05 it carried out 73 inspections to monitor the types of waste accepted at landfills, resulting in four penalty infringement notices for unlawfully accepting degradable and industrial waste. It also carried out 40 inspections to monitor waste disposal and storage practices, resulting in five penalty infringement notices (DEC 2005).

WMAA, National Landfill Division argued that state authorities were reluctant to enforce licence conditions to the point of closing the landfill:

> If you close down a landfill, it causes major disruption, and it may be the only waste disposal facility in that area, so there's some reluctance to take such a draconian measure and things have been let go ... (trans., p. 1130)

SITA Environmental Solutions (sub. DR143, p. 11) argued that 'issues of resources, evidentiary requirements and the limited value of penalties have provided disincentives for EPAs to pursue illegal operations'. Darwin City Council also commented that poor resourcing hindered compliance monitoring and enforcement in the Northern Territory (trans., p. 1085).

In light of the above, the Commission considers that compliance with landfill licences in Australia is a problem and enforcement could be improved.

In conclusion

Although landfill regulation varies from jurisdiction to jurisdiction, in the main, it now appears that modern, fully-compliant landfills in Australia are effectively dealing with waste disposal externalities. However, in some respects, regulation has become sidetracked in attempting to address other objectives. Examples include requirements to install gas collection systems for greenhouse gas abatement reasons, and requirements to divert non-hazardous waste to satisfy waste hierarchy priorities.

Further, some generic prescriptive features of the regulation may impose high compliance costs on landfill operators. In these respects, the Commission concurs with the views of Westlake who stated:

> The important concept is that a … landfill should be sited, designed and operated in a way that is appropriate to the local conditions and which reduces the associated risks to an acceptable level. In this context, the setting of politically determined, prescriptive requirements for landfill design and operation are inappropriate at best and may be detrimental to the objectives of sustainable landfill development. Similarly, strict adherence to a waste management hierarchy, regardless of, for example, economic markets (for example, for recycled goods) and of regional- or waste-specific variations, may not represent the most effective and lowest risk option for waste disposal. (Westlake 1997, p. 460)

Regulators should focus on measures that address waste management policy-relevant problems as directly as possible and should not be diverted by other objectives. They should also provide appropriate performance-based compliance alternatives, whenever a prescriptive requirement could impose high net costs on the community.

While regulation has led to substantial improvements in the environmental performance of landfills, it is not clear whether the current quantum of regulation is adequate, falls short or exceeds what is needed to maximise net benefit to the community. What is reasonably clear, however, is that any further tightening of landfill regulation beyond these measures would not appear justified at the moment, and should only be considered after a thorough cost–benefit analysis is conducted. Furthermore, as argued elsewhere, it would seem appropriate for governments to assess the effectiveness of the current regulations and more accurately measure the residual levels of externalities. Lastly, it is apparent that enforcement could be improved.

FINDING 8.2

Current State and Territory landfill regulations mostly focus on the policy-relevant externalities of landfill disposal including pollution of air, surface waters and groundwater, and amenity losses during the operational life of landfills and after their closure. However, some components of regulation have been driven by inappropriate objectives, such as increasing resource recovery and waste diversion. In addition, some regulations have pursued greenhouse gas abatement — an objective that would be best addressed through a comprehensive national approach.

RECOMMENDATION 8.2

Landfill regulation should focus on the policy-relevant externalities of landfill disposal. It should be based on a rigorous assessment of the risk of damage from those externalities, and should aim to reduce that risk to levels at which the cost of further reductions begins to exceed the benefit.

Regulation should consist of a mix of prescriptive and performance-based measures and should provide for alternative methods of compliance, if there is a likelihood that a particular requirement could impose unjustifiably high compliance costs.

RECOMMENDATION 8.3

The State and Territory Governments should evaluate the cost effectiveness of current regulations in addressing the externalities of landfill disposal, to determine whether current requirements are at an appropriate level to deliver the greatest net benefit to the community.

FINDING 8.3

Compliance with landfill licence conditions in Australia appears to be relatively poor, and enforcement somewhat variable and lax.

RECOMMENDATION 8.4

Once landfill licences are appropriately configured to account for all relevant risks and externalities, the State and Territory Governments should ensure that all landfills comply with their licence conditions.

Incineration and energy-from-waste processes

Modern incinerators burn solid waste, capture the energy generated from its combustion and use it to generate electricity; hence, the term ‘energy-from-waste’.

In Australia, there are currently no large-scale energy-from-waste facilities for the disposal of municipal non-hazardous, solid waste. The last incinerator closed in Waterloo, Sydney in 1996 due to pollution concerns (Greenpeace 2003). Two recent proposals for energy-from-waste facilities — at Kwinana, Western Australia in 2002 and at Brighton, Tasmania in 2003 — were abandoned due to intense community pressure (Greenpeace nd).

However, there are some energy-from-waste processes currently operating in Australia, often as part of a manufacturing complex. These processes use agricultural, forestry or manufacturing by-products for heat or energy generation or for conventional fuel substitution, typically in cement kilns.

Incineration and energy-from-waste processes must be licensed in all states and territories. In South Australia, for example, the incineration of municipal solid waste requires a licence under the *Environment Protection Act 1993*. Similar provisions are contained within the environmental protection legislation of other states and territories.

Licensing requirements are commonly based on two potential environmental concerns — the emission of contaminants into the air through exhaust stacks, and the toxicity of the ash residue. Accordingly, state and territory governments require incinerators and energy-from-waste facilities to comply with performance-based standards for air emissions and ash residue.

All jurisdictions have similar forms of regulation for air emissions as required under the associated National Environment Protection Measure (NEPM) for air quality (NEPC 1998). The regulation sets out pollutant standards, such that pollutants must not exceed a specified maximum concentration (typically in parts per million by volume) over a period of time (typically over an hour or a day). Regulated pollutants include: nitrogen dioxide; sulphur dioxide; particulate matters; mercury compounds; dioxins and furans (NEPC 1998). Operators are also required to comply with standards for pollutant monitoring.

Fly ash (a component of the ash residue) is listed as a prescribed or a controlled waste in environmental protection legislation (for example, in Western Australia under the Environmental Protection (Controlled Waste) Regulations 2004).[6] Fly ash is prescribed because it can contain toxic metals — mercury, cadmium or lead. As a result, regulations restrict how fly ash is transported and disposed. For example, if fly ash contains more than a specified quantity of lead, it must be disposed of at a hazardous waste landfill.

Benefits and costs

Requiring incinerator operators to effectively control air discharges to meet specified concentration levels means that the incinerator must be equipped with modern technologies (air pollution equipment such as scrubber devices that use a liquid spray to neutralize acid gases, and filters that remove tiny ash particles). Such

6 Fly ash is also listed as a ‘controlled waste’ in the NEPM on the Movement of Controlled Waste (NEPC 2004).

technologies have proven to be very effective in reducing emission levels in other countries.

For example, in Germany, where regulations prescribe that these technologies be implemented, the emission levels of dioxins and other pollutants are low (appendix B). The technologies used in Germany have resulted in gases emitted from incinerators being ‘no longer relevant in terms of public health’ (German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety 2005, p. 7). Further, in Switzerland, modern incinerators equipped with energy recovery received 99 per cent of unsorted solid waste in 2004, and still met stringent environmental standards (SAEFL 2005).

Reduced air pollution leads to many benefits, such as improved health, amenity, and visibility. For example, smog can aggravate existing respiratory ailments such as asthma, or increase the risk of respiratory problems, as well as reduce visibility (EPA Victoria nd2).

Prescribing conditions for the disposal of fly ash in a hazardous waste landfill would provide a benefit, if it reduced the environmental risks associated with groundwater contamination from ash leachate.

However, incinerators equipped with modern technologies have the potential to produce relatively inert ash (CIF, sub. 71; US EPA 2006b). Regulations that do not distinguish between ash on the basis of its hazardous characteristics can, therefore, impose costs for little or no benefit. A possible example is the Queensland Environmental Protection Regulation 1998, because it prevents the use of inert fly ash in valued applications, such as road base (CIF, sub. 71; US EPA 2006b).

Other compliance costs can include the implementation of modern technologies to ensure that emissions are below specified concentration levels. This involves very large capital costs (chapter 4).

Enforcement of environmental quality objectives — both air emissions standards and ash requirements — may be quite costly, as detailed monitoring and reporting are likely to be required. However, such enforcement seems appropriate.

Likely future developments

In Australia, some energy-from-waste processes have had great difficulty being approved due to an anti-incineration mindset. The memory of some of the dirty incinerators of yesteryear persist. However, several inquiry participants revealed that there is interest in revisiting this issue. The BRSD (trans., p. 90) observed there will be some circumstances where energy-from-waste processes provide the most economic and sustainable solution to waste disposal. The Packaging Council of Australia (sub. 67, p. 13) suggested there are times when energy recovery is both cost-effective and environmentally efficient.

In addition, the introduction of a guide produced by the WMAA, Energy from Waste Division should help address concerns and facilitate a more informed debate within the community about energy-from-waste processes (box 8.8). The energy-from-waste guide was introduced to help operators determine:

> i) whether the materials in question are suitable for [energy] conversion
>
> ii) whether the immediate impacts of the conversion activity are acceptable: that is, will the benefits be optimised and the disbenefits minimised or eliminated? (WMAA, Energy from Waste Division, sub. 82, att. 1, p. 2)

Box 8.8 Sustainability guide for 'energy-from-waste' practices

The sustainability guide was developed by the WMAA, Energy from Waste Division. The guide provides a basis for determining whether materials are suitable for conversion to energy, and whether the immediate impacts of the conversion activity provide a net benefit. The guide outlines when it is appropriate to use materials for energy-from-waste purposes through an 'assessment roadmap'. The roadmap involves asking the following series of questions:

- Is an energy-from-waste process the best use of material?
  – Should consider life-cycle analysis, materials flux analysis, risk assessment and benchmarking.
- If yes, then can optimum conversion be achieved?
  – Should consider feedstock characterisation, conversion pathways and site characteristics.
- If yes, then are environmental outcomes adequately controlled?
  – Should consider pre-treatment or fuel preparation, site availability and selection.
- If yes, then are social outcomes adequately controlled?
  – Should consider emissions to air, land or water, traffic issues, odour, dust and other issues.
- If yes, then is the delivery of commitments certain?
  – Should develop compliance criteria (such as ISO standards, national pollutant inventory emissions or triple bottom line) and monitor progress with audits.
- If yes, then can the commercial interface be managed?
  – Should demonstrate that the structuring of the project to achieve commercial viability does not compromise the environmental and social outcomes.

Source: WMAA, Energy from Waste Division (2004) (attachment to sub. 82).

The WMAA, Energy from Waste Division prepared this guide because it was concerned that fractions of solid waste that are potential sources of energy and have no further practical value for reuse, recycling or reprocessing — were being lost to landfill disposal (sub. 82, att. 1).

Other energy-from-waste processes are limited by regulatory impediments in some jurisdictions. For example, the cement industry uses some waste materials as an alternate energy source, yet noted there are regulatory impediments that restrict energy recovery for certain materials. In particular, the Cement Industry Federation, (sub. DR174) claimed that the use of waste oil was distorted by the differential subsidy rates under the Product Stewardship for Oil Program (appendix C). Different regulation across states and territories regarding the use of tyres and carbon dust in cement kilns is also a problem. In some jurisdictions, these materials are deemed as hazardous and prohibited from use, while in others, they are not classified as hazardous and can be used (CIF, trans., p. 62).

Regulatory restrictions that do not allow energy-from-waste processes to compete on a level playing field, and that are not otherwise addressing valid concerns, need to be reconsidered (chapter 12).

With appropriate design and pollution controls, energy-from-waste processes can be managed so there is only a negligible environmental impact. Although energy-from-waste processes are costly, they can provide benefits by displacing electricity generated from fossil fuel. In addition, an energy-from-waste facility can have lower greenhouse gas impacts compared with a landfill without gas capture (chapter 4).

Community opposition to energy-from-waste is symptomatic of a broader problem discussed throughout this report, that being that community attitudes to particular waste policy issues have often been influenced by incomplete or inaccurate information on the relevant risks, costs and benefits. The Commission considers that there is a clear role for Australian governments in correcting ill-informed community perceptions with regard to the costs and benefits of different waste disposal options, including the capture of energy from waste (see chapter 11 for more detailed discussion).

FINDING 8.4

Modern, efficient, well-regulated energy-from-waste facilities have proven to be a satisfactory means of disposing of some non-hazardous waste in many advanced economies. In theory, Australian regulation does not completely preclude energy-from-waste facilities but, in practice, strong community and political opposition has, to date, prevented appropriate consideration of this disposal option.

8.6 Litter and illegal dumping

Litter refers to waste that is improperly disposed of outside the regular disposal system. Littering usually involves small quantities of waste such as plastic bags, cigarette butts and cigarette packaging, and chewing gum. Illegal dumping, on the other hand, is a deliberate act of disposal, and usually involves relatively large quantities of waste. Regulations relating to litter and illegal dumping raise similar issues and so are considered jointly in this chapter.

This section discusses the issues relating to general anti-litter regulation and analyses the foreshadowed regulatory response to a particular source of litter — plastic shopping bags.

General regulation

All states and territories have litter regulation — either through explicit litter legislation or litter provisions within environmental protection legislation — administered and enforced by environmental authorities and local councils. Illegal dumping is regulated through environmental protection legislation. While state or territory regulation tends to cover commercial quantities of illegal dumping, local councils impose penalties on smaller-scale, local dumping. For example, in Queensland, dumping more than 20 litres of waste is unlawful under the Environmental Protection (Waste Management) Regulation 2000, while dumping less than 20 litres of waste is prohibited under relevant local government rules.

Typically, litter and illegal dumping regulation prohibits depositing waste into or onto land or waters in a public place or an open private place (includes littering from a vehicle). The regulations also prescribe penalties for such practices. For example, in the Northern Territory, persons found littering may be fined $2000 under the *Litter Act 1999*. While penalties are typically imposed on the persons littering or dumping the waste, land owners with knowledge of dumping may also be held liable and fined.

Such regulation can provide benefits through a decrease in the amount of litter and dumped waste, and reduce adverse impacts on health and safety, wildlife and visual amenity (chapter 4). However, enforcement costs may be large, as it is hard to determine who is responsible for a particular infringement.

Over time, litter and illegal dumping regulation has increased. In addition, there has been an increase in the amount of enforcement. For instance, in New South Wales, there has been a large increase in the number of fines issued, from fewer than 800 in 1999 to around 8700 in 2003-04 (DEC 2004c). In Victoria, the number of infringement notices grew from around 4700 in 1998-99 to around 18 200 in 2004-05 (EPA Victoria 2005a).

However, EPA Victoria (2005b) claimed the amount of littering and illegal dumping is not declining, despite the increase in regulation and enforcement. Litter and illegal dumping are significant problems and impose large costs. In Western Australia, it is estimated that $16 million is spent on countering litter and illegal dumping each year (Department of Environment WA 2005b). In New South Wales, a $6 million illegal dumping package was introduced in 2002, with on-the-spot fines for illegal dumping doubling for individuals and more than tripling for corporations. (EPA NSW 2003c). Additional resources may be introduced in the future in New South Wales, because it is anticipated that dumping will increase as landfill levies rise (*Daily Telegraph*, 17 February 2006, p. 3).

Studies on the effectiveness of litter and illegal dumping regulation conclude that regulation and other related policies need to take account of local conditions in order to change behaviour and reduce the amount of littering and dumping. For instance, a study in New South Wales concluded that litter and dumping interventions 'will be effective when strategies fit the characteristics and circumstances of the various public place activities associated with different sites' (BIEC 1999, p. 6). In this regard, EcoRecycle Victoria found that an educational program called 'bin it or swim in it' has been effective in reducing litter in the water in Port Phillip Bay (EcoRecycle Victoria 2005c).

Inquiry participants also noted that littering and illegal dumping is partially a behavioural issue. The Packaging Council of Australia (sub. 67, p. 35) stated that 'people are less likely to litter in places where there is no rubbish on the ground already.' Similarly, EcoRecycle Victoria noted 'it is well recognised that litter creates more litter' and 'positive messages are more powerful and effective' than regulatory responses (EcoRecycle Victoria 2005c).

Therefore, it appears that regulation that is generally targeted at reducing littering and illegal dumping is likely to be more effective when it is coupled with additional measures. Examples of such measures can include: educational programs; the provision of adequate infrastructure (appropriate bins and associated servicing); industry involvement (providing information about disposal on containers); and community involvement (use of enforcement hotlines and clean up programs). For example, in the City of Greater Dandenong in Victoria, regulation, in combination with litter patrols and the use of high visibility black and yellow markings on dumped materials, led to the removal of the majority of dumped materials within 72 hours (MAV, sub. 113). Chapter 11 provides examples of public education campaigns in targeting littering behaviour. The Commission supports government provision of education and moral suasion measures targeting littering behaviour, provided the information is accurate and relevant, is likely to be under-supplied by private markets, and can be delivered at a relatively low cost.

FINDING 8.5

Regulation and enforcement for litter and illegal dumping are necessary but not sufficient to achieve the best result for the community. Accompanying measures, such as education, community involvement and moral suasion, can make regulation more effective.

Foreshadowed phasing out of plastic bags

The Commonwealth, State and Territory Governments have jointly announced a goal to phase out plastic bags by the end of 2008 (EPHC 2005e). They have yet to decide how this would be implemented, but it appears that a phase out would apply to plastic retail carry bags, with possible exemptions for purposes such as in-store packaging of bread, fruit and meat.[7] This section outlines the case for government intervention, assesses the results of recent bag-reduction efforts, and identifies the resulting lessons for policy makers.

The case for government intervention

The key rationale for reducing plastic retail carry bags is that they can be a particularly undesirable source of litter. Specifically, plastic-bag litter:

- can be highly visible and long lasting, since plastic bags easily become airborne, are moisture resistant, and take many years to decompose; and
- has the potential to injure or kill wildlife, particularly in the marine environment through ingestion or entanglement.[8]

Government intervention to reduce plastic-bag litter could be justified if, as seems likely, it is a 'public good'. That is, litter reduction would be undersupplied by private parties because 'free riders' cannot be excluded from enjoying the benefits. Or alternatively, litter is oversupplied because litterers cannot always be made to pay for the costs they impose on others.

Other concerns — such as a scarcity of landfill space and natural resources — have also been mentioned as reasons to reduce plastic bags. However, these do not

7 The term 'plastic retail carry bag' is used here to refer to a lightweight polymer carry bag provided at the point of sale for carrying and transporting retail goods.

8 The EPHC (2002) reported that plastic-bag litter on land does not appear to be a major problem for wildlife, despite reports that some cattle have died from plastic bag consumption.

appear to be a sound basis for government intervention. For example, plastic bags take up little landfill space, and their inert characteristics can actually help to reduce a landfill's potential for adverse environmental impacts:

> … plastic bag disposal to landfill is estimated at … roughly 0.2 per cent of total solid waste going to landfill each year in Australia [by weight].
>
> … the environmental impact of plastic bags in landfill is likely to be low due to their essentially inert or unreactive nature. It appears that plastic bags may have some landfill management benefits including stabilising qualities, leachate minimisation and minimising greenhouse gas emissions. (EPHC 2002, p. 11)

A report commissioned by the Australian Government found that the impact of plastic-bag litter on Australia's marine wildlife is very uncertain:

> Actual numbers of animals injured or killed annually by plastic-bag litter is obviously nearly impossible to determine. (Nolan-ITU 2002, p. 30)

Nevertheless, some have claimed that at least 100 000 animals are killed each year by plastic bags. For example:

> In the marine environment plastic-bag litter is lethal, killing at least 100 000 birds, whales, seals and turtles every year. (Planet Ark nd, p. 1)

Nolan-ITU (2002) noted such claims are based on a study conducted near Newfoundland (Eastern Canada) in the early 1980s. The National Association of Retail Grocers of Australia (NARGA, sub. DR266) observed that the study quantified the number of animals killed by fishing nets, not plastic bags. In particular, the study's authors stated:

> This paper reports on the catch of marine birds and mammals in fishing nets … We identify and discuss the key factors influencing net-mortality and those species most vulnerable to entrapment in active or discarded fishing gear (Piatt and Nettleship 1987, p. 344)

The authors concluded:

> Summer surveys of the incidental catch of marine birds and mammals in fishing nets around the east coast of Newfoundland indicated that over 100 000 animals were killed during a 4-year period (1981–1984). (Piatt and Nettleship 1987, p. 344)

The Commission asked several organisations that have been active on plastic-bag issues to help identify an alternative study that demonstrates that plastic-bag litter kills at least 100 000 animals every year. None of the organisations identified such a study.[9] Many parties have, however, highlighted case studies of individual animals that have come into contact with plastic litter. Such case studies rarely, if ever, isolate the impact of plastic bags from other potentially-harmful forms of plastic litter. Nor do the case studies measure how marine litter (let alone plastic bags) affects whole populations of a particular species (as opposed to individual animals).

The overall impact of plastic-bag litter on marine wildlife is likely to remain very uncertain because it is extremely difficult to measure how whole populations are affected. Laist (1997) summarised the measurement problems in an extensive review of research on animal entanglement in marine debris:

> Most animals vulnerable to entanglement are highly migratory … and tend to be scattered across wide ocean areas … When dispersed throughout their ocean ranges, animals are visible for only brief instances at or above the sea surface. The fleeting glimpses of wildlife afforded from the decks of ships or plane windows does not provide a reasonable opportunity to detect entangled animals … Moreover, animals that become entangled and die may quickly sink or be consumed by predators at sea, thereby eliminating them from potential detection … As a result, most data on entangled animals at sea are opportunistic anecdotal records. When systematic sampling efforts have been attempted, small sample sizes have precluded statistically meaningful analyses.
>
> Most entanglement records have, therefore, been gathered by land-based observers examining animals that strand on beaches or congregate seasonally on shorelines … Reliance on such land-based sampling, however, introduces a number of common sampling biases … Most important, live entangled animals returning to shore include only those survivors entangled in debris light enough or close enough to shore to allow them to swim or fly to land. (Laist 1997, pp. 100–1)

Nevertheless, his extensive review of the evidence suggests that, while significant amounts of marine debris may come from land-based sources, fishing is the principal source of items hazardous to marine wildlife:

> The types of marine debris most commonly associated with entanglement are fishing nets, monofilament line, lost crab traps and fish pots, rope, and strapping bands. The greatest source of this material is commercial fishing operations, although cargo vessels, recreational fishing, and land-based sources also may be significant contributors …
>
> Because of the predominance of fishing-related debris in entanglement incidents, source-reduction efforts should focus on incorporating new management measures into

9 Some parties have cited a literature review by David Laist (1997) as the source for a similar claim that plastic marine debris (not just plastic bags) kills over a million birds and 100 000 marine mammals and turtles each year (for example, MCS 2006). However, he did not make such a finding. The Commission also confirmed with David Laist that he had not made such a finding in any other research.

> fishery management programs to avoid losses and to increase recovery of such items. (Laist 1997, pp. 117–8)

Thus, it appears that efforts to protect marine wildlife would be more effective if they put greater emphasis on the risks associated with fishing-related debris.

Reflecting the above-mentioned measurement difficulties, the Threatened Species Scientific Committee (2003) advised the Australian Government it was unable to find sufficient evidence that marine debris — which can include many things other than plastic bags — would cause a species to become extinct, endangered or vulnerable. However, the Committee did find that twenty species already considered to be endangered or vulnerable were adversely affected by marine debris. This led to the listing of 'injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris' as a 'key threatening process' under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth).

FINDING 8.6

Plastic-bag litter has the potential to injure marine wildlife, including endangered species. However, claims that at least 100 000 animals are killed each year by plastic-bag litter are not supported by evidence. Such claims appear to be based on the misinterpretation of Canadian research on the impact of fishing nets. Some have also misinterpreted case studies of individual animals that have come into contact with plastic debris (not just plastic bags) as being representative of the overall impact of plastic-bag litter. The true extent to which plastic-bag litter injures populations of marine wildlife, as opposed to individual animals, is likely to remain very uncertain because it is extremely difficult to measure.

Dealing with the litter problem

The (limited) available data suggest that measures to reduce plastic-bag litter will be more cost effective when tightly focused on the narrow circumstances where bags are likely to be littered, rather than targeting all uses of plastic retail carry bags. For example, research commissioned by the Australian Government estimated:

- only 0.8 per cent of plastic bags become litter;
- plastic bags account for 2 per cent of all litter items (by number)[10]; and

[10] More recent surveys conducted for Keep Australia Beautiful suggest this is an overestimate. The latest results show that 'light-weight carry bags' accounted for 0.7 per cent of all litter items by number in May 2006 (McGregor Tan Research 2006a).

- around 2 per cent (or $4 million) of annual expenditure on cleaning up litter is attributable to plastic bags (Nolan-ITU 2002).

Nevertheless, available estimates do suggest that, in absolute terms, plastic-bag litter is significant. A report prepared for the DEH estimated that Australians used about 3.9 billion HDPE retail carry bags in 2005 (Hyder Consulting 2006).[11] If 0.8 per cent of these were littered, it would equate to roughly 31 million plastic bags. This is essentially a guess and so should be interpreted with great care. NARGA (sub. DR266, DR269) noted there is no data to support the view that the littering-rate for plastic bags is as high as 0.8 per cent. NARGA (sub. DR269) also questioned widely-cited estimates by Nolan-ITU (2002) that, combined with estimates of bags removed in litter clean ups, imply that a net quantity of 40–60 million plastic bags are added to the environment each year:

> If it were true that a net 40–60 million plastic bags … entered the environment each year, there would be substantial numbers of plastic bags in every street. As these quantities of bags have been in use (and presumably littered to the same extent) for over 20 years, we are talking about an accumulation of over 1 billion bags on our streets [since plastic bags take many years to decompose].
>
> Where are they?
>
> We would suggest that there has been a gross overestimation of the number of bags littered, with both the figures used to estimate the number of bags entering the environment as litter and being removed from the environment in clean-up activities having no factual foundation. (sub. DR272, p. 4)

In any case, governments, retailers and community groups have already taken various initiatives on plastic retail carry bags. Among the measures that most directly target the litter problem are guidelines developed by governments for the management of plastic-bag litter at landfill sites and outdoor public places, such as recreational parks and shopping precincts (EPHC 2005c, 2005d). These are the locations where plastic-bag litter is most likely to occur (EPHC 2002; Nolan-ITU 2002).[12]

Other initiatives have tended to focus on reducing the use of plastic retail carry bags, particularly in supermarkets. The major supermarket chains adopted a code of

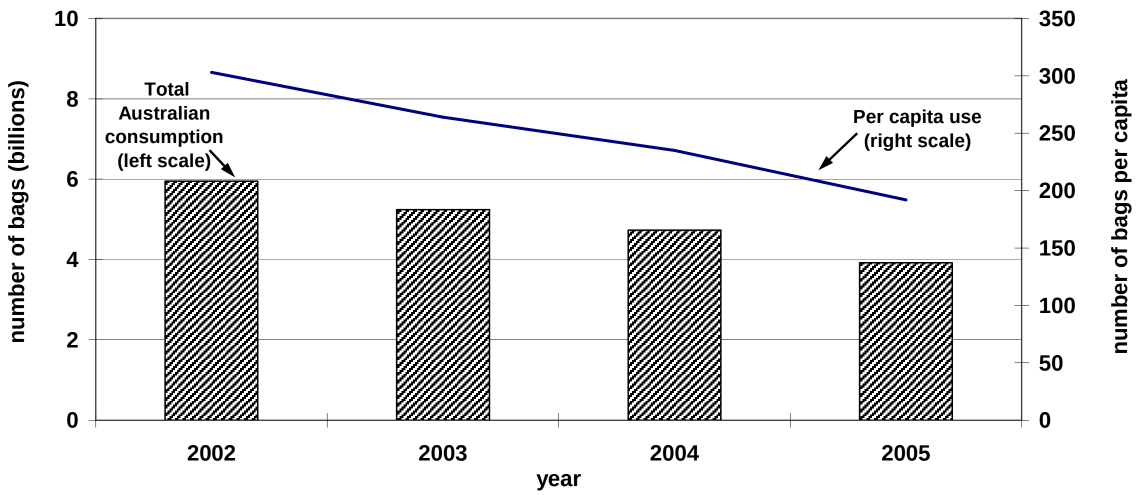
[11] HDPE retail carry bags — sometimes referred to as ‘singlet’ or ‘single-use’ bags — are typically provided by supermarkets at checkouts and appear to be the most common type of plastic retail carry bag. Nolan-ITU (2002) estimated that 90 per cent of all plastic retail carry bags issued in Australia were HDPE bags, with the remainder being mostly LDPE (low density polyethylene) retail carry bags, such as those provided by department stores.

[12] Nolan-ITU (2002) estimated that roughly 60 per cent of plastic-bag litter is linked to away-from-home uses, such as takeaway food consumed in public places. The remaining 40 per cent was attributed to inadvertent littering during waste management activities, such as from bins at shopping centres and from unloading at landfills.

practice and have spent over $50 million on plastic-bag initiatives (ANRA 2006, sub. DR207; ARA 2003, sub. DR211). Governments have encouraged shoppers to avoid using plastic retail carry bags and publicly supported retailers that stop supplying such bags. Marrickville Council (sub. DR151) noted it employs a ‘plastic-bag reduction officer’ to aid its efforts. Community groups have also been active in discouraging the use of plastic retail carry bags. A prominent example is the ‘say NO to plastic bags campaign’ run by Clean Up Australia (sub. DR185) and supported by retailers (ARA, sub. DR211).

Overall, efforts to date appear to have been very effective in reducing the number of plastic retail carry bags used. Available estimates indicate that the number of HDPE retail carry bags provided to consumers fell by about 34 per cent from 2002 to 2005 (figure 8.2). For supermarkets, an even greater reduction in HDPE bags has occurred, reflecting the current emphasis on supermarket bags. In particular, the major supermarket chains reduced the use of HDPE retail carry bags by 45 per cent from December 2002 to December 2005 (ANRA 2006).[13]

Figure 8.2 **Consumption of HDPE retail carry bags, 2002–2005**



Data source: Hyder Consulting (2006).

However, the significant decline in the use of HDPE retail carry bags does not appear to have translated into a fall in overall plastic-bag litter. According to the National Litter Index survey, the average number of littered plastic ‘light-weight carry bags’ in each state grew by 17 per cent from November 2005 to May 2006

13 The major supermarket chains have been criticised for not achieving a reduction target of 50 per cent by the end of 2005. However, that target was arbitrary, rather than being based on a thorough analysis of the costs and benefits to the community, and achieving it may have had little, if any, impact on plastic-bag litter, as indicated later in this section.

(McGregor Tan Research 2006a). That survey has only been conducted on a national basis since late 2005, and so longer-term data are unavailable for Australia as a whole. A longer time span is available from Clean Up Australia, which analyses a sample of the rubbish its volunteers collect each year. The number of ‘supermarket/retail' plastic bags found in its sampled rubbish collections grew by 40 per cent from 2002 to 2005. However, the share of such bags in total counted litter items grew less rapidly — from 2.0 per cent in 2002 to 2.2 per cent in 2005 (Clean Up Australia 2005).

There are various possible reasons why the large fall in the use of HDPE retail carry bags has not been reflected in litter statistics. These include:

- weaknesses in litter estimates[14]
- a significant increase in the rate at which plastic bags are littered
- most of the decline in HDPE-bag use has been for bags unlikely to be littered.

Given the education and publicity campaigns of recent years, it is unlikely there has been a significant increase in the rate at which plastic bags are littered. It seems more plausible that there are weaknesses in litter statistics and/or much of the decline in the use of HDPE retail carry bags has been for bags unlikely to be littered.

A major drawback of the National Litter Index survey is that results are so far only available for two points in time and these are only six months apart. In addition, there are large disparities in reported changes in plastic-bag litter between states, which raise doubts about the accuracy of the survey.[15] Clean Up Australia’s sampling of its rubbish collections may not provide a representative measure of litter at locations other than its clean-up sites. A potential problem for all litter surveys is that plastic bags can persist in the environment for many years, and so some of the counted bags could have been littered before the use of HDPE retail carry bags began falling. This would be less of an issue if the same sites were surveyed each year.

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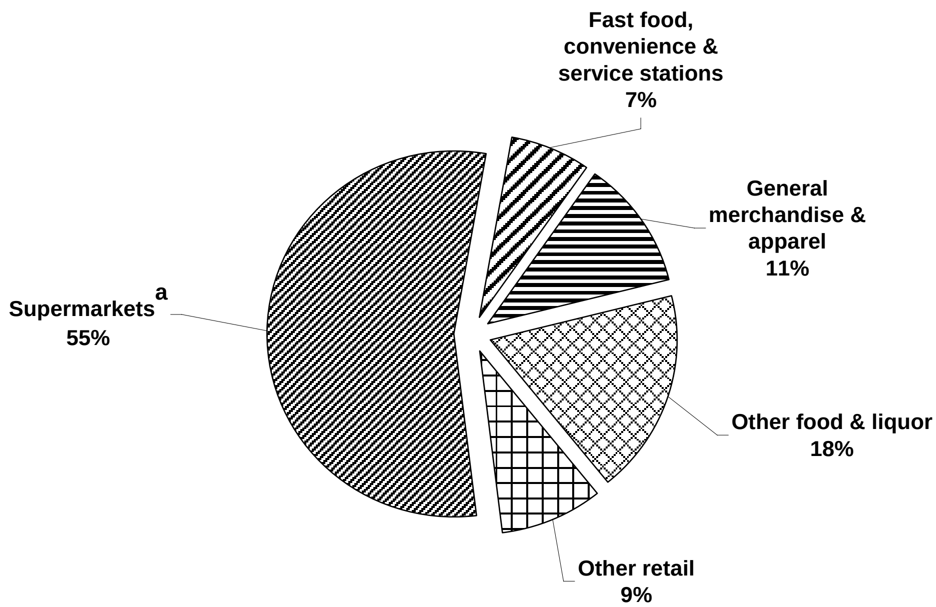
[14] Litter estimates are not as robust as counts of plastic bags issued by retailers. The estimated fall in HDPE bags issued by major supermarket chains should be reasonably accurate because it was audited as part of their code of practice (ANRA 2006).

[15] According to the state-level results of the National Litter Index survey, the number of littered plastic light-weight carry bags grew by 12 per cent in New South Wales from November 2005 to May 2006, compared to 103 per cent in Victoria, 36 per cent in Queensland, –9 per cent in South Australia, –34 per cent in Western Australia and –5 per cent in Tasmania. Additional data are available for South Australia, which show the count of littered light-weight carry bags declining by 39 per cent from August 2004 to May 2006 (KESAB 2005a, 2005b; McGregor Tan Research 2006b).

Much of the recent decline in the use of HDPE retail carry bags appears to have been for bags unlikely to be littered. Available estimates indicate that supermarkets accounted for around 74 per cent of the fall in the use of HDPE retail carry bags during 2002–2005 (Hyder Consulting 2006).[16] This reflects the current focus on supermarkets, which may seem appropriate because supermarkets are the largest single source of HDPE retail carry bags (figure 8.3).

Figure 8.3 **Consumption of HDPE retail carry bags by source, 2005**



[a] ANRA (2006) estimated the major supermarket chains now account for less than half of all HDPE retail carry bags, given that they reduced their supply of such bags by 45 per cent during 2003–2005.

Data source: Hyder Consulting (2006).

However, the likelihood of a supermarket bag being littered is probably very low because people mostly use them to carry goods to their homes. Bags supplied for away-from-home uses — such as takeaway food consumed in public places — could be much more likely to be littered. Clean Up Australia noted ‘most of the plastic bags that are coming in the litter stream are coming from the small retailers’ (trans., p. 796). Estimates by Nolan-ITU (2002) suggest that about 5 per cent of

[16] Hyder Consulting (2006) estimated that supermarkets issued 3.64 billion HDPE bags in 2002, out of a total national consumption of 5.95 billion HDPE bags, and issued 2.14 billion HDPE bags in 2005, out of a total national consumption of 3.92 billion HDPE bags. The authors stressed these estimates were derived from the views of bag manufacturers and were indicative only because there was no direct measurement of bag consumption from sources other than supermarkets.

plastic bags supplied for away-from-home uses are littered, compared to a negligible proportion of bags used to carry goods home.[17]

Prospective policy developments

The Commonwealth, State and Territory Governments are currently considering various policy options to achieve their goal of phasing out plastic bags by the end of 2008. These include ‘a ban, a government levy, advance disposal fee and a retailer’s charge on bags’ (EPHC 2006, p. 2).[18] The issues associated with these policies can be complex and governments have yet to demonstrate a strong case for any of the options.

A per-unit charge on plastic retail carry bags could be imposed at the level of bag producers, retailers or consumers, and the resulting revenue could be kept by bag producers, retailers or governments. The outcomes from these various approaches may differ markedly in practice. Policy makers seem to prefer a charge imposed on consumers because this provides the most direct price signal to bag users, but there is little evidence it would deliver a net benefit to the community.

Advocates of a per-unit charge on consumers often highlight Ireland’s experience with its plastic-bag levy. This was introduced in March 2002 at a rate of €0.15 per bag and is claimed to have reduced the proportion of litter that is plastic bags from 5.0 per cent to 0.3 per cent (and reduced plastic-bag use by at least 90 per cent) (Department of the Environment, Heritage and Local Government 2004). However, the claimed litter reduction appears to be exaggerated. A litter survey conducted for the Irish Government indicates that plastic shopping bags accounted for 0.75 per cent of litter items in the year before the levy was introduced, not 5.0 per cent (TES Consulting Engineers 2002).

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[17] This takes account of inadvertent littering of home-use bags at the waste disposal stage. Specifically, Nolan-ITU (2002) estimated that 20–30 million plastic bags (HDPE and LDPE) used to carry goods home were inadvertently littered during waste disposal, such as at landfills. This equated to roughly 0.3–0.5 per cent of the estimated 6.91 billion plastic bags consumed from all sources. Among plastic bags supplied for away-from-home uses, 30–50 million were estimated to be littered (both deliberately and inadvertently), which equated to 3.9–6.5 per cent of total plastic-bag consumption (the average of this range gives a littering rate of about 5 per cent).

[18] The latter three options differ because a government levy can be applied at either the wholesale or retail level, with the revenue going to government; an advance disposal fee is typically applied at the wholesale level (although retailers may pass the cost on to consumers) with the revenue going to an industry body to fund recycling and disposal initiatives; and a retailer’s charge is applied to consumers, with the revenue kept by retailers.

The impact of the Irish levy on plastic-bag use appears to be waning. The Irish Government informed the Commission that per capita use of plastic bags has grown by roughly a third since the levy was introduced.[19] Some have claimed that the levy has encouraged much greater use of paper bags, and these are more harmful to the environment than plastic bags (Cadman et al. 2005a, 2005b; CBC 2006b). There have also been claims that the levy encouraged increased theft at retail outlets, and that it has been difficult to monitor and enforce compliance by all retailers (CBC 2006a). NARGA (sub. DR269) claimed that UK exports of plastic-bag materials to Ireland have not fallen in recent years, which suggests that Irish consumers have replaced the plastic shopping bags they formerly reused (such as for bin liners) with other types of plastic bags.

The Victorian Government recently announced a per-unit charge on consumers that, unlike the Irish levy, would be kept by retailers.[20] In particular, retailers would be required to charge at least 10 cents per plastic bag at most points of sale from 1 January 2009 (DSE 2006b). The enabling legislation would come into effect if plastic bags are not phased out by the end of 2008 under the foreshadowed national approach (Thwaites 2006b). The Victorian Government has not released a cost–benefit analysis to support its proposed policy.

A ban on plastic retail carry bags also raises a number of difficult issues. It would inconvenience consumers, such as when they forget to take reusable bags to the supermarket.[21] Thus, reusable bags are not a perfect substitute for plastic bags. Furthermore, a ban could impose a financial cost on consumers:

> If plastic bags were replaced by alternatives, including degradable bags, the financial cost to the consumer would certainly increase. (EPHC 2002, p. 13)

Past research indicates that a large proportion — possibly as high as 75 per cent — of plastic shopping bags are reused for purposes such as bin liners and general carry

[19] This estimate should be interpreted with caution. It is based on levy revenue received by the Irish Government and could be affected by (a) recent strengthening of enforcement that has probably increased levy revenue; and (b) time lags between when retailers collect the levy and when the money is forwarded to the Irish Government. Nevertheless, the Irish Government intends to soon raise the levy to €0.22 to address concerns about the levy's waning impact.

[20] One of the reasons why the Victorian Government may have opted for a retailer's charge is that constitutional constraints prevent it from imposing a government levy.

[21] A survey of SA residents in 2005 found that, among people who did not frequently use reusable shopping bags, 59 per cent left them at home, 23 per cent left them in the car, and 15 per cent preferred plastic bags because they could reuse them for other purposes like bin liners (Harrison Market Research 2005).

bags (EPHC 2002).[22] Banning plastic retail carry bags would deny consumers this benefit. Instead, they are likely to purchase more plastic garbage bags, at additional financial cost to themselves. This could also counteract at least some of the anticipated environmental benefits from banning plastic retail carry bags.

Preliminary survey research by the Australian Retailers Association (ARA, sub. DR271) suggests that many smaller retailers would switch to providing paper bags at checkouts if a ban was imposed on plastic bags. Again, this could lead to unintended environmental costs. For example, the greenhouse gases emitted in producing a paper bag have been estimated to be around five times greater than those from producing a plastic bag (Allen Consulting Group 2006a).

A thorough assessment of a ban, or per-unit charge, would need to take into account the impact on consumers. As research for the Australian Government has noted, plastic bags provide a valuable service for shoppers:

> The current plastic shopping bag is well suited to its task — it is cheap, lightweight, resource efficient, functional, moisture resistant, allows for quick packing at the supermarket and is remarkably strong for its weight.
>
> … Plastic bags also currently perform an important task in product and food safety, keeping uncooked meat or cleaning products separate from other foods. (Nolan-ITU 2002, p. 4)

While some surveys claim to show high levels of public support for the elimination of plastic bags (for example, McGregor Tan Research 2003), the actions of consumers are a more reliable indicator of their preferences. Despite the widespread availability and promotion of reusable bags, consumers still used 3.9 billion HDPE retail carry bags last year (Hyder Consulting 2006).

A ban on plastic bags would also impose costs on retailers. These could include increased theft of goods and shopping trolleys, health and safety problems experienced by staff in handling contaminated and/or overladen reusable bags, and reduced operational efficiency at checkouts (which would also impose an increased cost on consumers in terms of queuing time) (ANRA, trans., pp. 808–9; NARGA, sub. DR194).

A further complicating factor is that some exemptions would probably have to be provided under a ban or per-unit charge, as occurs in Ireland. For example, health considerations provide a strong case for retaining the use of plastic bags to package

22 A survey of SA residents in 2003 found that 97 per cent had reused plastic bags recently, and that, on average, respondents had reused 75 per cent of their plastic bags. Around 87 per cent had reused plastic bags as bin liners, 75 per cent as general carry bags, 33 per cent as lunch bags, and 22 per cent for shopping (McGregor Tan Research 2003).

meat. The Victorian Government has already suggested it will exempt 'fresh produce' under its proposed per-unit charge (Thwaites 2006b). It has also indicated that small retailers may be exempt, which could mean that bags with the highest likelihood of being littered — those issued for away-from-home purposes — escape the charge, thus significantly reducing the likely environmental benefit.

Rather than a ban, some have suggested that biodegradable bags should replace current types of plastic bags. However, this is unlikely to reduce the rate at which bags are littered, and could even lead to worse environmental, social and financial outcomes:

> Currently a littered plastic bag can be removed from the litter stream in one piece (one action). A 'degradable' bag breaks down into many pieces and will be more difficult to recover and can, potentially, create more problems for land-based wildlife.
>
> At a practical level, the adoption of biodegradable bags will interfere with plastics recycling and, depending on the technology used, may not be up to the task of carrying wet or frozen products, or provide the right type of barrier properties when used to carry certain foods. Biodegradable bags also tend to require more energy to manufacture.
>
> A move to degradable bags will see an increase in the proportion of degradable material going to landfill, with implications for associated emissions …
>
> If degradable bags are introduced and promoted they would need to conform to a set of standards which would be beyond the average retailer to assess, leaving them, the public and the environment open to false claims of degradability. Degradable bags would also give government an enforcement problem. (NARGA, sub. DR269, p. 27)

Similar concerns were expressed by Nolan-ITU (2002). It concluded that widespread use of biodegradable materials as an alternative to the current plastic retail carry bag may not deliver an overall environmental benefit.

Quantification of costs and benefits

At the time of writing this report, the RIS for the foreshadowed national approach on plastic bags was not publicly available. However, the EPHC had released a cost–benefit study intended as an input to the RIS. That study — prepared by the Allen Consulting Group (2006a, 2006b) — considered eleven policy options and found all of them would impose a large net cost on the community (table 8.2).

It could be argued that the Allen Consulting Group was too pessimistic in its assessment of cost increases. For example, a ban on plastic bags from the start of 2009 was assumed to generate a one-off cost for retailers — largely due to increased theft and additional staff training — of $187 million, and extra ongoing costs — due to increased transaction times and administration — of $60 million per annum. But retailers already train their staff and some have modified their checkouts to deal with the use of alternatives to plastic bags. Furthermore, there is little evidence on the extent to which retail theft increases as a result of constraints on plastic-bag use.

Table 8.2 **Allen Consulting Group's assessment of potential HDPE-bag policies, 2005–2016[a]**

Policy option	*Litter reduction*	*Benefit*	*Cost*	*Net impact*[b]
	millions of bags	$m	$m	$m
Ban HDPE retail carry bags from start of 2009	361	218	1057	–839
Wider adoption of (ARA 2003) code of practice[c]	233	156	646	–490
Escalating charge[d]	418	266	1293	–1027
Voluntary phase out to 2009, mandatory beyond[e]	422	271	1093	–823
Advance disposal fee[f]	301	181	768	–586
Minimum price regulation[g]	361	218	1035	–817
Government levy[h]	313	189	900	–711
New code of practice with high retailer adoption[i]	111	170	562	–392
New code of practice with modest retailer adoption[j]	102	154	430	–276
Progressive target with high adoption by retailers[k]	148	93	799	–706
Progressive target with modest adoption by retailers[l]	134	84	535	–450

a Impacts are the cumulative effect over a 12-year period (2005–2016 inclusive) and are measured relative to a base case of 'no further government action' that includes retailers no longer following their (ARA 2003) code of practice. Financial estimates are expressed in net present value terms using a discount rate of 7 per cent. **b** Net impact may differ slightly from the benefits less costs shown in the table due to rounding. **c** All large retailers and 50 per cent of other retailers reduce HDPE retail carry bags by 50 per cent (relative to 2002). **d** A per-bag charge set at 5 cents from the start of 2007, increased to 15 cents in 2008 and 25 cents in 2009. **e** Voluntary phase out by the end of 2008 in accordance with a new agreement between retailers and the EPHC, and a mandatory ban for all retailers thereafter. **f** Regulated fee of 2 cents per HDPE retail carry bag on retailers from the start of 2009 to recover the cost of cleaning up 40 million littered retail carry bags per annum. **g** Retailers required to charge at least 25 cents per HDPE retail carry bag from the start of 2009. **h** A 10 cent charge per HDPE bag is paid by consumers at the point of sale from the start of 2009 (comprising a government levy of 7 cents per bag and explicit cost recovery by retailers of a further 3 cents per bag). **i** All retailers with an annual turnover of more than $5 million achieve a 50 per cent reduction in HDPE retail carry bags by the end of 2006 (relative to 2002), and switch to biodegradable material for remaining plastic bags thereafter. **j** Major retailers achieve a 50 per cent reduction in HDPE retail carry bags by the end of 2006 (relative to 2002), and switch to biodegradable material for remaining plastic bags thereafter. In addition, 25 per cent of other retailers match the actions of major retailers by the end of 2009. **k** All retailers with an annual turnover of more than $5 million achieve a 50 per cent reduction in HDPE retail carry bags by the end of 2006 (relative to 2002). In the following 5 years (2007–2011), they reduce HDPE retail carry bags at an annual rate of 10 per cent. HDPE retail carry bags are maintained at their 2011 level thereafter. **l** All major retailers and 25 per cent of other retailers achieve a 50 per cent reduction in HDPE retail carry bags by the end of 2006 (relative to 2002). In the following 5 years (2007–2011), they reduce HDPE retail carry bags at an annual rate of 10 per cent. They maintain their supply of HDPE retail carry bags at the 2011 level thereafter.

Source: Allen Consulting Group (2006a, 2006b).

However, any overstatement of costs is likely to be more than outweighed by an apparent overstatement of benefits. The Allen Consulting Group (2006a, p. ix) acknowledged its results were based on a 'generous treatment' of environmental benefits. Specifically, it assumed the *total* environmental benefit from removing a plastic bag from the environment ($1.00 per bag) was fifty times greater than its own calculations indicated was the case ($0.02 per bag).[23] It could be argued those calculations overlooked some benefits, but this is unlikely to justify an upward adjustment of fifty times. Thus, it appears the reported net impacts are overly optimistic, and the net cost of each policy option would actually be many times worse than indicated.

The key reason why the policy options would not deliver a net benefit is that they are poorly targeted. They would penalise most uses of plastic retail carry bags, whereas the potential environmental benefit only comes from the less than 1 per cent of bags that are littered.

In summary, plastic-bag litter is a complex issue. The current emphasis on reducing the largest source of HDPE retail carry bags (supermarkets) has led to a big reduction in the use of such bags, but seems to have had little impact on plastic-bag litter. This, combined with the small proportion of plastic bags that are littered, suggests a widely-applied ban or per-unit charge on plastic retail carry bags, with emphasis on larger retailers, would not deliver a net benefit to the community. The cost–benefit study commissioned by the Australian, State and Territory Governments confirms this, even when the environmental benefits are assumed to be fifty times greater than available evidence suggests. Nor is a shift to biodegradable bags likely to deliver a net benefit, since such bags tend to be more costly, do little to change littering behaviour, and can have worse environmental impacts than existing plastic bags. Governments should therefore consider a policy approach that more directly targets the littering problem, rather than seeking to eliminate plastic bags or substitute them with a biodegradable alternative.

FINDING 8.7

Based on the evidence available to the Commission, it appears that the Australian, State and Territory Governments do not have a sound case for proceeding with their proposed phase out of plastic retail carry bags. Similarly, there does not appear to be a sound basis for the Victorian Government's proposed per-unit

23 The $0.02 benefit per bag was derived by valuing the time that volunteers had contributed to removing plastic-bag litter during Clean Up Australia day in 2005 (based on average post-tax weekly earnings). The Allen Consulting Group (2006a) noted this measured the total environmental benefit on the assumption that clean-up volunteers were concerned about all impacts of plastic-bag litter. The alternative approach of asking people their willingness to pay for environmental improvements was considered unreliable because (a) there can be an expectation that governments will pay (or individuals will be charged), thus encouraging people to overstate (or understate) their willingness to pay, and (b) litter reduction can be a 'public good', providing an incentive for some to 'free ride' on the efforts of others.

charge on plastic bags. A cost–benefit study commissioned by the Governments shows that the benefits of a phase out or a per-unit charge would be significantly outweighed by the costs. This is because the policies would penalise most uses of plastic retail carry bags, whereas the potential benefit would only come from the small proportion of bags that are littered. A more cost-effective approach would be to target littering directly.

RECOMMENDATION 8.5

To help ensure governments adopt the best policy approach on plastic bags, the Environment Protection and Heritage Council should include the following in its forthcoming regulation impact statement:

- ***a clearly-specified objective to reduce plastic-bag litter in a way that maximises the net benefit to the community;***
- ***a comprehensive review of evidence on the environmental impacts of plastic-bag litter;***
- ***a thorough evaluation of recent initiatives to reduce plastic bags in Australia, including consideration of why the large reduction in supermarket plastic carry bags in recent years appears not to have translated into an environmental improvement;***
- ***assessment of an alternative policy approach that, rather than targeting supermarkets or most uses of plastic carry bags, involves a combination of:***
  - ***strengthened litter-reduction policies, such as education, enforcement of litter laws, and containment with litter traps and other infrastructure; and***
  - ***measures focused directly on away-from-home sources of plastic-bag litter, including measures that target plastic-bag litter entering marine and riverine environments.***

9 Market-based instruments

Key points

- A wide range of market-based instruments has been utilised in waste management policy in Australia, including landfill levies, advance disposal and recycling fees, deposit-refund schemes, and subsidy schemes.
- Landfill levy schemes are one of the major instruments in waste management policy. Landfill levies are currently being used to pursue objectives such as landfill diversion targets and generating revenue to fund waste policies. This approach is likely to result in net costs to the community.
- The case for using landfill levies to address environmental externalities is weak. The residual externalities after complying with modern landfill regulation are small, limiting the scope for applying levies without duplicating regulation. Also, the externalities vary significantly according to waste type, location of disposal, and the type of landfill facility, making it difficult to set levies to suit individual circumstances.
- Most householders currently pay a flat annual waste disposal fee and, hence, receive only weak price signals about their waste disposal activities. Introduction of low-cost variable charging systems for municipal waste disposal and resource recovery should be considered.
- Advance disposal or recycling fees could promote more efficient disposal or recycling of some products. However, there are considerable difficulties in setting such fees at correct levels. The schemes may be justified for products associated with a high risk and cost of illegal disposal.
- Deposit-refund schemes are typically costly and can only be justified for products that have a high cost of illegal disposal. They are not warranted in the case of beverage containers.
- Subsidy schemes that directly address market failures in recycling, and research and development, are warranted where they result in a net benefit to the community. Subsidising consumer purchasing of goods with recycled content is not supported.
- It is currently not clear what purpose tradeable property rights mechanisms would serve in waste policy. Such mechanisms can be useful means of achieving targets cost-effectively. However, developing optimal waste disposal and resource recovery targets is practically impossible, and enforcing arbitrary targets can impose large costs on the community.

This chapter examines the issues associated with the deployment of market-based instruments in waste management policy. Such instruments utilise market mechanisms to influence parties to act in ways that will help to achieve policy objectives, such as correcting externalities. The instruments can generally take one of two forms:

1. *Financial incentives* — these instruments internalise the externality by altering the prices faced by relevant parties. Financial incentive instruments can involve the use of levies, taxes or charges to target the external costs, or the use of subsidies to target the external benefits of certain actions.
2. *Tradeable property rights* — these instruments impose a quantitative limit on the level of a particular activity and apportion tradeable rights for the shares within that limit to individual parties.

Historically, most of the focus of waste management policy in Australia and overseas has been on financial incentive instruments. More recently, there has been some interest in the application of tradeable property right instruments to waste management.

9.1 Landfill levies

Levies on waste going to landfill are a widely-used policy instrument in Australia. All Australian mainland states, with the exception of Queensland, have introduced some form of levy on landfills, over and above the normal gate fee imposed by the landfill owner, although the levels of the levy vary significantly across jurisdictions (table 9.1).

Table 9.1 **Australian landfill levies in 2006**

Location	*Type of waste*	*NSW*	*VIC*	*WA*	*SA*
		$/tonne	$/tonne	$/tonne	$/tonne
Metropolitan	Municipal	22.70	7	3	10.80
	C&I and C&D[a]	22.70	11	1	10.80
Rural	Municipal	15	5	0	5.40
	C&I and C&D	15	9	0	5.40

[a] Commercial and industrial and construction and demolition waste.

Sources: DEH (sub. 103); WMAA, NSW Branch (sub. DR150).

In theory, the imposition of a levy on landfill can result in efficient outcomes. Where disposal of waste to landfill generates negative externalities, imposing a tax on disposal equal to the value of those externalities would force the landfill users to face the full cost of disposal. This would encourage a reduction in waste disposal to efficient levels. The size of the reduction would depend on the costs to landfill users of other options for dealing with the waste. The less costly it is to switch to alternatives to landfill disposal, the more responsive the demand for landfill will be to increases in price. Regardless of the degree of responsiveness, provided users face the *correct* price of landfill disposal, the resulting level of disposal will be one that maximises net benefit to the community.

In practice, however, there are considerable challenges in implementing such a landfill levy scheme. These are discussed below.

Setting an appropriate objective

In order to address the market failure associated with landfills, a landfill levy should reflect the external costs that are imposed on the community from landfilling waste. No jurisdiction currently uses landfill levies explicitly to internalise those externalities. Internalising the externalities of disposal may have been the intention in the past in some jurisdictions, such as New South Wales. In that state levies were reset in 1997, apparently to reflect the external costs of landfill disposal (BDA Group and EconSearch 2004). However, that connection has been subsequently lost.

The Department of the Environment and Heritage (DEH) observed:

> Economic arguments are often used to justify levies, but in practice tend to be the least important factor motivating the establishment and quantum of levies. (sub. 103, p. 50)

Examination of various state policy documents as well as submissions received by the Commission reveals that levies are currently used primarily to achieve landfill diversion targets, and to generate revenue for government.

Using levies to achieve waste diversion targets

Most of the states have set targets for diverting waste from landfill (chapter 7). Following the introduction of a landfill levy in some states, the size of the levy has been calibrated with reference to progress in achieving waste diversion targets. For example, the WA Government (2005b, p. 6), in discussing a proposed increase in the levy, stated:

> Striking the right balance [in setting levies] is important if we are to achieve the targets set for reductions in waste to landfill …

In Victoria, the decision to have a higher levy rate for commercial and industrial waste appears to have been driven by the objective of reducing the size of that waste stream (BDA Group and EconSearch 2004).

Some jurisdictions have used landfill levies as a means of improving the relative financial attractiveness of other options for treating waste. For example, the Department of Environment and Conservation (New South Wales) (DEC) stated that the recent decision to increase the landfill levy from $22.70 to around $57 by 2012:

> … was deliberately aimed to give a leg up to the kind of technologies that will help achieve the state's waste targets … The amounts involved are very close to the amounts that industry had put to us that were necessary to overcome obstacles to the introduction of the technologies and the solutions the government wanted to see put in place. (trans., p. 444)

Estimates prepared by the Business Roundtable on Sustainable Development (sub. 70) suggest that increasing the levy in New South Wales could provide a significant financial benefit to recycling operators ($120 million between 2006-07 and 2010-11).

The WA Government also supported the idea of using levies to encourage resource recovery:

> A levy set too low (as at present) fails to provide sufficient financial incentive to invest in waste avoidance and resource recovery activity. (2005b, p. 6)

Using levies to generate revenue

In Victoria, South Australia and Western Australia, landfill levies are often justified as a mechanism for funding government waste management programs. For example, the Department of Environment (Western Australia) stated:

> … while a landfill levy may act as a moderate disincentive for disposal to landfill in some circumstances e.g. for Construction & Demolition waste, its main benefit is to raise revenue to support waste reduction initiatives. (sub. 101, p. 5)

In New South Wales, the landfill levy is a non-trivial source of government revenue. In 2004-05, the NSW Government received $104 million from levy payments. The revenue is projected to grow significantly in the future, reaching $309 million in 2009-10 (NSW Treasury 2006).

The DEH (sub. 103) stated that the reasons for introducing landfill levies include collection of funds to directly support recycling and contribute to the state's general revenue.

Consequences of setting the wrong objective

The Commission considers that using levies to reach selected landfill targets, or to generate revenue, is incompatible with the desired objective of internalising the externalities of waste disposal to landfill.

Using a levy to achieve a specific diversion target fails to take account of the relative benefits and costs of waste disposal to landfill, and of the various landfill diversion options. There is a strong risk that this approach would impose net costs on the community. Similarly, a levy that aims to bridge the cost differential between landfill and other disposal options, without a thorough assessment of the economic costs and benefits of the different options, is unlikely to generate a net community benefit. With regard to the increase in the New South Wales landfill levy, Collex argued:

> The level of the NSW waste levy now bears little relationship to the economic, social and environmental costs associated with waste management. It already generates more revenue than is spent on dealing with waste management issues. At the new rate, the surplus revenue will be substantial indeed. (sub. 80, p. 19)

A further consequence of this approach may be the generation of some perverse outcomes. One of these is increased illegal disposal. Where the price of landfill is high (and increasing strongly), as in New South Wales, the incentive for illegal disposal would be substantial. The Business Roundtable on Sustainable Development (trans., p. 96) argued that increasing the levy in New South Wales to drive reductions in waste generation by the commercial and industrial sector (which has a low volume responsiveness to price) has resulted in increased illegal disposal. Peter Carroll (trans., pp. 1101-02) claimed that increases in the landfill levy in Victoria have resulted in significant growth in illegal disposal, particularly in rural areas.

The risk of illegal disposal is greatest when landfilling is the only available option for waste generators and disposers. For example, asbestos is no longer produced or used in Australia, and it cannot be recycled. Hanson Landfill Services (sub. DR125) noted that the high levy imposed in Victoria on disposal of asbestos waste to landfill ($26 per tonne) discourages decontamination of sites, and encourages disposers to illegally dump asbestos, or to hide it among other waste going to landfill.

High levies could also encourage costly avoidance behaviour. The Waste Contractors and Recyclers Association of New South Wales (trans., pp. 913-14) gave an example of transfer stations and recycling centres in New South Wales transporting waste a considerable distance to unlicensed landfills that were not subject to the levy. The financial incentive also appears to be discouraging some recycling. The Australian Council of Recyclers (sub. 40, p.10) argued that the higher levies in metropolitan areas could make recycling of cars from rural areas financially unattractive compared to sending the car to a local unlicensed (and hence, unlevied) landfill. This would be because the shredder floc left after recovering materials from the car in Sydney, for example, attracts the landfill levy while disposal of the whole car to an unlicensed rural landfill attracts no levy.

With regard to the revenue-raising objective of landfill levies, general revenue-raising mechanisms are likely to be less distortionary and less costly to administer. Further, if a levy exceeds the full external cost of waste disposal, as it almost certainly will in New South Wales, there will be equity concerns about taxing waste disposers to fund government activities.

A number of participants supported landfill levies on the grounds that they could raise funds for waste management programs (for example, WMAA, New South Wales Branch, sub. DR150; Western Australia Waste Management Board, sub. DR208). However, there are unlikely to be any efficiency grounds for hypothecating (earmarking) the revenue from the landfill levy to waste programs. Hypothecation may be desirable if there is a close connection between the source of funds and their subsequent use, so that the levy effectively constitutes a payment for services received. One example is the funding of road repairs and maintenance from the fuel excise paid by truck operators.

However, the link between a levy on landfill disposal and broader waste management programs run by governments is weak. If anything, the size of the levy should reflect the cost of landfill externalities, and not the funding requirements of broader waste-related policies. On the other hand, the funding allocated to particular government programs should reflect the community benefit of those programs and not the revenue generated by the landfill levy. The Commission considers that sourcing the funds for waste management policy programs from general revenue is likely to generate better outcomes.

Challenges in setting the levy at the correct level

There are significant practical difficulties in setting the levy to internalise the externalities of landfill disposal. A landfill levy is poorly suited to accounting for the variability in externalities arising from the different waste types and circumstances of disposal. The costs to the community of landfill disposal depend on the:

- geographic location of disposal
- type of landfill facility
- type of waste.

In order to accurately reflect the externalities of disposal, the landfill levy would need to vary to account for the above factors.

Currently, all of the jurisdictions charge different levy rates for landfill disposal in rural and urban areas. However, none have explicitly linked these differences to differences in externalities. In Victoria, the reason for this difference appears to be a lack of resource recovery options in rural areas (BDA Group and EconSearch 2004).

None of the jurisdictions vary their levy rates on the basis of the type of landfill facility. This disregards any differences in the technologies and practices adopted by different landfill operators, and the associated differences in the external costs of landfill disposal. Consequently, landfill operators receive no price signal with regard to the actual environmental performance of the landfill, and have little incentive to improve that performance. For example, Collex argued that their bioreactor landfill in New South Wales:

> … [is] less polluting and therefore particularly disadvantaged by the current levy arrangements … Higher gate fees associated with higher environmental standards, effectively internalise what might have been externalities in the past. The levy does not provide any incentive to improve environmental performance, but could even be considered to penalise it. (sub. 80, p. 9)

Some of the schemes allow for limited variability in rates for different waste types. In Victoria, different levies apply to municipal and non-municipal, non-hazardous, solid waste. However, in that state, the levy for construction and demolition waste is greater than for municipal waste, despite the fact that construction and demolition waste is typically associated with lower disposal externalities (chapter 4). In Western Australia, different rates are charged for municipal and non-municipal waste, although the WA Government (2005b) has proposed to align those rates by 2009. In contrast, New South Wales and South Australia charge a flat levy for all non-hazardous solid waste.

Introducing substantial variability into the landfill levy to reflect externalities is likely to significantly increase administrative costs. Cost increases are likely to be exacerbated by information asymmetries between governments and waste generators or landfill operators. In particular, variable charging on the basis of waste type may be difficult to monitor, thus giving waste generators an incentive to misrepresent the nature of their waste to achieve the lowest cost disposal option. DEC commented about the tradeoffs involved with waste-specific levies:

> Our experience is that even ensuring consistent application of the levy in its simple form is not a simple business. It is very complicated. People don’t want fancy paperwork. The thing would be way open to rorting if it’s far too complicated. So ... we

> do think about the appropriate level of coarseness versus specificity and try to strike a practical balance for people so they can get on with their lives. (trans., p. 452)

The failure to adequately account for variability in external costs of landfilling different types of waste means that relatively inert types of waste would be overtaxed compared to waste associated with higher disposal externalities.

Linking the levy to waste generating activities

In order for a landfill levy to be efficient, the correct price signals must reach the waste generator. In the case of most commercial and industrial, and construction and demolition waste generators, this link is generally present because they pay a charge based on the quantity of waste disposed. In the case of municipal waste, the landfill levy is passed on to local governments who provide the waste disposal service to households. Local governments recover their costs from households through local rate payments, which typically include a flat fee for the provision of the waste disposal service. A limited form of variable charging for waste disposal has been introduced by some local governments by charging an additional amount for provision of a larger than standard bin. However, generally, for householders there is a weak link between the quantity of the waste disposed and the cost of disposal.

The cost for a household of generating an additional unit of waste is effectively zero (until the bin is full), hence there is little incentive to curb waste disposal. A study of landfill taxes in the United Kingdom (Martin and Scott 2003) indicates an insignificant impact on municipal waste disposal, despite a tax of £14 per tonne, but a large reduction in disposal of inert construction and demolition waste that was taxed at only £2 per tonne. The study concluded that one of the main reasons for this outcome was that householders did not receive a clear price signal about their waste disposal.

SITA Environmental Solutions (sub. 42) argued that, even if households were not sensitive to changes in the landfill levy, local governments are very sensitive. Consequently, a landfill levy could drive local governments to seek other waste disposal methods. However, if the price signal reached them directly, households could, for example, decide to increase the reuse of their goods or generate less waste in response to an increase in the price of waste disposal.

The issues associated with introducing quantity-based pricing of waste disposal are analysed in the next section. However, it should be noted that a landfill levy scheme that is not coupled with variable pricing for waste collection and disposal, is likely to be ineffective in fully achieving its objectives, and could impose net costs on the community. The costs are likely to be exacerbated if the levies are continuously increased to achieve selected waste diversion targets, and price signals are not reaching the relevant decision makers.

Conclusions on the case for using landfill levies

Landfill levies coexist with a suite of regulations governing landfill practices. These regulations can reduce the externality costs of landfill disposal to very modest levels (chapters 4 and 8). Consequently, the scope for applying a landfill levy without duplicating the effect of existing regulation is small.

With regard to the small non greenhouse-related externalities of landfill disposal not addressed by regulation, there might still be a case for a weight-based tax on landfill disposal, if it could be shown that the weight of waste was the primary determinant of those externalities. However, other factors, such as the type of waste and location of disposal, are also likely to be important. It is difficult to design a practical landfill levy that reflects this variability. Even if the levy were set at a level that corresponded to the true *average* size of residual landfill externalities — as is claimed to be the case in Victoria (Victorian Government, sub. DR187) — levies would still be too blunt to send the correct price signals to landfill users and operators. Levies set in that manner would give no incentive to landfill operators to improve their practices, nor would they lead to efficient levels of disposal of particular types of waste.

Finally, the current practices of using (and increasing) landfill levies to generate revenue, and pursue selected landfill diversion targets, are likely to impose net costs on the community. They also may have some perverse consequences, such as increased illegal disposal and costly evasion behaviour.

Thus, on balance, the Commission does not favour the use of landfill levies in Australia.

RECOMMENDATION 9.1

Governments should discontinue using landfill levies because:

- ***the externalities of disposal to a properly-located, engineered and managed landfill are typically small, and the scope for applying levies without duplicating the effect of existing regulation is very limited;***
- ***residual disposal externalities vary significantly according to waste type, location of disposal and type of landfill facility, and it would be impractical to vary the levy to reflect that variability; and***

- ***using levies to achieve selected landfill diversion targets and revenue generation to fund environmental programs will not encourage outcomes which are in the best interests of the community, and may have perverse consequences, such as increases in illegal dumping and other forms of evasion.***

9.2 Unit pricing of waste disposal

As noted previously, householders generally receive weak price signals on the costs of waste disposal, because the price paid does not vary greatly with the quantity of waste disposed. The DEH stated:

> The marginal private cost of waste disposal to a householder is … zero, or at best negligible (even though the marginal social cost is not) … there is no financial incentive for a householder … to reduce their generation of waste. (sub. 103, p. 30)

A variable pricing system reflecting waste disposal costs would allow householders to make informed decisions about their waste generation and disposal. There is extensive international experience on the use of variable disposal fee systems (also known as 'pay-as-you-throw') for municipal waste collection. Pay-as-you-throw (PAYT) schemes have been used in the United States and some European countries. The schemes can take a number of forms (box 9.1).

Box 9.1 **Different types of household variable pricing schemes**

- *Variable frequency of collection* — householders pay a rate based on their choice of frequency of waste collection.
- *Variable bin volume* — householders pay a rate based on their choice of bin size or number of bins.
- *Pre-purchased garbage bags or bag tags* — householders can only dispose of waste by placing it in special bags that they purchase prior to disposal, or by attaching a pre-purchased tag to their garbage bag.
- *Variable weight* — householders pay a rate based on the weight of waste.

A number of Australian local governments have also introduced various PAYT schemes. The potential costs and benefits, as well as the issues relevant to implementing a variable charging system, are discussed below.

Reduced disposal of waste

A large number of international studies conclude that the introduction of PAYT leads to reductions in waste disposal. In the United States, Van Houtven and Morris (1999) reported that a pre-purchased garbage bag charging system in Georgia resulted in a 36 per cent reduction in waste generation. Fullerton and Kinnaman (1996) estimated that, in Virginia, a volume-based charging system resulted in a 14 per cent reduction in the weight of waste disposed, although some of that was likely to have been diverted to illegal dumping. Dijkgraaf (2003) estimated that waste disposal in the Netherlands fell between 7 and 38 per cent depending on the type of PAYT scheme in operation. In South Korea, a nationwide introduction of a PAYT system resulted in an 18 per cent reduction in waste disposal, while the service charges paid by households did not increase (Hong 1999). A number of US studies conclude that introducing unit pricing diverts some waste to recycling (for example Ferrara and Missios 2005).

A study of Australian variable charging schemes by Atech (1999, quoted in BDA Group and EconSearch 2004) concluded that they have resulted in waste reductions of up to 50 per cent. However, the BDA Group and EconSearch (2004) argued that this was partly attributable to improved recycling services and education programs that accompanied the introduction of those schemes.

Assessing the potential benefit to the community of introducing PAYT systems for municipal waste across Australia is difficult, because of the scarcity of data on the responsiveness of Australian householders to changes in the price of waste disposal. Porter (2002) used data from the studies on the operation of US PAYT schemes and estimated that, if such schemes were introduced across the United States, municipal waste disposal could fall by around 33 per cent, creating a gross national benefit (before counting the costs of implementing PAYT) of US $3.5 billion.

Variable pricing for disposal and recycling

In order to avoid distortions in waste disposal activities, PAYT schemes should ideally apply to all legal methods of disposal available to the household. Thus, where both a waste disposal service and a recyclables collection service are provided (as is the case in most parts of Australia), households might ideally be charged for the true costs to the community of supplying each service.[1] This would involve a variable component that should reflect the marginal community costs.[2]

1 These costs do not include the landfill levy.

2 However, if the marginal community benefit of recycling were greater than its marginal cost, householders should be provided a refund reflecting the marginal community benefit created.

This would enable households to make appropriate choices about which services to use.

However, it appears that some local governments may be using their charging regimes to achieve particular waste disposal or resource recovery targets. For example, the City of Ryde allows householders to purchase additional or larger size bins for waste disposal and recycling. However, according to the City of Ryde (trans., p. 864), the relative costs of disposal and recycling bins are set purely to encourage greater resource recovery — an additional 240 litre garbage bin attracts a $410 per annum charge, while a 240 litre recycling bin attracts a $31 annual charge. The charges are not based on the costs to the community of providing the service and hence are unlikely to encourage efficient outcomes in waste generation, disposal or resource recovery.

Issues in selecting the appropriate PAYT scheme

Variable charging of waste disposal is likely to be associated with higher implementation and administrative costs for local government. These would vary depending on the complexity of the scheme. The costs of measurement and billing associated with sophisticated weight-based systems are likely to be substantial, potentially making them impractical to implement for households (particularly if the marginal costs of disposal are low). Fullerton and Kinnaman (1996) estimated that the administrative costs of even a relatively simple pre-paid garbage bag tag scheme in the United States outweighed the benefits of the scheme.

The effectiveness of PAYT schemes in reducing waste disposal depends on how clear the price signal is for households. Weight-based charging systems provide the clearest price signal to the household, and are likely to generate the greatest reduction (Dijkgraaf 2003). On the other hand, coarser PAYT schemes, like variable charging based on bin volume, are likely to be less effective. However, there is a clear tradeoff between the sophistication of the scheme and its administrative costs.

Early experience in Australia shows that many local governments have adopted the simplest forms of PAYT. Typically, such schemes involve offering households multiple bin sizes at different prices, or providing them with a second bin for an additional charge. In some cases, frequency-based charging has also been adopted. For example, the Municipal Association of Victoria (sub. DR179) reported that in the City of Frankston, householders can receive a $20 rate reduction, and either a free worm farm or compost system, for accepting less frequent waste collections. The Commission is not aware of any municipal weight-based charging schemes currently in operation in Australia.

Some inquiry participants argued that the adoption of more sophisticated forms of PAYT such as weight-based charging was not financially or technically feasible in most cases. The Municipal Waste Advisory Council (sub. 52) observed that a weight-based waste charging scheme had been trialled by one Western Australian council, but the technical difficulties and costs were prohibitive. The Municipal Association of Victoria (sub. 113) stated that the City of Melbourne ran a trial of a pay-by-weight system in the early 1990s and found the required modifications to existing systems were too costly at the time. It noted that while current technology is more affordable, it is still not cost effective. The Ipswich City Council (sub. DR198) also stated that a weight-based PAYT scheme was currently not cost effective for it.

On the other hand, SITA Environmental Solutions observed that it and a number of other companies, already had the capacity to provide weight-based charging, and that weight-based charging of households could be implemented within two to three years (sub. DR143; trans., p. 840). The City of Ryde reported that it had started installing electronic chips on household bins that could allow it to charge for the weight of disposed waste in the future (sub. DR176), although others noted the difficulty of certifying the weighing equipment (discussed below). It appears that, currently, weight-based charging is better suited for commercial and industrial (rather than municipal) waste disposal. This would be because the costs of such charging per unit of waste are likely to be lower due to less frequent lifts and greater quantities of waste disposed per lift.

There is no universally preferred form of PAYT scheme. The choice would depend on a large number of factors that could influence both the effectiveness and the administrative costs of the scheme, and would likely vary between different locations. For example, frequency-based PAYT schemes may be appropriate and cost-effective in Victoria (Municipal Association of Victoria, sub. DR179) but less so in warmer-climate states, where frequent disposal of putrescible waste may be necessary for community health reasons. A separate set of issues would arise in locations with high proportions of multi-unit dwellings, where it is typical for a number of households to use common waste bins. In such cases, effectively implementing most forms of PAYT would be difficult, and a scheme utilising pre-paid bags or bag tags (as is done in many European countries) may be the only practical option.

The gains from using more sophisticated and precise forms of PAYT would be greater when the marginal cost of waste disposal is high. However, the marginal costs of waste disposal in Australia appear to be relatively low, and weight-based charging still appears to be significantly more expensive than other forms of PAYT. Thus, the current bias towards simpler forms of PAYT may be appropriate.

Illegal disposal

A problem with variable pricing is that it increases incentives for illegal disposal. Evidence of this link is usually anecdotal. For example, the BDA Group and EconSearch (2004) stated that many South Australian local governments reported increased illegal disposal following the introduction of variable charging.

Internationally, Fullerton and Kinnaman (1996) estimated that, while the introduction of variable disposal pricing in one US state reduced waste disposal, illegal dumping amounted to around 30 per cent of that reduction. On the other hand, Dijkgraaf (2003) estimated that introduction of PAYT in the Netherlands led to a four per cent increase in illegal disposal, and a displacement of five per cent of the waste to surrounding municipalities that had no variable pricing. Dijkgraaf concluded that the costs of increased illegal disposal would have to be very large — €750 per tonne of illegally disposed waste — to outweigh the benefits of a PAYT scheme.

Surveys of US communities that operate variable disposal pricing typically show that the associated increase in illegal disposal is not a significant problem (Skumatz 1993). Skumatz also noted that the size of the shift to illegal disposal depended on the local circumstances, including the social characteristics of the community. The BDA Group and EconSearch (2004) observed that education and awareness raising programs could play an important role in reducing the shift to illegal disposal from the introduction of PAYT.

The choice of pricing method can influence household behaviour with regard to minimising disposal costs. A number of studies show that PAYT systems based on waste volumes can lead to a significant increase in compaction of the waste by some households (for example, Fullerton and Kinnaman 1996). This can make it difficult to design a correct pricing signal on the basis of waste volumes, although Miranda, Bauer and Aldy (1996) argued that, over time, increasing knowledge about expected compaction rates can alleviate this problem. Further, if compaction behaviour is a substitute for illegal disposal, it may be a preferred outcome. Compaction may also create benefits if landfill disposal costs are related to waste volume rather than weight, as was claimed by some participants (for example, the Eastern Metropolitan Regional Council, sub. DR155, p. 1).

Potential barriers to implementing a PAYT scheme

Some participants suggested that implementation of PAYT schemes could be hindered by existing legislation governing the operation of the waste services industry and local governments.

SITA Environmental Solutions (sub. DR143; trans., pp. 840-841) argued that it was prevented from implementing weight-based charging by the requirement, under the National Measurement Regulations 1999, for all measuring equipment used for trade purposes to be certified by the National Measurement Institute. It suggested that existing weighing devices failed to achieve the accuracy required for certification. Examining the list of currently certified weighing devices, the Commission has not found any devices approved for weighing municipal waste bins. However, the National Measurement Institute has certified devices for measuring the weight of larger non-municipal waste bins (National Measurement Institute 2006).

The operation of rate-setting provisions in local government could also hamper implementation of PAYT schemes. The Packaging Council of Australia argued:

> Councils are constrained in the way they can set charges, raise revenues and charge for services by the various Local Government Acts around Australia. As a general rule, these provisions prevent councils implementing fully commercial and flexible charging arrangements for waste services. These limit the flexibility of Councils to implement differential charges for garbage and recycling services … (sub. 67, p. 23)

The Commission has examined this issue and concluded that there do not appear to be any substantial legislative barriers to local governments implementing PAYT schemes. Under the *Local Government Act 1993* (NSW), local governments in that state are required to set an annual charge for provision of waste services (s. 496) and can only increase that charge between years up to a limit determined by the Minister for Local Government (ss. 507–510). However, DEC (trans., p. 891) stated that local governments were entitled to charge for provision of waste services as they wished, with no direct control from the Minister. It suggested that, while the Minister had the power to impose an upper limit on the charge, this was a reserve power that has never been exercised. Examination of the local government legislation of other Australian states and territories does not reveal any apparent barriers to the implementation of the more simple variable charging schemes for municipal waste disposal.

FINDING 9.1

Charges for household waste collection that vary with the amount of waste could promote more efficient outcomes, where they are cost effective and practical to introduce. This will depend on the implementation costs and any consequent increase in illegal disposal. Wider adoption of simple forms of variable charges, such as charging an additional fee for a larger than standard bin, would seem desirable, with more sophisticated 'pay-as-you-throw' approaches adopted if and when they become more cost effective and practical.

9.3 Advance disposal and recycling fees

Advance disposal and recycling fees (ADF and ARF) have received greater attention from policy makers as part of the general growth of product stewardship schemes. Under this policy instrument, a fee is levied on a new product to fund the costs of its future disposal or (in the case of ARF) recycling.

In Australia, ADF and ARF schemes currently apply to ozone-depleting refrigerants, oil, mobile phones, agricultural chemical containers and some chemicals (box 9.2). A number of tyre retailers have also adopted advance charging for handling and disposal of used tyres, where consumers pay the fee as part of the purchase price of the new tyre (Federal Chamber of Automotive Industries, sub. DR141).

In theory, ADF and ARF schemes can lead to efficient outcomes. An ADF reflecting the external costs of disposal would internalise the externality, and lead to efficient levels of disposal. If recycling generates the greatest net benefit of all waste management options, an ARF set to reflect the external benefit of recycling would result in efficient outcomes.

With both types of schemes, to the extent that the price signal reaches the producer, the producer would have an incentive to change the design of the product to reduce subsequent costs of disposal, or improve the product's recyclability.

Advance disposal or recycling fees could also be a preferable instrument to PAYT schemes for recovering costs from waste disposers, in cases where PAYT is likely to significantly increase illegal disposal. In contrast to a PAYT scheme, an ADF or ARF does not target waste disposal directly, and the corresponding incentive for illegal disposal would, therefore, be weaker. Thus, for products that are easy to litter or that carry high costs of improper disposal, an advance fee that covers both private and external costs of disposal or return for recycling, may be a better instrument than PAYT.

In practice, there are limitations on the ability of ADF and ARF schemes to achieve efficient outcomes (as outlined below).

Box 9.2 Advance disposal and recycling fee schemes in Australia

Product Stewardship for Oil Program

The Product Stewardship for Oil Program began in 2000 as a regulatory program to recycle used oil. Under the program, a levy of around 5.5 cents per litre (or kilogram for grease products) is charged on producers and importers of petroleum-based oils and their synthetic equivalents. The levy funds are distributed among recyclers largely on the basis of the level of incentive required to encourage production of particular recycled oil products.

MobileMuster

The MobileMuster program was initiated in 1999 as a voluntary industry program. Consumers and retailers can dispose of mobile phones free of charge through a network of over 1000 mobile phone retail outlets, government agencies and businesses. The program is funded by a sales levy paid by participating manufacturers (constituting 90 per cent of the market). Since 1999, over 330 tonnes of mobile phones have been recovered and recycled through the program.

drumMUSTER

The drumMUSTER program was launched in 1999 to collect empty agricultural chemical containers. Under the program, consumers pay a levy of four cents per litre or kilogram when purchasing applicable farm chemical products in non-returnable chemical containers over one litre, or one kilogram, in content. Consumers can then return the containers to dedicated collection centres for disposal. The funds are used to pay for infrastructure, and the operating and administrative costs of the program. Some funds are reserved for R&D projects to remove barriers to program implementation.

ChemClear

The ChemClear program was launched in 2004 to collect rural agricultural and veterinary chemicals. Under the program, consumers can return free of charge the registered chemicals that were produced by participating manufacturers. The program is funded by the levy collected under the drumMUSTER program.

Sources: DEH (2005d); MobileMuster (2006); drumMUSTER (2006).

Challenges in setting the fee at the correct rate

The externalities of disposal or recycling would vary depending on the type of waste, location, method, and timing of disposal. Reflecting this variation with an ADF or ARF is difficult.

Reflecting waste-type variability

An ADF or ARF scheme is better able to reflect product-specific differences in external costs of disposal than a landfill levy. However, the scope for such schemes to reflect the characteristics of individual products is still somewhat limited. Typically, advance fee schemes involve a flat rate charge being levied on each product type without consideration of differences between models and brands.

The Boomerang Alliance proposed a variable ADF scheme on packaging materials:

> The amount of the fee will be determined on the basis of mass, volume, likelihood of litter, ability to be recovered and recycled content … (sub. 54, att. 2, p. 3)

However, there is a clear tradeoff between the sophistication of any ADF or ARF scheme and its administrative and compliance costs. For example, an ADF scheme for beverage containers operated in Florida from 1993 to 1995 by setting a flat fee on each container, and then providing a series of rebates and exemptions on the basis of the container's recycled content. The scheme was criticised for imposing high administrative and compliance costs. The American Grocery Manufacturers Association (2005) claimed that the administrative costs to industry were US$0.14 for every dollar collected in fees.

The cost of varying the size of an ADF or ARF would be lower for products where disposal costs vary on the basis of a simple, easily verifiable characteristic. For example, in the case of an ADF for used tyres (that is currently being developed), varying the charge on the basis of tyre weight (which is the main determinant of disposal costs) is not considered to substantially increase administrative costs compared with a flat rate scheme (DEH 2001b). However, as the complexity of the product increases, so would the cost of setting the ADF to reflect its disposal costs.

Reflecting location-specific variability

An ADF will rarely reflect the regional variability in disposal costs. The location of the purchase of the product can differ significantly from the location of its disposal, and it would be hard, if not impossible, to anticipate the cost differences with an ADF.

Further, adopting an ADF or ARF that varies by location may meet with constitutional difficulties. An ADF or ARF levied on specific products is likely to be classified as an excise.[3] Section 90 of the Australian Constitution prohibits state

[3] A significant body of Common Law exists on the issue of what constitutes an excise. See, for example, *Ha v New South Wales* (1997) 189 CLR 465 for a definition.

jurisdictions from introducing duties of excise, leaving this power to the Australian Government. The Constitution also requires the Australian Government to impose taxes in a way that does not discriminate between states or parts of states (s. 51 (ii)). This appears to significantly constrain the ability of governments to impose an ADF or ARF that would vary by location.

Timing of disposal issues

There can be a significant difference in timing between the incidence of the ADF or ARF and actual disposal or recycling. This complicates any estimation of the true disposal or recycling costs. Adjusting the fee at the point of disposal for any initial over or undercharging could be administratively costly.

The Australian Electrical and Electronic Manufacturers' Association observed:

> If the average working life of the product exceeds 10 years, as is the case with most domestic appliances and light fittings, post-consumer charges make more economic sense. Setting a fee to be collected at point of sale for a task to be performed in ten years' time to environmental standards not yet defined is unrealistic. (sub. 59, p. 20)

An ADF or ARF is, therefore, better suited to products with a relatively short and predictable working life. WM Waste Management Services (sub. DR140) suggested that this could include some electronic appliances such as computers, video players and DVD players.

Another timing issue concerns the disconnect between the revenue generation to fund disposal, and expenditure on actual disposal. It is likely that the revenue generated from new product sales would be used to fund current disposal activity. The OECD (2001a) noted that there are likely to be cases where the patterns of revenue generation are different from expenditure patterns. This could exacerbate the administrative difficulties of adjusting the disposal fee at the point of disposal.

Impact on product design

A common argument in favour of advance fee schemes is that they give manufacturers an incentive to change product design to reduce the costs of disposal or improve recyclability. However, a number of factors can limit the impact of an ADF or ARF on product design.

First, as discussed above, it is costly to introduce significant variability in the ADF on the basis of individual product characteristics. Advance fees that do not reflect differences in design between different product models and brands would generate weak price signals for manufacturers to change product design. Therefore, the ability of an ADF scheme to influence product design could be constrained by the administrative costs of the scheme.

Second, the impact of an ADF scheme will largely depend on the responsiveness of the manufacturer to the signal. In Australia, a significant proportion of manufactured goods are imported. For example, most televisions (for which an ADF scheme is currently in development) are produced overseas (DEH, sub. 103; trans., p. 621). To the extent that Australia constitutes a small proportion of the world market, an ADF is unlikely to significantly alter manufacturers' production decisions. The DEH noted that: 'In terms of driving change, there's no doubt we're a small voice in the global sense' (trans., p. 621).

Conclusions on advance disposal and recycling fees

Advance disposal or recycling fee schemes could, in theory, deliver several benefits over schemes that charge for disposal or recycling at the end of the product's life. These benefits include: a more accurate reflection of product-specific disposal and recycling costs; a more direct signal to manufacturers to incorporate disposal and recycling cost considerations in product design; and lower incentives for illegal disposal. However, drawbacks include: potentially high administrative costs; difficulties in reflecting location-specific costs of disposal; and difficulties in predicting future disposal costs when the timing of disposal is uncertain. Generally, such schemes would only be justified as a means of recycling or correctly disposing products that have a high risk and cost of illegal disposal.

FINDING 9.2

The scope for applying advance, rather than end-of-life, charging for disposal and recycling is limited by the difficulties in setting the fee at the correct rate and the high administrative cost of such schemes. Advance disposal and recycling schemes are only likely to be justified for products carrying a high risk and cost of illegal disposal.

9.4 Deposit-refund schemes

Deposit-refund schemes operate by charging consumers a deposit when they purchase a particular item and returning the deposit, or a part of it, when the item is returned to a specified waste collection or treatment facility.

In theory, a deposit-refund scheme can generate efficient outcomes. The deposit operates similarly to an ADF by imposing a tax at the consumption stage. The refund operates as a subsidy to reduce the negative externalities of littering and landfill disposal.

A number of studies argue that the fact that deposit-refund schemes target waste-related decisions at two ends of the chain means that particular waste diversion levels can be achieved at lower levels of intervention. For example, Palmer, Sigman and Walls (1997) estimate that to achieve a 10 per cent reduction in waste disposal in the United States would require an ADF of $85 per tonne, or a recycling subsidy of $98 per tonne, but only a $45 per tonne deposit-refund scheme.

In practice, however, deposit-refund schemes tend to have high operating costs, which can frequently outweigh the benefits. This can be illustrated by the analysis of the most common type of deposit-refund scheme — container deposit legislation.

Container deposit legislation

Container deposit legislation (CDL) has been operating in South Australia for around 30 years (box 9.3). Recently, the WA Government signalled its intention to introduce CDL and initiated an investigation into the different models for implementing the scheme (Department of Environment WA, sub. 101). Other states have also commissioned studies on the potential for introducing CDL, and it has been the subject of considerable debate in recent years.

Box 9.3 **Container deposit legislation in South Australia**

Container deposit legislation (CDL) has operated in South Australia since 1976. Following expansion of the scheme in 2003, it now covers most soft drink, beer and water containers, and containers of juices and flavoured milk of up to one litre in volume (but not wine containers).

Beverage manufacturers pay a five cent deposit and an agreed handling fee (usually three cents) to a collection coordinator. These funds are retained by the collection coordinator until the container is returned to a recycling depot for recycling. When consumers return containers to a recycling depot they receive a refund of the five cent deposit.

The recycling depot sorts the containers by material and by responsible collection coordinator, and sends the containers to the relevant collection coordinator.

The collection coordinator pays the recycling depot back the five cent deposit (which the depot paid consumers for return of the containers) and the handling fee.

The containers collected are subsequently sold to recyclers.

Sources: SA Government (sub. DR217); ISF (2001).

Every state and territory in Australia currently runs a kerbside collection scheme. Thus, any new CDL scheme would operate alongside an existing kerbside recycling scheme.

The arguments in favour of CDL usually focus on its potential to promote two objectives:

- increased recovery and recycling rates
- reduced littering.

These are analysed below.

Impact on recovery and recycling

Most of the studies of existing CDL schemes find that CDL significantly increases recovery rates of containers. For example, Fullerton and Wolverton (1997) reported that container return rates in US states that ran CDL varied between 77 and 93 per cent. Beck (2001) found that the average recovery rate of containers in US states with CDL was 72 per cent, compared with 28 per cent in non-deposit states.

Experience with CDL in South Australia indicates that it leads to greater container recovery rates. KESAB Environmental Solutions stated:

> Our beverage container return rates are: aluminium 85 per cent; PET [polyethylene terephthalate] 72 per cent; glass 82 per cent; liquid paperboard 38 per cent … I would suggest that there would be no other state within 20 per cent of any of those figures. (trans. p. 231)

With regard to the impact of CDL on the recovery rates of all recyclable materials, US studies consistently find that CDL increases overall recovery rates. In Australia, data from Hyder Consulting (DEH, sub. 103, att. A) showed that in 2002-03 South Australia had the highest recovery rate for non-organic municipal solid waste of all states. However, the impact of CDL on overall recovery rates is unlikely to be great because beverage containers make a relatively minor contribution to the municipal waste stream. The Packaging Council of Australia (sub. 67) claimed that beverage containers only made up around four per cent of the municipal waste stream. The ISF (2001, vol. 3) estimated that if CDL schemes were applied in New South Wales, and achieved the same container recovery rates as in South Australia, they would only reduce the municipal waste stream by between four and eight per cent.

Impact on littering

Most international studies conclude that CDL reduces the incidence of container litter. For example, Fullerton and Wolverton (1997) reported that CDL reduced container litter by 80 per cent in the United States, and cited other studies that arrived at similar estimates. It is also generally accepted that CDL has reduced beverage container litter in South Australia.

However, the significance of this outcome in the context of general litter reduction is the subject of debate. Analysis of Keep Australia Beautiful litter count data (McGregor Tan Research 2006a) shows that, if bottle tops were excluded,[4] beverage containers made up 10 per cent of the litter stream in South Australia by volume. In contrast, in other states, beverage containers accounted for between 19 and 39 per cent of the litter stream by volume. Some participants (for example, the Boomerang Alliance, sub. 54, sub. DR183; South Australian Government, sub. DR217) argued that volume was an appropriate measure when considering the costs of beverage container litter. Consequently, they argued that overall costs of litter could be significantly reduced by a beverage container-specific scheme. On the other hand, if items in the litter stream were counted by number, Keep Australia Beautiful data (McGregor Tan Research 2006a) show that, excluding bottle tops, beverage containers made up one per cent of the litter stream in South Australia and between two and nine per cent in other states. Consequently, some participants (for example, the Packaging Council of Australia, sub. 67) argued that any reductions in the entire litter stream from CDL were likely to be small.

One approach to estimating the litter reduction benefits of CDL is to focus on the cost of removing beverage containers from the litter stream in the absence of CDL. The ISF (2001, vol. 2) estimated that a CDL scheme in New South Wales would reduce litter collection and management costs by five per cent or $4.5 million per annum. It attributed the low estimate to the fact that a large proportion of litter-management costs is fixed and costs would not decrease linearly in proportion to reductions in litter.

Cost of introducing a CDL scheme

The costs of introducing a CDL scheme include:

- costs of establishing infrastructure for collection and processing of containers
- operational costs of running the scheme including:
  - householder transport and labour costs of returning the containers

4 Bottle tops are not required to be returned to receive a refund.

– the cost of handling and processing returns

– government costs of administering and monitoring the scheme.

KESAB Environmental Solutions (trans., p. 231) and the SA Government (sub. DR217) commented that when CDL operated alongside a kerbside recycling scheme, there was significant potential for the use of common infrastructure. The SA Government further argued that CDL reduced the cost of kerbside recycling in South Australia by removing a large proportion of glass from the kerbside recycling stream. They suggested that this increases the ability to compact the loads collected at kerbside without the risk of broken glass contaminating other materials. However, CDL in South Australia does not target all of the glass containers generated by households — for example, wine bottles are excluded, as are all non-beverage glass containers. Further, the Australian Food and Grocery Council argued:

> … if you look at the South Australian model, one of the arguments is that the hand sorting and removing the glass through CDL produces cleaner paper, for example, and therefore it's more valuable. In fact the publishers and the paper industry will tell you that South Australia's paper is actually consistently worse because they don't have a comprehensive recycling system that's on the scale or on the efficiency of what we see in New South Wales, Victoria and elsewhere. (trans., p. 511)

A number of participants argued that if a CDL scheme were introduced in addition to a well-established kerbside recycling scheme, this would result in duplication of infrastructure costs and limited potential for the use of common infrastructure (PCA, sub. 67; Australian Food and Grocery Council, sub. 93). They also suggested that the additional costs of establishing infrastructure for a CDL scheme were likely to be substantial.

Australian studies on the potential for implementing CDL schemes suggest that the financial costs of such schemes could be substantial. The ISF (2001) found that the financial costs (and benefits) of CDL could vary significantly depending on the design of the scheme – particularly the number and location of container collection centres. It estimated the net financial costs (exclusive of household labour costs) of introducing and running CDL in New South Wales to be between $72 and $107 million per annum compared to the net financial cost of kerbside recycling of $41 million. The institute's separate estimates of the cost of household labour ranged from $335 to $385 million per annum for CDL compared to $285 million for kerbside recycling.[5]

5 In reporting these numbers, the ISF (2001) stated that they were only rough estimates and could be in error by a factor of two or more.

A review by Perchards of the report on the financial costs of implementing CDL in Victoria estimated the additional costs of introducing and running CDL at between $73 and $81 per household per annum for the three case study regions, compared to the average net annual cost of kerbside recycling of $29 per household (EPA Victoria 2003).[6]

Can the costs of CDL be reduced by program design?

The costs of running a CDL scheme will, to some degree, depend on program design. For example, the South Australian CDL scheme is generally seen as being relatively expensive, because it relies on manual sorting of beverage containers and their separation by brand (Phillip Hudson Consulting 2000).

The Boomerang Alliance (sub. 54) argued that a CDL scheme that did not require the sorting of containers by brand would have a significantly lower cost. Beck (2001) found that adoption of this approach by the Californian CDL system reduced the operating costs of the program (excluding householder costs) by over 60 per cent relative to traditional CDL programs that relied on manual sorting in other US states. However, Beck warned against projecting any of the cost estimates in that study to any new CDL schemes. The study suggested that the cost of the Californian CDL system may have been reduced by the availability of old container collection infrastructure, that pre-dated the current CDL scheme, and was unique to California.

Further, a subsequent critique of the study by Northbridge Environmental Consultants (2002) concluded that the study ignored a significant proportion of administrative, collection, and processing costs of the scheme. According to the critique, this resulted in an underestimation of the operating costs of the Californian CDL program by over 30 per cent. Northbridge Environmental Consultants (2002) also suggested that the low cost of Californian CDL was partly attributable to the narrow range of containers that were originally targeted. It argued that when the program expanded to cover non-carbonated beverage containers in 2000 (a change not analysed in the Beck report), program costs increased significantly.

The Boomerang Alliance (sub. 54) also argued that new technology, particularly the use of reverse vending machines, could significantly reduce the costs of container recovery. Reverse vending machines are commonly used in most European

6 The original report by Nolan-ITU (EPA Victoria 2003) estimated the costs to be significantly greater, but contained a significant error in methodology in valuing unredeemed deposits by households as a net economic cost.

countries that have CDL. Using such machines to collect and process container returns would reduce labour costs.

Beck (2001) found that the operating costs of CDL (excluding household costs) in US states that utilised reverse vending machines were nearly 40 per cent lower than the cost of traditional CDL schemes. However, Northbridge Environmental Consultants (2002) concluded that the study ignored the costs of space occupied by reverse vending machines and the returned containers, as well as the labour costs involved in emptying the machines. This resulted in the true operating costs (excluding household costs) being underestimated by over 20 per cent.

A study of the impacts of implementing CDL in the ACT estimated that the capital and operating costs of running CDL using reverse vending machines were comparable to the cost of running the ACT kerbside recycling system (Centre for Environmental Solutions 2002).

Cost-effectiveness in achieving resource recovery and litter objectives

A number of studies have found that, while CDL increased resource recovery, costs were higher than for kerbside recycling. The cost of sorting and counting containers under CDL makes it a more expensive method of resource recovery (Phillip Hudson Consulting 2000).

Beck (2001) compared the cost-effectiveness of CDL in achieving resource recovery to other instruments across all US states. He found that the states that introduced CDL recovered 490 containers per person, while the states without CDL recovered 191 containers per person. The average cost of increasing the recovery rate through CDL, net of the value of recovered materials, was 1.71 US cents per container. Porter interpreted these numbers to mean that recovering one tonne of beverage containers would have a net financial cost of US$889 (OECD 2004a). Beck’s separate estimates of net recovery costs for the Californian CDL scheme and CDL schemes utilising reverse vending machines were US$118 and US$293 per tonne respectively. However, if the additional costs of those schemes identified by Northbridge Environmental Consultants (2002) are included, net recovery costs would increase to US$275 per tonne for the Californian CDL scheme and US$510 per tonne for CDL schemes that utilised reverse vending machines.

Further, the costs included in those studies exclude the transport and labour costs of households, so the calculations are likely to significantly underestimate the costs of material recovery under CDL.

The Perchards review of the report on the financial costs of implementing CDL in Victoria estimated the gross costs of recovering an additional tonne of beverage containers through CDL to be in the range of $1159 to $2219 (EPA Victoria 2003). This compared to the market price of used beverage containers that ranged between $72 per tonne for glass and $1100 per tonne for aluminium.

A number of commentators have argued that CDL and kerbside recycling are rival schemes (OECD 2004a). To the extent that CDL would divert some materials from kerbside recovery, the economies of scale from kerbside collection of recyclables would be reduced. The PCA (sub. 67) argued that the economies of scale in kerbside collection are significant with two thirds of the total costs being fixed. The Australian Food and Grocery Council argued:

> Given the advanced development of waste management, recycling and litter management programs in Australia, the introduction of CDL would create an additional system that would undercut recycling programs by creating competing systems and increase the costs of implementing both approaches. (sub. 93, p. 18)

Relatively little research exists on the cost-effectiveness of CDL as a litter control mechanism. The PCA (sub. 67) argued that litter is a behavioural problem not confined to a particular product in the litter stream. Consequently, it argued that policy instruments that targeted litter in general, rather than a small component of the litter stream, were likely to be more cost-effective. Litter count data from Keep Australia Beautiful (McGregor Tan Research 2006a) indicate that CDL in South Australia may only be affecting littering behaviour in relation to items that attract a refund. For example, the proportion of bottle tops (which are not required to be returned to receive a refund) in the litter stream in South Australia is the second highest of all states (McGregor Tan Research 2006a).

In an interim review of the EC Packaging and Packaging Waste Directive, Perchards commented:

> Given the extremely heterogeneous nature of litter, it is doubtful whether market restrictions, taxes or mandatory deposits on particular types of packaging will have much effect on the overall litter problem. Litter is a behavioural issue which needs to be addressed holistically … (2004, p. 153)

Perchards further stated:

> It would be fairer, and more effective, to take measures that tackle all of litter, not just a small proportion. (p. 154)

A study by Syrek (2003) concluded that CDL was a very costly litter control mechanism in the United States. It found that without CDL only 1 in 164 containers sold ended up in the litter stream. The cost of receiving and processing 164 containers (US$3.42) was spent on controlling one item of container litter. In comparison, Syrek estimated that targeted advertising cost US 1.3 cents to eliminate one item of litter, comprehensive programs aimed at preventing litter cost US 14.2 cents, and litter pick-up programs cost US$1.41 per item of litter.

Conclusions on CDL

The case for introducing CDL in addition to existing kerbside collection schemes on resource recovery grounds is weak. CDL achieves improved recovery of beverage containers. However, it does so at the cost of introducing an additional collection system that competes with existing kerbside collection schemes for resources, and is likely to reduce the economies of scale of kerbside collection. Resource recovery under CDL is also likely to be significantly more costly than under kerbside recycling.

With regard to litter reduction, CDL reduces beverage container litter, but there is little evidence that it affects other littering behaviour. The litter-reduction benefits (measured as reduced costs of litter collection) are likely to be marginal. This is due to the fact that beverage containers make up a relatively small component of the litter stream and most of the litter collection costs are fixed. The costs of achieving the benefits are likely to be high. CDL does not target the littering behaviour directly nor, by focusing on one component of the litter stream, does it do so comprehensively.

The high operating costs typically associated with CDL suggest that the benefits of a consumer deposit-refund scheme would need to be very substantial to justify its implementation. Thus, a deposit-refund scheme might only be warranted for products with a disproportionately high cost of illegal disposal.

FINDING 9.3

Deposit-refund schemes are typically costly and would only be justified for products that have a very high cost of illegal disposal. Container deposit legislation is unlikely to be the most cost-effective mechanism for achieving its objectives of recovering resources and reducing litter. Kerbside recycling is a less costly option for recovering resources, while general anti-litter programs are likely to be a more cost-effective way of pursuing overall litter reduction.

9.5 Subsidies

Subsidy schemes have been a popular instrument in waste management policy in all Australian states. A subsidy can result in a net community benefit if it internalises the external benefit of a particular activity. To do that, a subsidy would need to be set to equal the external benefit (or the external costs avoided) of the action.

In waste management policy, subsidies could be used to reduce the negative externalities of waste disposal and littering, or to assist actions that generate positive externalities in knowledge or information dissemination. Financial assistance for research and development, or for projects with significant demonstration effects, may fit within this category.

Subsidising diversion of waste from landfills

Subsidising kerbside recycling

Kerbside recycling schemes are run in all states and are often subsidised by state governments. For example, the Victorian Best Practice Kerbside Recycling Program provided grants to local governments to adopt a recycling system with particular configurations of recycling bins (box 9.4). In South Australia, the Kerbside Performance Incentives scheme provides assistance for local governments that introduce or upgrade kerbside recycling systems. A further three programs are run in South Australia to distribute financial grants for the establishment and upgrade of infrastructure for resource recovery. The WA Government runs a Resource Rebate Recovery scheme that subsidises local government collection of recyclables from households.

Box 9.4 **Subsidies for kerbside recycling in Victoria**

The Best Practice Kerbside Recycling Program has operated in Victoria since 2000, by providing grants to local governments for adopting a particular kerbside recycling system. The requirements placed on local governments include providing specific recycling bin configurations to households and employing contractors accredited by EcoRecycle Victoria. Since the program's inception, over $9 million has been allocated to 34 local governments.

A review of the program in 2002 showed that recycling yields in local governments that received the subsidy increased by 20 per cent for a 9 per cent increase in the cost of collection.

Source: EcoRecycle Victoria (2002, 2005a).

Kerbside recycling can be associated with a number of benefits. These include, for some products and regions, the financial benefits of recycling and a possible reduction in illegal disposal. Kerbside recycling may also have some upstream environmental benefits. However, as argued in chapter 5, these could be more effectively and efficiently tackled through direct upstream instruments.

To maximise their benefit to the community, subsidies should be linked to the value of the externalities from the subsidised activity. There appears to have been little explicit effort made to set subsidies in this way, and little evaluation of existing subsidy programs.

The one evaluation that has come to the Commission's attention — that of the Victorian Best Practice Kerbside Recycling program (EcoRecycle Victoria 2002) — referred to net community benefit in the context of the Nolan-ITU and SKM Economics (2001) study of kerbside recycling. However, the Commission considers that study to have significantly overstated the benefits of kerbside recycling (chapter 4).

Earlier discussion in this report (chapter 4) concluded that the avoided landfill externalities from kerbside recycling (the major policy-relevant externality in subsidising recycling) are small, because kerbside recyclables are typically inert. Thus, the net benefit to the community of subsidising kerbside recycling may not be great, particularly in view of the administrative costs that a subsidy scheme would entail.

Subsidising alternative waste technology facilities

The private costs of waste disposal using alternative waste technologies are significantly higher than those of landfill disposal (chapter 4). Several participants (for example, WMAA, New South Wales, AWT Working Group, sub. 30) suggested that governments should subsidise alternative waste technology (AWT) facilities to encourage diversion of waste disposal from landfills. SITA Environmental Solutions (sub. 42) estimated that a subsidy of $53 million per annum was required for AWT infrastructure to achieve NSW Government targets on reducing landfill disposal of municipal solid waste.

Consolidated data on current levels of direct and indirect financial assistance provided to AWT facilities are generally unavailable. Assistance is provided from a variety of sources and in a number of forms. In some cases assistance may be substantial. For example, examination of local government documents relating to the establishment of an AWT facility in the Western Region of Melbourne (Melton Shire Council 2006) shows that the following government grants are anticipated:

- $2 million from the Sustainability Victoria Renewable Energy Support Fund
- $6 per tonne subsidy for green organics from Sustainability Victoria

- $21 million from the Victorian Sustainability Fund.

The signatories to the agreement estimated that the above grants would reduce the cost of waste disposal to the new facility from $81 to $55 per tonne for the first five years of its operation (although, in the absence of significant landfill levy increases, landfill disposal was still expected to be a less costly option) (Melton Shire Council 2006).

In addition to direct subsidies, AWT operators are indirectly subsidised by the setting of levies on landfill disposal. As discussed earlier, some jurisdictions (in particular, New South Wales) use levies as a means of improving the competitiveness of other disposal and resource recovery options. SITA Environmental Solutions (sub. 42) suggested a high landfill levy could effectively replace direct financial assistance to AWT operators.

However, providing financial and other forms of assistance to AWT operators to achieve particular landfill diversion targets, is unlikely to result in the most beneficial outcomes for the community (chapter 7). In theory, subsidies to encourage establishment of AWT facilities to replace the existing methods of disposal may be warranted to the extent this would create external benefits for the community. The size of the subsidies should reflect the size of those benefits. However, the external benefits of an AWT facility over a properly located, engineered and managed landfill that incorporated a gas management system with electricity generation, are likely to be small (chapter 4). This means that a subsidy reflecting the true external benefits of an AWT is unlikely to bridge the cost differential between AWTs and compliant landfills. Thus the Commission sees little justification for applying subsidy schemes to AWT facilities.

Subsidising recyclers directly

Some government programs provide financial assistance to recyclers. For example, the Product Stewardship for Oil Program distributes the funds collected from an ARF to recyclers. The size of the subsidy varies for different end-products. The subsidy differential is based on an assessment of the level of incentive required to encourage a particular recycling activity, as well as a view that recycling to recreate a refined grade of oil ('lube-to-lube') is the most desirable outcome. The largest subsidy paid for re-refined base oil is, at 50 cents per litre, five times greater than the second largest subsidy. DEH (sub. DR214) stated that this reflected the level of incentive required to develop a re-refining industry, when no markets existed for the product. The proposed national scheme for tyres would also distribute the funds collected from an advance fee to recyclers (JWGT 2005).

The Victorian Market Development program provided funds to a wide range of industry projects that used recycled materials, or increased recovery rates of recyclables (box 9.5).

Box 9.5 Examples of projects supported by the Victorian Market Development program

- *Recycled Plastic Pipes Pty Ltd* — a subsidy was given to a company that produced irrigation pipes from kerbside recycled plastic bottles. The subsidy was used to develop a prototype sintering/casting machine to produce the pipes.
- *Visy Recycling* — a subsidy was given to Visy Recycling to develop sorting and recovery technologies for PET bottles, and to assess the impact of incorporating high performance PET barrier bottles into conventional collection and recovery systems.
- *Rofin Pty Ltd* — a subsidy was given to a company producing optical equipment for sorting kerbside plastics. The funding was used to test the sorting equipment in a materials recovery facility.

Source: EcoRecycle Victoria (2005c).

The grounds for subsidising recyclers directly are, in principle, similar to those for subsidising kerbside recycling. Again, it is important that the subsidy is linked to the right objective. It is unclear that this has always been the case. For example, the decision to heavily subsidise lube-to-lube recycling under the Product Stewardship for Oil Program appears to have been driven partly by waste hierarchy-suggested priorities, and partly by the objective of assisting an infant industry. Similar objectives may have driven parts of the Victorian Market Development program. This approach is unlikely to produce net benefits to the community. Subsidising recyclers on the basis of the incentive required to encourage the recycling activity uses the wrong criterion to determine the level of assistance, and is also unlikely to generate efficient results. The size of the subsidy should be guided by the policy-relevant externalities.

Another important consideration is cost-effectiveness. In order to ensure that the projects with the greatest community benefit are chosen, it is essential to have contestability in subsidy allocation. This could be done by choosing projects through a tender scheme. The tender criteria should be clear, transparent and based on the net benefit of the project.

Incentives for purchasing goods with minimum recycled content

Some participants (for example, WMAA, Compost Australia Division, sub. 55) also advocated the use of financial incentives for consumers to purchase products with recycled content. One example was the sales tax exemption for 100 per cent recycled paper products that operated in Australia from 1990 to 1995. More recently, the WA Government (2005c) proposed to introduce a scheme of rebates for purchases of products with a minimum level of recycled content.

The Commission does not support this type of policy. First, subsidies for the purchase of goods with recycled content are an indirect instrument, relying on a strong connection between the sale of a recycled content product, and some positive environmental externality. However, this link is not always present. For example, if the product or the recycled materials used in its manufacture were imported, the rebate would effectively be subsidising the activities of overseas recyclers, meaning that little, if any benefit, would accrue to Australia.

Second, such subsidies would be likely to create market distortions. Implementing a sliding scale of incentives for products with different levels of recycled content is likely to be administratively expensive, and the only practical option may be to set a single threshold that would trigger a rebate or a discount.

Third, monitoring of compliance by manufacturers is likely to be difficult because of information asymmetries between governments and producers, and the clear incentive for producers to misrepresent the nature of their product. The monitoring costs are likely to be particularly high in markets with many small producers and/or a significant proportion of imports.

In assessing the sales tax exemption on recycled paper in Australia, the Industry Commission (IC 1991) recommended its abolition, largely on the above grounds.

The Commission considers that, where assistance for recycling is likely to result in a net benefit to the community, subsidies that directly target the relevant recycling activity should be preferred over provision of incentives for purchasing goods with recycled content.

Subsidising R&D and demonstration projects

Australian governments currently operate a framework of general policies supporting research and development (R&D) that include maintaining an intellectual property rights system, tax concessions, competitive grants, and concessional loans for R&D.

In addition, a number of states provide financial incentives specifically for research into waste management. For example, New South Wales operates the Environmental Trust to distribute grants to research projects on topics that can include waste management. In South Australia, the Research and Market

Development Incentives Scheme distributes financial assistance to research projects that focus on promoting markets for recyclable materials. In Victoria, the EPA Sustainability Fund provides grants for innovative projects that improve sustainability (including through reduced waste generation). In addition, some of the grants distributed under the Victorian Market Development scheme appear to have been motivated by the objective of generating demonstration effects for industry.

The Australian Government has also supported waste management R&D through the Cooperative Research Centre (CRC) for Waste and Pollution Control that operated between 1991 and 2002 (box 9.6). In addition, a CRC for Contamination Assessment and Remediation of the Environment was established in 2006. The CRC will produce research on various aspects of environmental contamination including: risk-based assessment of contamination costs; development of technologies to prevent and remediate contamination; and analysis of the associated social, economic, political and legal issues (CRC CARE 2006).

When the benefits of research can be sufficiently appropriated by those undertaking it, the need for government assistance is reduced. A significant volume of private research in waste management is done by firms for that reason. However, some of the benefits arising from research cannot be fully appropriated by those undertaking it. To the extent that this may discourage socially beneficial research, there may be a role for government subsidising the activity.[7] The assistance should be linked to the value of the external benefits.

The rationale for subsidising demonstration projects is similar to that of subsidising R&D. Industry projects generating significant external demonstration effects may be underprovided by private firms because those undertaking the project cannot appropriate its full benefit. However, when there are significant private incentives to engage in projects that inevitably, though unintentionally, create a demonstration effect, the case for government assistance would be weak.

7 There is also a case for providing government assistance to research aimed at informing policy makers. The Business Roundtable on Sustainable Development (sub. 70, p. 17) observed that currently there is an over-reliance on ‘overseas research, with little investigation of its applicability to Australia’s circumstances — our geology, hydrology, soils, and climate’. The WMAA, Queensland Division (sub. 91) suggested that governments should support applied research into the cultural and social barriers impeding the uptake by Australian consumers of products made from recycled materials. The Commission has also identified a need for governments to provide or assist research into the effect of current regulations on the external costs of landfill disposal (chapter 8).

Box 9.6 **Cooperative Research Centre for Waste and Pollution Control**

The Cooperative Research Centre (CRC) for Waste and Pollution Control operated between 1991 and 2002.

The CRC engaged in research on life-cycle assessment and impact analysis, waste management systems, biological water treatment and toxic waste immobilisation. Research priorities were determined collaboratively by waste facility operators, regulators and industry participants in the program. Input was also received from several Australian universities and government laboratories that also undertook some of the applied research. Over the life of the program, the Australian Government invested $45 million in the CRC's research and development projects. In 1992, a private company — Waste Technologies of Australia — was established as the commercialisation arm of the CRC. The company was subsequently sold to Zeolite Australia Pty Ltd — an environmental technology company — for $20 million.

Source: Waste Technologies of Australia (2002).

Evidence on the performance of the above schemes is scarce. The DEH (sub. 103) argued that demonstration projects for industry were generally a relatively ineffective instrument in environmental policy. The DEH attributed this to (among other things):

- the incentive for those hosting the demonstration project to retain the competitive advantage and hinder the diffusion of information; and
- the generally slow rate of diffusion of information on demonstrated best practices due to organisational barriers within and between firms.

However, the Business Roundtable on Sustainable Development (sub. 70) argued that in some cases subsidising demonstration projects could create a benefit to the community. For example, it suggested that demonstration projects to disseminate information about the benefits and potential uses of compost, would assist the development of the market for compost.

No formal evaluations of the CRC for Waste and Pollution Control were undertaken. However, a general evaluation of all CRC programs noted that the CRC for Waste and Pollution Control was one of the most effective among the environmental CRC's in terms of generating international patents (Howard Partners 2003). Various press releases issued over the life of the CRC (for example CSIRO 1998) also claim that a number of commercially profitable research projects were undertaken. This suggests that the CRC may have been privately cost-effective, although it would be difficult to assess whether government subsidies resulted in a net benefit to the community. When research output can be protected through the patenting system, and the research is privately cost effective, there is generally no case for governments to further intervene.

The Commission considers that there may be a case for provision of government assistance in R&D and demonstration projects in waste management. Assessment criteria for allocating funding should be based on whether the projects are likely to result in a net benefit to the community, and whether government assistance is necessary for the projects to be undertaken.

However, it is unclear why R&D assistance programs that focus specifically on waste management are required in addition to the general forms of R&D assistance currently provided by the Australian, state and territory governments. Subsidising R&D and demonstration projects in waste management through a broad R&D competitive grants scheme may be a more effective and efficient way of addressing the relevant market failures. First, this approach is more likely to result in a consistent allocation of funds across different fields of R&D. Second, this approach may be less costly for governments, due to economies of scale from administering a uniform R&D policy regime. Finally, this approach would minimise the potential for 'double dipping'. Having assistance programs that focus specifically on waste management R&D and demonstration projects would only be warranted if those activities resulted in benefits that could not be adequately considered within a broad assistance scheme.

9.6 Tradeable property rights

Tradeable property right (TPR) mechanisms in environment policy work by setting a quota on the aggregate level of a particular activity, and allocating tradeable property rights to shares of that quota to those undertaking the activity.

One prominent example of a TPR mechanism is the Greenhouse Gas Emission Trading Scheme that has emerged in Europe as a result of the ratification of the Kyoto Protocol by European Union Member States. However, this type of instrument is relatively new in waste management policy. Two schemes are currently in operation, both in the United Kingdom.

The Packaging Waste Recovery Notes (PRN) mechanism has operated in the United Kingdom since 1997, as part of the EC Directive on Packaging and Packaging Waste. Under the scheme, manufacturers with a turnover greater than £2 million and handling over 50 tonnes of packaging per annum are obliged to pay for recovery and recycling of a certain quantity of packaging waste. This can be done by purchasing volume-based packaging waste recovery notes from approved domestic recyclers, or by purchasing equivalent certificates from overseas recyclers.

The UK Landfill Allowance Trading Scheme (LATS) commenced in 2005. The scheme sets a cap on the total volume of biodegradable municipal waste sent to landfill. Entitlements to a share of the total cap are allocated to local government bodies responsible for handling municipal waste. Trading in entitlements between these government bodies is permitted under the scheme (box 9.7).

Box 9.7 **UK Landfill Allowance Trading Scheme**

The UK Landfill Allowance Trading Scheme commenced in April 2005, as part of the implementation of the EC Landfill Directive. The Directive set targets for the total volume of landfilled biodegradable waste (relative to its 1995 level) of 75 per cent by 2010, 50 per cent by 2013, and 35 per cent by 2020.

Under the scheme, landfill allowances have been allocated to waste disposal authorities on the basis of historic landfill volumes. Allowances can be traded, and the government operates a web-based bulletin board to facilitate the transactions. Authorities are permitted to 'bank' any surplus entitlements for future use, but not in target years. A credit of five per cent of entitlements out of next year's allowance is also permitted, but not in target years. The penalty for non-compliance is fixed at £150 per tonne. There are no other constraints on the price of entitlements.

Source: DEFRA (2006).

Advantages of using tradeable property right instruments

Greater certainty of achieving targets

A key feature of mechanisms, such as the LATS and the PRN scheme, is the imposition of a cap on activities like landfill disposal or recycling. If this cap is underpinned by adequate monitoring of compliance and severe penalties for non-compliance (£150 per tonne under LATS, for example), TPRs would effectively guarantee that the target is reached.

Experience with the PRN scheme indicates that it has achieved a substantial increase in recovery rates of packaging materials. Recovery rates rose from 27 per cent in 1997 to over 55 per cent in 2004, and are likely to be close to meeting the 2006 target of 66 per cent.

This contrasts with financial incentive mechanisms that are commonly criticised for their inherent uncertainty in achieving particular targets, such as tonnes of landfill disposal or recycling.

Cost-effectiveness in achieving targets

The tradeable aspect of TPR instruments increases the likelihood that the target would be achieved at the lowest cost, particularly if the market has many participants and the costs of trading are low. In the case of LATS, those for whom diversion from landfill is relatively costly have an incentive to purchase additional entitlements from those for whom diversion is less costly. Thus, actual diversion should be undertaken at the lowest available cost. Government provision of a web-based bulletin board to facilitate trading improves the cost-effectiveness of the scheme by reducing transaction costs.

In addition, allowing the banking and crediting of allowances between periods, as was done in the LATS, provides flexibility that should help to reduce compliance costs over the longer term.

Allowing trading in property rights under a quantity cap offers advantages in cost-effectiveness over instruments that set simple prescriptive targets. A study by researchers at the Technical University of Berlin concluded that the UK PRN scheme allowed the United Kingdom to achieve EU targets on recovery of packaging waste at a significantly lower cost than that of the German Green Dot System (Ewers, Tegner and Shatz 2002, quoted in Letsrecycle.com 2002). The study found that the tradeable property right aspect of the PRN scheme was one of the reasons for this outcome. It is generally accepted that the compliance costs of the PRN scheme are lower than those of instruments that aim to achieve the target by allocating fixed non-tradeable quotas to the parties (McGlade 2004).

Disadvantages of using tradeable property right instruments

Efficiency depends on the ability to set correct targets

While TPR instruments may lead to the achievement of particular targets at the least cost, implementing a waste TPR scheme that results in a net benefit to the community would be extremely difficult. The efficiency of TPR mechanisms depends on the ability of governments to set appropriate targets. Setting optimal waste disposal or resource recovery targets is very difficult because of fundamental uncertainties about the costs and benefits of reaching those targets (chapter 7). Further, the external costs of waste disposal vary depending on the location of disposal, type of waste and type of landfill facility and it would be difficult to reflect this variability in a broad waste disposal or resource recovery target.

Australian experience on the use of targets in waste management policy indicates that targets have generally not been underpinned by adequate consideration of the costs and benefits of achieving them (chapter 7). In the case of the LATS and PRN schemes, the targets were set to comply with EU legislation rather than any cost–benefit assessments.

Setting a hard target without considering the associated costs and benefits could impose substantial costs on the community (even if the tradeable aspect of the TPR mechanism allows to minimise those costs for the given target). Compliance costs under the PRN scheme and the LATS appear to be significant. Harding (2005) reported that, between 1999 and 2003, the total value of packaging waste recovery notes purchased by UK manufacturers was £300 million, and that administrative costs incurred by firms to comply with the scheme would have been more than this. The prices of entitlements under the UK LATS are kept confidential. However, prior to the introduction of the scheme, the UK Local Government Association (2004) estimated that the price of allowances would reach £100 per tonne.

The difficulties in setting an efficient target, and the potentially high cost of setting the wrong target, suggest it might be better to use ‘soft’ quotas. Having low penalties for underachieving the target, or releasing new entitlements into the market once a particular price ceiling is reached, would reduce the risk of imposing high compliance costs. However, the BDA Group and EconSearch (2004, p. 79) noted that this would essentially transform the TPR into a financial incentive mechanism with little benefit over existing levy approaches.

Potentially high implementation and administration costs

Development and implementation of a tradeable property rights instrument could require significant additional government expenditure. The BDA Group and McLennan Magasanic Associates (2003) presented case studies on introducing a tradeable certificate scheme and a tradeable landfill allowance scheme in Australia. It concluded that administrative costs were likely to be greater than for financial incentive mechanisms. For example, in the case of a tradeable certificate scheme similar to the PRN scheme they stated:

> The regulator would have a number of responsibilities including calculating the certificate liability, accrediting recyclers, creating and registering certificates, registering certificate sales, monitoring and auditing compliance, reporting on the system, setting penalty levels, invoking penalties and receiving surrendered certificates. There would need to be sound certification, tracking, auditing and reporting systems. (BDA Group and McLennan Magasanic Associates 2003, pp. 57-58)

To the extent that the costs of compliance are not controlled and may be greater in tradeable property right instruments, the incentives for illegal disposal and rorting of the scheme would also be greater. The BDA Group and McLennan Magasanic Associates (2003) noted that illegal dumping was a major policy concern in considering a tradeable landfill allowance scheme. A recent investigation into the UK PRN scheme (DEFRA 2004) found that some reprocessors and recyclers were incorrectly issuing compliance documentation that made it appear that they were recycling more packaging waste than they were. Thus, around 10 per cent of notes for plastic packaging waste were issued illegally in 2002 and 20 per cent in 2003.

FINDING 9.4

It is currently not clear what purpose tradeable property rights mechanisms would serve in Australian waste policy. Such mechanisms can be useful means of achieving targets cost effectively. However, developing meaningful waste disposal and resource recovery targets is practically impossible, and enforcing arbitrary targets can impose large costs on the community.

10 Extended producer responsibility and product stewardship

Key points

- Governments have urged industries to introduce extended producer responsibility or product stewardship schemes for numerous products.
- Such pressure has already led to various schemes — such as for packaging and mobile phones — and detailed proposals for others, including computers, televisions and tyres.
- Governments plan to encourage industries to develop more schemes by introducing a national system of regulation that prevents any firm from 'free riding' on the efforts of others.
- It is doubtful such a mandatory approach is justified for some of the products targeted by governments because:
  - the benefit from curtailing waste from the targeted products may be relatively small; and
  - mandatory arrangements tend to be costly, particularly when there are many firms in the industry that can rapidly enter and exit the market, and it is difficult to measure and enforce compliance.
- Case studies of existing and foreshadowed schemes show that governments have participated in — and sometimes demanded — the development of schemes without first providing a thoroughly-researched and clearly-articulated case for such intervention.
- To deal with this problem, the Commission recommends two reforms:
  - objectives should be reformulated to focus on reducing to acceptable levels the risks to human health, the environment and social amenity from waste (objects that detract from this focus, such as those relating to resource conservation and upstream environmental protection, should be removed); and
  - introduce a requirement that, before intervening, policy makers consider the findings of an independent review of scientific evidence on a product's alleged environmental and public health impacts, and a preliminary assessment of the likely costs and benefits of intervening.

In recent years, the focus of waste management policy has expanded beyond waste disposal to also include waste avoidance and materials recovery (chapter 3).

This shift has led to a new generation of policies that target those not directly involved in waste disposal. The broad concept underlying such policies has come to be known as either:

- extended producer responsibility (EPR), when the focus is on changing producer behaviour; or
- product stewardship (PS), when a wider range of parties are targeted.

This chapter reviews the case for EPR and PS, outlines how they are implemented, considers when their use is appropriate, and evaluates specific Australian examples.

10.1 What are EPR and PS?

Swedish academic Thomas Lindhqvist devised the term EPR in the early 1990s (AFGC 2003; Lindhqvist 2000; ISF 2001). While Lindhqvist and others subsequently worked on clarifying its meaning, the most widely accepted definition of EPR now appears to be one developed by the OECD:

> OECD defines EPR as an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle. There are two related features of EPR policy:
>
> 1. the shifting of responsibility (physically and/or economically; fully or partially) upstream toward the producer and away from municipalities; and
> 2. to provide incentives to producers to incorporate environmental considerations in the design of their products. (OECD 2001a, p. 9)

Thus, EPR is not a specific policy instrument, but rather a generic term for initiatives that make producers (at least partially) responsible for waste treatment and/or disposal of their products (Lindhqvist 2000; Tojo 2004). The responsibility assigned to producers does not have to be a requirement to physically take back products and process or dispose of them. Instead, producers could be made responsible for financing such activities by others.

Many local governments favour EPR, possibly because it shifts (at least some of) the financial and/or physical responsibility for waste management from councils to producers (Local Government Association of South Australia, sub. 102; Local Government and Shires Associations of New South Wales, sub. 98; Municipal Association of Victoria, sub. 113; WALGA 2004).

Others have questioned the efficiency of just targeting producers, given that many parties are involved in a product's life cycle (Department of the Environment and Heritage, sub. DR214; Packaging Council of Australia, sub. 67; National Packaging Covenant Industry Association, sub. 92; van Rijswijk 2001). This has led to interest in the broader concept of stewardship.

There are many definitions of PS, but they are often vague statements about responsibility being shared among all parties. One of the more useful definitions was developed by the Environment Protection and Heritage Council (EPHC), which defined PS as:

> An approach which recognises shared responsibility for the environmental impacts of a product throughout its full life cycle, including end of life management, and seeks to reduce adverse impacts and internalise unavoidable costs within the product price, through action at the point(s) in the supply chain where this can be most effectively and efficiently achieved. (EPHC 2004, p. 18)

Thus, PS can be interpreted as targeting those who can most effectively and efficiently manage an environmental problem (Wright 2002).[1] This raises the question of who are those parties.

10.2 Why not just target final consumers?

If there is a market failure associated with waste disposal, ideally this should be addressed by targeting final consumers, since they decide when a product is discarded and whether it is collected for recycling or reuse. Providing a signal directly to final consumers to curtail waste and recycle more should also feed into their purchasing decisions, and so encourage suppliers to provide goods with less end-of-life waste.

This approach would be consistent with the property rights assigned to consumers when they buy products. Once a product is sold to a consumer, they become responsible for it (IC 1991). If product owners were not made responsible for their possessions, a potential source of market failure known as 'split incentives' could arise — when owners do not bear the full consequences of their actions, they have little incentive to dispose of waste appropriately.

Nevertheless, many have argued that, in practice, just targeting final consumers is not an efficient or effective way of dealing with waste disposal (Calcott and

1 A similar approach was advocated by the IC (1991). Namely, liability for waste disposal should rest where the costs to the community of disposal are lowest, rather than at an arbitrary stage in the production or consumption process.

Walls 2000; OECD 2001a, 2005a; Palmer and Walls 1999; Porter 2002; Walls 2003; Department of the Environment and Heritage, sub. 103; Tasmanian Government, sub. DR164). They attribute this to the following sources of market failure:

- inability to set cost-reflective prices — it is not feasible to set disposal fees that vary between every single product according to its social cost of disposal, or pay for recyclable materials according to the value of the recoverable materials;
- imperfect information — consumers rarely know the likely end-of-life disposal cost or recycling benefit of goods they purchase, and so any signal sent to consumers to curtail waste may only be weakly transmitted upstream to suppliers;
- possibility of illegal dumping — it is difficult to make consumers always bear the total cost on the community of their waste disposal (by, for example, imposing a disposal fee) because it is relatively easy for them to illegally dump waste; and
- limited competition between producers — some have claimed that, even if a signal to curtail waste reaches producers, there may be few improvements in product designs, because producers face little competitive pressure to do so.

Thus, there can be difficulties in getting price signals to final consumers and in relaying those signals to producers to encourage product design changes that reduce end-of-life waste.

EPR and PS schemes are seen by their supporters as a way of overcoming such problems, because their effectiveness is less dependent on consumers changing their behaviour and on signals being transmitted through market transactions.

However, an EPR or PS approach should only be adopted if it would deliver a net benefit, and other policy options would not provide a greater net benefit. The circumstances where this is more likely to occur are considered later in this chapter, after first outlining how EPR and PS schemes are implemented.

10.3 Potential models for implementing EPR and PS

There are many different ways in which the broad concepts of EPR and PS could be implemented. This section summarises the potential administrative structures and policy instruments that could be used.

Administrative structure

There are four different models that can be used to structure an EPR or PS scheme:

1. voluntary industry initiative — firms participate on a voluntary basis and there is no direct government involvement (albeit there is often some coercion or strong encouragement);
2. voluntary industry–government agreement — both firms and governments are involved, but individual firms can choose not to participate;
3. industry–government co-regulation — a combination of industry self regulation and supporting government regulation, with the latter being used to ensure, among other things, no firm can 'free ride' on the efforts of others; and
4. government regulation — governments are solely responsible for setting and enforcing the rules.

Australian examples of these different models are given in table 10.1. There are also many examples in other countries. European countries in particular have been pioneers in developing EPR and PS schemes (Palmer and Walls 2002). One of the earliest and most well known examples is an ordinance Germany introduced in the early 1990s requiring producers to take back and recycle used packaging (Muenk 2001).

The self-regulation component of co-regulation is often described as voluntary (for example, National Packaging Covenant Industry Association, sub. 92; NPCC 2005). This is misleading, because the only other option for individual firms is to 'volunteer' for government regulation. In addition, industries have often adopted self-regulation in response to government coercion, rather than on a voluntary basis (section 10.4). The Commission considers EPR and PS schemes to be mandatory when they are based on co-regulation, since parties cannot free ride.

Voluntary versus mandatory approaches

Some inquiry participants were concerned that voluntary EPR and PS schemes enable firms to free ride on the efforts of others (for example, Australian Tyre Recyclers Association, sub. 51). Similarly, some have questioned whether a voluntary approach is effective, given that firms are expected to voluntarily bear the cost of addressing a market failure without being able to capture the resulting benefits to society (for example, Palmer and Walls 2002; Department of the Environment and Heritage, sub. 103; Product Stewardship Australia and Consumer Electronics Suppliers Association, sub. 66).

Table 10.1 **Australian examples of EPR and PS schemes, by administrative structure**

Administrative structure/product	*Scheme*
Voluntary industry initiatives	
Athletic shoes	Reuse-A-Shoe[a]
Office equipment	Cartridge Recycling Program[b]
Voluntary industry–government agreements	
Mobile phones	MobileMuster[c]
Newsprint	National Environmental Sustainability Plan (Newspapers)[d]
PVC products (excluding packaging)	Product Stewardship Commitment[e]
Chemical containers	DrumMuster[f]
Rural chemicals	ChemClear[f]
HDPE plastic bags	Code of Practice for the Management of Plastic Bags[g]
Industry–government co-regulation	
Consumer packaging	National Packaging Covenant and supporting regulation[h]
Ozone-depleting refrigerants	Refrigerant Reclaim[i]
Government regulation	
Oil	Product Stewardship for Oil program[j]
Beverage containers (SA)	Container deposit legislation[k]

[a] Operated by Nike Australia (2006) in conjunction with its US parent company. [b] Operated by Fuji Xerox. [c] Operated by the Australian Mobile Telecommunication Association. This scheme was recently revised following government pressure to include firmer targets (DEC 2006b). [d] Developed by the Newsprint Producer and Publisher Group (2005) — comprising Norske Skog Australasia and the Publishers National Environment Bureau — and endorsed by governments through the EPHC. [e] Made by the Vinyl Council of Australia (2002). [f] Both DrumMuster and ChemClear are managed by Agsafe. [g] This code of practice operated from October 2003 to December 2005 and was developed by the Australian Retailers' Association (ARA 2003) in conjunction with the EPHC. [h] The National Packaging Covenant is the self-regulation component of the scheme and is managed by the National Packaging Covenant Council (NPCC 2005). Parties that do not adopt the Covenant must comply with the supporting regulation component of the scheme, which is specified in the National Environment Protection (Used Packaging Materials) Measure and is implemented by individual states and territories. [i] Managed by Refrigerant Reclaim Australia and underpinned by the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989* (Cwlth). Individual firms can nominate an alternative to the Refrigerant Reclaim scheme, but so far none have done so. [j] Established under the *Product Stewardship (Oil) Act 2000* (Cwlth) and other legislation, and is administered by the Department of the Environment and Heritage. [k] Prescribed in the *Environment Protection Act 1993* (SA).

However, the cost borne by firms in changing a product or how it is managed may be negligible in some cases. Recently, for example, a PET (polyethylene terephthalate) bottle was produced with a PVC (polyvinyl chloride) sleeve label which created contamination problems during recycling. It was comparatively easy for the label material to be changed to avoid this problem. Producers could overlook such opportunities, not because they are costly, but because markets do not send a clear price signal about the benefits to the community. A voluntary EPR or PS approach could prompt producers to take action in such cases.

There are many examples of effective voluntary schemes, such as Fuji Xerox's take-back scheme for photocopier cartridges, Nike's Reuse-A-Shoe program for recycling athletic shoes into sporting surfaces, and the Cartridges-4-Planet-Ark scheme sponsored by various printer manufacturers and retailers (OECD 2001a; Planet Ark 2005; Schwartz and Gattuso 2002).

A major attraction of voluntary schemes is they tend to have lower administration and compliance costs than mandatory approaches. For example, voluntary schemes do not require the costly monitoring and enforcement measures associated with mandatory approaches. The typically lower cost of voluntary schemes could be important, since the potential benefit from reducing non-hazardous waste disposal may be small (chapter 4 and appendix B).

If the external benefit from addressing a non-hazardous waste disposal problem is considerable, it may be unrealistic to expect firms to voluntarily bear the (possibly large) associated cost. In such rare cases, a mandatory approach — involving either industry–government co-regulation or government regulation — may be the most appropriate option, provided the associated cost does not exceed the benefit. Costs and benefits are discussed in more detail later in this chapter.

Policy instruments

As noted previously, EPR and PS are broad principles rather than specific policy instruments. Indeed, there are many different policy instruments that could be used to turn the principles of EPR and PS into practice (examples are listed in box 10.1). Furthermore, a given EPR or PS scheme could use several of those instruments in combination to raise its efficiency and effectiveness (OECD 2001a).

It is, therefore, difficult to make general statements about the policy instruments used in an EPR or PS scheme. However, a scheme will usually be based on one of the following (table 10.2 lists examples):

- take-back requirements
- deposit refunds
- product leases
- performance targets
- advance disposal or recycling fees.

Mandatory take-back requirements in place overseas have proven to be very costly and not necessarily more effective than other policy options (chapter 8; National Packaging Covenant Industry Association, sub. 92). For example, the OECD (1998, p. 33) found that, under Germany's take-back scheme for packaging (Green Dot), the cost of recycling a tonne of used packaging that would otherwise have gone to final disposal 'effectively approach[ed] the costs of handling a tonne of hazardous waste'. Take-back requirements are not widely used in Australia and nor should they be, given their high cost and questionable effectiveness.

Box 10.1 **Potential policy instruments for EPR and PS schemes**

The policy instruments that could be used for an EPR or PS scheme include:

- **take-back requirements** — producers are required to take their products back from final consumers for the purpose of resource recovery and/or disposal;
- **product leases** — consumers lease the product and must eventually return it to the producer so that materials recovery and recycling can be undertaken;
- **advance disposal or recycling fees** — a fee is levied on a new product to (at least partially) subsidise the cost of its future disposal or recycling;
- **deposit refunds** — consumers pay a deposit when they buy a product and this is refunded when the product is returned to an approved dealer or specialised treatment facility;
- **tradeable recycling credits** — producers must obtain a certain number of recycling credits for every product they supply, either by earning them through their own recycling efforts or by purchasing them from others who recycle;
- **tradeable landfill diversion credits** — producers must obtain a certain number of landfill diversion credits for every product they supply, either by earning them through their own efforts to divert waste from landfill or by purchasing credits from others who do so;
- **education and awareness-raising** — information provision on how to dispose of a product or participate in a specific EPR or PS scheme;
- **labelling** — a product is labelled so that consumers have information on its environmental performance and/or how it can be recycled or disposed of;
- **targets** — producers must achieve specific outcomes, such as a minimum amount of recycled content per product; and/or
- **compliance measures** — such as penalties for non-compliance, bans on specific materials, and restrictions on disposal to landfill or a waste treatment facility.

Source: Adapted from DEC (2004d).

Similarly, deposit refund systems are rarely used in Australia and there is not a strong case for adopting them, particularly because they would tend to duplicate collection systems already operated by councils (chapter 9).

Product leasing seems to be best suited to machine parts, like photocopier cartridges, that are replaced after short periods of service and are very cost effective to reuse. It also appears to be more relevant to voluntary schemes run by individual suppliers. Leasing has little relevance to products that are not suitable for reuse, such as most packaging. It also has limited applicability to consumer durables, like televisions, since they are typically retained by householders to the point where obsolescence and general wear and tear means there is little scope for reuse.

Table 10.2 **Examples of EPR and PS schemes, by key policy instrument**

Key policy instrument /product	*Scheme*
Take-back requirement	
Packaging (Germany)	Packaging ordinance
Deposit refund	
Beverage containers (South Australia)	Container deposit legislation
Product lease	
Office equipment	Fuji Xerox
Performance target	
Consumer packaging (Australia)	National Packaging Covenant and supporting regulation
HDPE plastic bags	Code of Practice for the Management of Plastic Bags
Newsprint	National Environmental Sustainability Plan (Newspapers)
Advance disposal or recycling fee	
Oil	Product Stewardship for Oil program
Mobile phones	MobileMuster
Ozone-depleting refrigerants	Refrigerant Reclaim
Rural chemicals	ChemClear
Chemical containers	DrumMuster

Performance targets specify the desired outcome but not how you get there. An advantage of this approach is that firms can use their in-house expertise to find the lowest-cost way of achieving the outcome. A major disadvantage is that targets are often arbitrary goals, set with little apparent consideration of the tradeoff between a target’s benefits and costs. An example of this problem — the National Packaging Covenant — is discussed later in this chapter.

Advance disposal and recycling fees are popular policy instruments for EPR and PS schemes. Not only are they common among existing schemes (table 10.2), they are also expected to be the basis of forthcoming stewardship arrangements for televisions and tyres (JWGT 2005; Product Stewardship Australia and Consumer Electronics Suppliers Association, sub. 66; URS 2005).

Ideally, an advance fee would be set so as to bridge the gap between the total cost to the community of disposal/recycling and the financial cost firms and consumers otherwise bear. Firms and consumers would then have a signal about the total cost of their actions. However, as noted in section 10.2, it may be difficult to implement such pricing signals.

In practice, advance fees are usually set as a flat charge per product and are used to fund the financial (rather than the total) cost of disposal and recycling activities firms have agreed to facilitate. Thus, an advance fee is often used in combination with a commitment to use a particular waste disposal method or to meet a specific recycling target.

10.4 Recent policy developments

In recent years, the NSW, Victorian and WA Governments have adopted generic policies that could be used to underpin co-regulation or government regulation for specific EPR or PS schemes.[2]

To date, these generic policies have only been applied to a limited degree. However, their existence has been used to pressure numerous industries to introduce EPR or PS schemes. Most notably, governments have published lists of products for which they expect firms to take action.

Government pressure on industries

In 2004, the NSW Government identified 16 types of waste that it considered suitable for management by an EPR scheme (DEC 2004b). The WA Government (2004) noted this list was also a useful basis for its policies.

The NSW Government has since revised its list of targeted products to cover 17 products (table 10.3). Some of these are already subject to an EPR or PS scheme, but were listed because the Government considered the existing scheme 'needs to more clearly demonstrate that it is delivering' (DEC 2006b, p. 3). The NSW Government has given greatest priority to ensuring action on computers, mobile phones, office paper, paint, plastic bags, televisions and tyres. Similarly, the WA Government has given priority to polypropylene, paint, computers, tyres, concrete and mobile phones (WMB 2006).

As part of its most recent announcement of priority products, the NSW Government judged what progress individual industries had made in establishing effective EPR arrangements (DEC 2006b).[3] The statement warned the relevant industries they could be subject to government regulation in the future if they did not 'deliver real results'. Various industry associations noted they were being pressured by the NSW

2 In New South Wales, the policy was specified in the *Waste Avoidance and Resource Recovery Act 2001*. Victoria established its policy in 2001 by amending the *Environment Protection Act 1970*. Western Australia's arrangements were announced in a policy statement in June 2005 (WA Government 2005a) and further details were provided in a draft bill and explanatory notes in August 2006 (WA Government 2006a, 2006b).

3 The NSW Government published a similar evaluation in 2004 (DEC 2004b).

Government (for example, Australasian Paper Industry Association, trans., p. 1049; Australian Electrical and Electronic Manufacturers' Association, trans., p. 1010). The WA Government (2006a) plans to take a similar approach.

Table 10.3 **Products targeted under the NSW Government's EPR policy**

1. Agricultural/veterinary chemicals	10. Packaging
2. Agricultural/veterinary chemical containers	11. Paint[a]
3. Batteries	12. Plastic bags[a]
4. Cigarette butts	13. Polyvinyl chloride
5. Computers[a]	14. Televisions[a]
6. End-of-life vehicle residuals	15. Treated timber
7. Mobile phones[a]	16. Tyres[a]
8. Office paper[a]	17. Used oils and lubricants
9. Other electrical products	

[a] Identified by the NSW Government as a priority during 2006 because it considered the existing EPR scheme needs to more clearly demonstrate that it is delivering; or there is currently no EPR scheme and one is urgently needed due to high volumes of waste and/or low levels of recycling.

Source: DEC (2006b).

The Victorian Government (2005) has indicated it wants to see stewardship arrangements established for televisions, computers and information-technology equipment, other electrical and electronic products, tyres, consumer packaging (including plastic bags), paint, mercury-containing lamps, batteries, motor vehicles, treated timber, and domestic chemicals and related packaging.

Listing products of concern is not the only way in which governments have applied pressure to industries. Governments have, via the EPHC (2005a), publicly warned that regulation is an option for the computer industry if it fails to establish a self-regulation scheme that covers most computer waste. When the EPHC's member governments decided that insufficient mobile phones were being collected under an existing take-back scheme, they 'commenced negotiations' with the mobile phone industry to strengthen it (Department of the Environment and Heritage, sub. 103, p. 60). For plastic bags, the Australian Retailers' Association noted it was subject to 'strong government pressure' prior to developing its code of practice (ARA 2006).

Selection criteria used by governments

The Commonwealth, State and Territory Governments have acknowledged that not every product is suitable for an EPR or PS scheme (DEC 2004b, 2006b;

EPHC 2004; WA Government 2005a). To help them identify which products to target, the Governments have developed selection criteria (box 10.2).[4]

However, the Governments' criteria tend to be unfocused and are potentially inconsistent. For example, the NSW Government lists community concern about a waste as one of its criteria, but such concern may not reflect the waste's actual impact, which is another criterion used by the Government. There is little indication of the weight given to different criteria when such inconsistencies arise, or whether specific criteria take precedence over others. In addition, the NSW Government's criteria seem to imply that waste avoidance and resource recovery always deliver a net benefit to the community (in particular, the third and fourth criteria listed in box 10.2).

Box 10.2 **Criteria that governments use for EPR and PS schemes**

The NSW Government has identified priority wastes for future EPR schemes based on:

- detrimental environmental and/or public health impacts resulting from the recovery and/or disposal of the product;
- total volume of the waste requiring disposal and/or the percentage of the waste stream it comprises;
- potential for waste avoidance, reuse or beneficial resource recovery;
- potential to contaminate waste streams and limit opportunities for resource recovery;
- likelihood of illegal disposal through dumping or littering;
- level of community concern about the waste; and
- extent to which EPR is the appropriate tool for managing the waste.

The WA Government has also adopted these criteria, but with the extra condition that producers have the capacity to take action or to influence all of the supply chain.

The Victorian Government has identified priority products for stewardship schemes on the basis of:

- quantities of waste disposed to landfill now and predictions for the future;
- adequacy of current systems for recycling;
- environmental impacts arising from disposal (including toxicity);

(Continued on next page)

4 Box 10.2 mentions the EPHC's threshold criteria for co-regulatory schemes. These should not be confused with the EPHC's National Waste Framework (DEH, sub. 103, appendix E), which the Commission considers to be sound in most respects (chapter 6).

Box 10.2 (continued)

- cost to the community and recycling industry of managing discarded products and opportunities for improved management;
- adequacy of current systems not only for recycling, but also in managing environmental impacts from production through to consumption;
- environmental and health impacts (including toxicity) from disposal, as well as production and other stages of the life cycle; and
- existing federal and state jurisdictional priorities.

The EPHC nominated eight 'threshold criteria' for PS schemes involving co-regulation. These included clearly-identified costs and benefits, commitment and participation by most firms in the industry, a national approach, and a clear case that regulation is needed to ensure the scheme is effective.

Sources: DEC (2004b, 2004d, 2006b); EPHC (2004); EPR Expert Reference Group (2005); Victorian Government (2005); WA Government (2005a).

A better approach would be for governments to focus on the following two requirements for any proposed EPR or PS scheme:

- it delivers a net benefit to the community
- other policy options would not provide a greater net benefit.

The conditions under which an EPR or PS scheme is more likely to deliver a net benefit is considered in section 10.5 of this chapter.

Governments' preferred administrative structure

Various governments have expressed a preference for co-regulation (DEC 2006b; Department of the Environment and Heritage, sub. DR214; Victorian Government 2005; WA Department of Environment, sub. 101; WA Government 2005a, 2005b). This may be because co-regulation is seen as more flexible and less costly than a system based solely on government regulation (Department of the Environment and Heritage, sub. 103). In this regard, the Department of the Environment and Heritage (DEH) noted:

> While achieving a necessary environmental outcome, companies are free [under industry–government co-regulation] to choose the response that is most appropriate to their products and their businesses and the timing of particular initiatives. Flexible co-regulatory schemes on matters of national significance are therefore likely to be more efficient for individual firms ... (sub. DR214, p. 12)

Major cost differences between co-regulation and government regulation are evident from European countries' experiences with packaging waste. Germany's regulation requiring producers to take back and recycle packaging is widely viewed as having been very costly, because it duplicates municipal collection and recycling systems (Hanisch 2000; Porter 2002; Schwartz and Gattuso 2002; Packaging Council of Australia, sub. 67). In contrast, the Government of the Netherlands negotiated a co-regulation approach with industry. The self-regulation component was implemented in 1991 as a packaging covenant between government and industry (OECD 2001a). This approach has been far less costly than the German regulation (Schwartz and Gattuso 2002).

Governments might also prefer co-regulation because it enables some of the costs of administering a scheme to be transferred to industry. Furthermore, co-regulation might reduce industry resistance to having an EPR or PS scheme by creating the impression that firms designed it and volunteered to be subject to it.

Proposed national approach

The prospect of individual Australian states and territories introducing their own EPR or PS schemes has raised concerns about regulatory inconsistency between jurisdictions, given that many products are traded nationally. In addition, it is doubtful that individual states (or territories) could legally enforce some EPR and PS policy instruments, such as advance disposal fees and product take-back requirements, due to constitutional and other legal constraints (DEH, sub. 103; Business Roundtable on Sustainable Development, sub. 70; chapter 9). State (and Territory) Governments are therefore working together with the Commonwealth Government to develop a national approach that, like the state-based policies already in place, favours co-regulation.

The proposed national approach would involve the introduction of general-purpose regulation — specified in a National Environment Protection Measure (NEPM) — that could be used as part of any co-regulatory scheme (EPHC 2005f). It is envisaged that product-specific schedules will be attached to the NEPM. Products under consideration for incorporation in the NEPM include computers, televisions and tyres (DEH, sub. 103).

The EPHC (2006) has announced that a regulation impact statement (RIS) for the NEPM will be released in late 2006, as required under the regulatory principles adopted by COAG (2004). This would also be consistent with the recommendation of the Regulation Taskforce (2006) — which has been adopted by the Australian Government (2006) — that further analysis be undertaken to assess the merits of a generic product stewardship NEPM.

Various firms and industry associations have publicly supported national co-regulation (for example, Australian Tyre Recyclers Association, sub. DR169; Canmakers Institute of Australia and the Steel Can Recycling Council, sub. 115; Joint Working Group Tyres, sub. 75; National Packaging Covenant Industry Association, sub. 92; Plastics and Chemicals Industry Association, sub. DR203). However, the Commission is concerned this may be largely because industries fear the apparent alternatives — a system of inconsistent state-based schemes or mandatory regulation over which they have less influence. The DEH conceded this had been a rationale for the National Packaging Covenant:

> The counterfactual position was that jurisdictions were determined to act to reduce packaging, so this would inevitably have risked an array of onerous, inefficient and inconsistent schemes.
>
> … many in industry prefer the National Packaging Covenant due to the national consistency it offers. (sub. DR214, pp. 8–13)

Some of the industries targeted by governments have cited evidence suggesting an EPR or PS scheme is not justified for their product (section 10.6 provides examples). However, getting governments to consider such evidence is likely to be difficult for an industry, since it is often contrary to popular perceptions and can easily be dismissed as self-interested lobbying. In such circumstances, it is understandable that industries facing pressure from governments and environmental groups to introduce an EPR or PS scheme would conclude the ‘least-worst’ option is to support a national approach. Their support can then be presented to the public as a case of firms supporting a national scheme.

The Commission, therefore, considers that industry support for an EPR or PS scheme has to be viewed in the context of the pressure applied to the industry, and public perceptions about its products. Some firms may also support an EPR or PS scheme because they believe their costs would increase by less than those of existing and potential competitors (discussed further in the next section).

10.5 When is EPR or PS likely to deliver a net benefit?

This section considers the potential benefits and costs from an EPR or PS scheme, and under what conditions there is likely to be a net benefit. To illustrate the points being made, the analysis draws on case studies of three Australian schemes — for newsprint, waste oil and consumer packaging — detailed in appendix C.

What are the benefits?

The benefits resulting from an EPR or PS scheme will depend on two factors:

- the scale of the market failures being addressed
- how effective the scheme is in addressing those market failures.

Scale of the market failures

For many products, it appears unlikely that waste-related market failures impose a significant cost on the community (chapter 4 and appendix B). Thus, the potential benefit from an EPR or PS scheme is probably small in most cases.

The Commission does not claim to have comprehensively reviewed scientific evidence on the impacts of products targeted for EPR and PS schemes. It is up to policy makers to demonstrate that a product has adverse environmental or public health impacts if they want to address such impacts with an EPR or PS scheme. To date, advocates of EPR and PS schemes have tended to highlight potential impacts in broad terms, with little specific evidence for Australia (discussed further in sections 10.6 and 10.7). In addition, they rarely explain why research results that do not support the case for government intervention can be dismissed. An example of such contrary research is provided by Planet Ark, which found the external cost from depositing computer equipment in Australian landfills is unlikely to be significant:[5]

> Planet Ark research has indicated that:
>
> - Much of the concern regarding e-waste relates to its composition and the potential for materials making up these products to leach from landfill into the wider environment.
> - While e-waste contains a variety of materials that are considered hazardous or potentially environmentally damaging — lead in CRT [cathode-ray tube] screens and solder, flame retardants in plastic and other metals and chemicals — their environmental impact in a landfill context depends on a wide range of factors, including the composition/scale of the remainder of the waste stream, the manner in which the landfill is managed (particularly leachate controls) and its design and construction.
> - While computer CRT monitors contain substantial quantities of lead (between 0.5 and 3 kilograms dependant on size), this is mostly contained within the glass structure and is not generally available to rapid extraction by leachate …
> - In recent years greater attention has been paid to the location, design, construction and management of landfills (and leachate), which suggests that the potential for adverse

5 Gattuso (2005) reached a similar conclusion for the United States, based on a review of scientific studies on the impacts of landfilling electronic equipment.

> impact of computer and related equipment disposal has been reduced. (AIIA and Planet Ark 2005, p. 32)

Planet Ark has also concluded that the test often used to demonstrate problems with landfilling cathode-ray tube (CRT) monitors is misleading:

> The test commonly used to determine leachability … involves crushing the glass to be tested into particles that can pass through a 9.5 millimetre sieve (and smaller), digesting this material with an acidic solvent and analysing it for lead. While a proportion of computer CRT monitors (and televisions) that have been landfilled are likely to be broken by compaction equipment, the glass is unlikely to be reduced to such small particle size. The relevance of this test method is therefore questioned, particularly as the rate of lead leaching into the landfill is critically dependent on the particle size of CRT glass — it is surface area dependent. (AIIA and Planet Ark 2005, p. 33)

Nevertheless, the Victorian Government (2006) recently announced that it would make a pilot computer recycling trial in Melbourne — known as Byteback — permanent and, subject to assistance from the computer industry, expand the scheme across Melbourne and regional Victoria.

To illustrate the potential for misguided EPR and PS schemes, Planet Ark noted the European Union's directive for nickel cadmium (NiCad) batteries:

> The current debate regarding computer recycling brings to mind rationales provided for the recycling of NiCad batteries, again widely practiced in Europe under their Battery Directive.
>
> The most quoted reason relates to the toxic nature of cadmium and its ability to accumulate in the food chain.
>
> A study completed for the European Commission … states that the risks associated with the use/life cycle of NiCad batteries is extremely small: 'Under the worst case scenarios, NiCad batteries contribute less than 1 per cent of the anthropogenic emission sources' (the majority of the other 99 per cent comes from fertiliser — usually applied directly to crops, including food crops). (AIIA and Planet Ark 2005, p. 34)

In Australia, a stewardship scheme for consumer packaging — the National Packaging Covenant and supporting regulation — applies to a product that does not appear to involve significant waste-related market failures. In particular, it is essentially a non-hazardous waste. There appears to be little evidence of a problem that justifies such an elaborate and costly scheme, other than that consumers receive little or no price signal about the cost of disposal (discussed further in section 10.6).

In contrast, the potential payoff for some hazardous wastes could be significant. Indeed, some participants argued that EPR and PS schemes should be limited primarily to hazardous or difficult-to-manage products, because they are the only products where the benefits are likely to outweigh the costs (Australian Electrical and Electronic Manufacturers' Association, sub. 59; Australian Food and Grocery Council, sub. 93).

An example of a potentially hazardous product is waste oil, which is subject to the Product Stewardship for Oil (PSO) Program (appendix C). This scheme addresses a clearly-identified and potentially-significant problem. Namely, market failures leading to the disposal of a hazardous product in a way that could have adverse impacts on human health and the environment (Allen Consulting Group 2004; DEH 2005e).

Effectiveness in addressing market failures

The effectiveness of an EPR or PS scheme will depend on the extent to which any resulting change in behaviour addresses the market failures. This will be a function of a range of factors, including the extent of non-participation or free riding; how important the Australian market is to producers; how orphaned and existing products are dealt with; the extent to which a scheme's administration is centralised; and the ability to target the most appropriate parties. These factors are discussed below.

Free riding

Free riding by targeted firms is less likely if:

- the cost of participating in the scheme is low;
- the relevant firms can be readily identified and made accountable, and they will remain in the industry over the long term;
- it is easy to measure whether the desired changes in behaviour occur; and
- there is a readily enforceable deterrent to free riding, such as a financial penalty.

An example of where free riding would be hard to prevent is personal computers. This product is often supplied by small businesses that can rapidly enter and exit the industry, making it difficult to detect and penalise non-compliance, and to prevent suppliers from leaving a legacy of 'orphaned' products for others to deal with.

The NSW Government has estimated that up to 40 per cent of computers sold in Australia are 'white-box' (unbranded) products supplied by small businesses (DEC 2006b). Nevertheless, the NSW, Victorian and WA Governments have given priority to establishing stewardship schemes for computers (DEC 2006b; Victorian Government 2005; WA Government 2004). The Australian Information Industry Association (AIIA) responded to such pressure in 2005 by proposing a stewardship scheme for the computers supplied by its members, but this was rejected by governments because it only covered about half of all computers sold in Australia (EPHC 2005a). The AIIA is now developing an alternative proposal that seeks to capture all producers (discussed further in section 10.6).

In contrast, there are relatively few firms involved in producing or using newsprint for newspapers and magazines. In the early 1990s, those firms successfully negotiated between themselves to establish a stewardship scheme for newsprint that appears to be effective (appendix C). This scheme continues to operate, with an updated agreement made between the parties in October 2005 (Newsprint Producer and Publisher Group 2005).

Relative importance of Australian market to producers

One of the key benefits attributed to EPR and PS schemes is that they cause producers to shift to less wasteful product designs. However, this is unlikely to occur when Australia is a small market for the producer, as is the case for many manufactured goods.

Thus, recent government efforts to establish stewardship schemes for computers and televisions — products that are mostly imported into Australia — may not lead to major changes in product designs.

The DEH (sub. 103) acknowledged this constraint, but concluded Australian policies are more likely to be effective when similar EPR or PS schemes exist overseas. While it seems pointless for Australia to independently attempt to make policy in areas where it has little influence, there may be a role for Australian policies to complement those of other countries, if it limits the importation of highly problematic or difficult to recycle products.

Orphaned and existing products

Orphaned and existing products can be a significant constraint on an EPR or PS scheme's efficiency and effectiveness. The OECD defined such products as follows:

> Orphaned products are those subject to EPR requirements whose producer has disappeared due to bankruptcy or for other reasons.
>
> Existing products are those designed and/or introduced on the market before EPR requirements were established. (OECD 2001a, p. 87)

The problem of orphaned products is more likely to arise when there is a high level of turnover of firms in the industry, possibly because it is relatively easy to enter and exit the market. As noted previously, this is the case for personal computers.

Existing products can be a problem because they were designed without consideration of the requirements of a future EPR or PS scheme, and so may be very costly to manage at the post-consumer stage. This will tend to be a more significant issue for durable goods — such as televisions and motor vehicles — because it takes many years for the nation's stock of such goods to be replaced.

AIIA and Planet Ark (2005) estimated it would cost $156 million to $1161 million to collect and recycle existing personal computers (including those no longer in working order). The wide range of estimates was largely due to uncertainty about the volume of computers that could potentially be involved.

The Australian Tyre Recyclers Association (sub. 51) claimed orphaned products were not a significant problem in the case of tyres. It asserted existing stockpiles of old tyres could be dealt with at 'moderate' cost.

Some have argued for a 'pay-as-you-go' approach to funding the treatment of orphaned and existing products (for example, Veerman 2004). This would involve a fee on new products to fund the disposal or recycling of similar products already at the post-consumer stage. A drawback of this approach is that it weakens the link between the disposal or recycling fee and the actual cost of disposal or recycling (OECD 2001a). It also raises equity concerns about today's consumers being forced to pay for products that others bought in the past, and were designed without considering the requirements of a future EPR or PS scheme.

Centralised administration and flat charges

Some aspects of an EPR or PS scheme — such as waste collection and the levying of an advance recycling fee — are often undertaken by a collective industry body or government organisation.

While this approach can reduce the administrative and compliance costs of a scheme, it may also limit the scheme's effectiveness. This is because centralised administration tends to dilute the signal producers are given to make waste-reducing changes to their products. In particular, it is common for an administrative body to levy a flat per-unit charge on firms for its services, rather than attempt to set charges according to the cost of collecting and disposing or recycling specific models and brands (chapter 9).

Flat charges are used because their administrative simplicity is seen to outweigh the case for cost-reflective charges that reward individual producers for supplying goods that are easier to dispose or recycle. For example, Product Stewardship Australia (sub. 66) noted the most likely approach for televisions would be a flat advance recycling fee on each product regardless of screen size, type of display or brand. However, this will tend to penalise producers whose goods are less costly to dispose or recycle (OECD 2005a).

Targeting the most appropriate parties

Another constraint on effectiveness is the difficulty in identifying which stage in a product's life cycle is the most efficient to target, and what responsibilities should be assigned to the relevant firms. There are many possibilities, including designers, manufacturers, distributors and retailers.

The OECD (2001a) argued those with greatest control over materials selection and product design should be targeted. However, this will be impractical if such parties do not have a physical presence in Australia or have ceased operations. A better approach would be to target the point in a product's life cycle where it is least costly to address the environmental problem (IC 1991; chapter 6).

What are the costs?

There are many potential costs associated with an EPR or PS scheme, particularly a mandatory one. This section discusses some of the more significant costs.

Establishment and administration costs

The cost of establishing and then administering an EPR or PS scheme will tend to be lower for the same reasons it is more likely to be effective. That is, if there are a small number of firms to target, they remain in the industry over the long term, and it is straightforward to measure and enforce their compliance.

The DEH (sub. 103) acknowledged that significant resources can be required to establish a stewardship scheme. It observed that negotiations began in 1999 to establish schemes for televisions and tyres and they have yet to reach a conclusion. The DEH also noted there had been a 'very long lead-up' to the establishment of a stewardship scheme for consumer packaging in the late 1990s (trans., p. 629).

The Commission considers the computer industry will also pose difficulties, since there are a large number of small producers, making it difficult for governments to negotiate their preferred model of co-regulation. Furthermore, the large number of small businesses will make it costly to measure and enforce compliance, as noted by AIIA and Planet Ark:

> The fragmented and variable nature of the market, together with the high percentage of orphan or unbranded products amongst historical material makes it difficult to design

> and enforce the implementation of a scheme that is equitable and competition-neutral and that covers the cost of the recovery of this material (which is as yet unknown). (AIIA and Planet Ark 2005, p. 8)

Protracted negotiations over an EPR or PS scheme are not only costly in their own right, but also because of the uncertainty they create. Such uncertainty will tend to discourage firms from useful activities like investing and launching new products.

Compliance costs

The costs firms incur in complying with an EPR or PS scheme will have a major bearing on whether it delivers a net benefit.

The DEH claimed there is a tradeoff between compliance costs and effectiveness, and its preferred model of co-regulation provides the best compromise between the two:

> There is always a trade-off to be made between the costs of compliance (including costs of reporting and monitoring) and the effectiveness of the policy. Co-regulation provides a good compromise between high cost, inflexible policy options (such as mandatory EPR schemes) and less costly but less effective or potentially unworkable options (such as voluntary product stewardship agreements). (sub. DR214, p. 13)

However, there is little robust evidence available on the costs to Australian firms of complying with existing EPR and PS schemes. For example, the compliance costs of the National Packaging Covenant are probably high, since firms have to develop action plans and report detailed data annually. However, the RIS prepared for the Covenant (Nolan-ITU 2005) only considered compliance costs in a very superficial way, and the methodology probably biased the results towards significantly underestimating costs (section 10.6).

A more thorough analysis of the stewardship scheme for waste oil has been undertaken, although still with limited quantitative information. The most recent evaluation of the oil scheme indicated the administrative arrangements were complex — and hence potentially costly — because of their reliance on the excise and customs arrangements (Allen Consulting Group 2004).

The Australian Electrical and Electronic Manufacturers' Association (AEEMA) noted that firms have an incentive to reduce the cost of complying with environmental regulations, and have done so:

> … data from the OECD and other global bodies would indicate that the costs of addressing environmental regulations (either EPR models or the more blunt legislative approach) can be minimised and even eliminated through innovation that delivers other benefits. Voluntary agreements between industry and government (EPR or other

> product stewardship models) can be useful policy tools to promote innovation. Companies will innovate in response to tighter waste regulations — they will change products and processes so that they generate less waste, and in so doing they save money (from better processes) and then find an opportunity to market that better product at a premium. (sub. DR182, pp. 2–3)

However, firms can be expected to seek to reduce their compliance costs regardless of whether a regulation is appropriate or not. Policy makers need to take a broader perspective by asking themselves what is the net impact on the whole community relative to other policy approaches (including no intervention).

Schemes that are genuinely voluntary — in the sense they allow free riding and are not created in response to government coercion — may have the lowest compliance costs. The arrangements for recycling newsprint could be an example of this (appendix C). However, as noted previously, voluntary schemes are unlikely to be effective unless most of the benefits can be captured by participating firms.

Regulatory gaming and anticompetitive effects

Where an industry has more than a handful of firms, governments have sought to negotiate co-regulation arrangements with an industry association. For example, governments have been negotiating with the AIIA over a stewardship scheme for computers. In principle, dealing with an industry association can reduce the establishment costs for both governments and firms.

Similarly, firms have sometimes sought to reduce the cost of complying with an EPR or PS scheme by establishing a producer responsibility organisation (PRO) to act on their behalf. For example, Germany's packaging ordinance led to the establishment of an industry body — Duales System Deutschland — that licenses its Green Dot logo to firms to fund collective industry efforts to gather and recycle packaging (Hanisch 2000; Palmer and Walls 2002). The alternative of each producer setting up its own collection and recycling systems would have significantly increased the cost of the regulation.

A local example is Product Stewardship Australia (PSA). This organisation was established largely through the efforts of the Consumer Electronics Suppliers' Association (CESA) to negotiate and implement stewardship schemes for consumer electronics, with initial emphasis on televisions (PSA and CESA, sub. 66). Thus, PSA aims to be the PRO for such products, and to take a leading role in negotiating the details of the co-regulation it would implement.

A major risk with industry associations and PROs taking a leading role is they can be dominated by a handful of firms whose interests do not necessarily coincide with those of other parties in the industry or consumers. Thus, there is potential for some firms to 'game' the system by ensuring the introduction of rules that increase competitors' costs relative to their own. However, Agsafe (sub. DR168) noted it managed two stewardship schemes on an industrywide basis — DrumMuster and ChemClear — and these had been authorised by the Australian Competition and Consumer Commission (ACCC 2005).[6]

Nevertheless, it is notable that industry associations and firms involved in negotiating stewardship schemes typically express the view that such schemes must prevent any firm from free riding (for example, Australian Tyre Recyclers Association, sub. 51; PSA and CESA, sub. 66). In defence of this view, AEEMA observed:

> It is a truism that any stewardship scheme must ensure all industry players are treated the same way — allowing free riders merely undermines the integrity of the scheme and promotes anticompetitive behaviour. This is the reason why associations will always be adamant that rules must apply equally to all parties — it is not a case of creating rules that favour one over the other, but quite the opposite. (sub. DR182, pp. 4–5)

However, it is unlikely that a given set of rules will have the same impact on all firms. Some are likely to benefit (or lose) more than others, and it is in the interests of firms to influence a scheme to their own advantage:

> … being in a situation where we think we are doing the right thing, we're not afraid of additional regulatory requirements coming in [that], you know, perhaps puts us in a better position being a large company than some of the smaller players who might in fact find it more difficult to meet some of these requirements. (AEEMA, trans., p. 1013)

The Business Roundtable on Sustainable Development (BRSD, sub. 70) claimed that anticompetitive behaviour was evident in the recycling market for lead-acid batteries. It noted there were only two recyclers operating in Australia's larger cities, and referred to (unsuccessful) legal action one of those firms had taken to

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6 The DrumMuster and ChemClear schemes are managed by Agsafe on behalf of CropLife Australia, Animal Health Alliance (Australia), the National Farmers' Federation, the Veterinary Manufacturers and Distributors Association, and the Australian Local Government Association. The schemes are funded by a per-unit levy imposed on chemical manufacturers.

The *Trade Practices Act 1974* (Cwlth) prohibits certain forms of anti-competitive agreements, including agreements between competitors that limit their ability to deal with whom they choose or on the terms they choose (including price). Authorisation provides immunity from court action under the Act arising from such agreements but can only be granted where the ACCC is satisfied that the public benefit flowing from the conduct outweighs any public detriment.

prevent its competitor from transporting used batteries to a processing plant in New Zealand:[7]

> Evidence presented at the legal proceedings cited, pointed to less than complete collection of used batteries as well as competition policy issues, in the highly concentrated used-battery/lead-scrap market in Australia.
>
> In this latter respect, industry concentration (two companies) in the ULAB [used-lead acid battery] recycling market has allowed strategic and anticompetitive behaviour that appears to be reducing or resulting in incomplete collection of ULABs. (BRSD, sub. 70, support document 7, p. 58)

The DEH acknowledged that restricted competition may be an unintended outcome of stewardship schemes but:

> If it is part of a co-regulatory agreement, the regulatory requirements are no different from any other regulation and would be subject to cost–benefit analysis and a regulatory impact statement. The fact that the product stewardship agreement provides flexibility (within a co-regulatory framework) means that it is less likely to act as a barrier to entry than would a straight regulatory approach. (sub. 103, p. 61)

Given the poor quality of some cost–benefit analyses — especially for the National Packaging Covenant (section 10.6) — it is doubtful such analyses discourage all anticompetitive impacts. It is also doubtful the so-called flexibility of co-regulation is a barrier to possible anticompetitive impacts.

The DEH also asserted:

> The risk of industry capture can be minimised by designing the [stewardship] scheme in such a way that:
>
> - the desired environmental outcomes are clearly specified;
> - the operation of the scheme is transparent, so that companies can be held accountable for their performance;
> - sanctions for non-participation or non-compliance are available and enforced; and
> - third parties such as non-government organisations have the opportunity to participate in the scheme's ongoing development and monitoring.
>
> These concerns were addressed in the negotiation of the second National Packaging Covenant. (sub. DR214, p. 13)

While these may be desirable features for a stewardship scheme, it is not clear why they would necessarily prevent regulatory gaming and anticompetitive effects. Furthermore, the Commission does not consider the National Packaging Covenant

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7 *Australian Refined Alloys Pty Limited and the Minister for the Environment and Heritage and Anor* [2003] AATA 247 (17 March 2003).

to be an example of good regulatory practice (detailed further in section 10.6 and appendix C).

Distorting the market in favour of particular products

Some EPR and PS schemes involve the collection of an advance fee on new products to fund disposal or recycling. A problem with this approach is it can be used to 'pick winners'.

For example, Australia's stewardship scheme for waste oil uses an advance recycling fee to partially offset the cost of recycling the product. The recycling subsidies now established provide a significant preference in favour of re-refined base oil, sometimes referred to as 'lube-to-lube' (appendix C). A formal evaluation of the scheme concluded this distortion is not warranted on environmental or economic grounds, and recommended the disparity in subsidy rates between different products be reduced (Allen Consulting Group 2004).

The Cement Industry Federation expressed similar concerns about the subsidy rates for recycled oil:

> The PSO has introduced market inequities by providing disproportionate support for technologies with similar environmental outcomes. For example, the PSO provides a benefit of 50c/litre for lube-to-lube oil recycling compared to 3c/litre for the cement kilns that recover energy. (sub. 71, p. 8)

In contrast, Australia's only operator of a used oil refinery (Southern Oil Refineries, sub. DR192) and the DEH (sub. DR214) disputed the findings of the PSO evaluation, and cited more recent evidence to support the current subsidy rates (appendix C). The Commission has not made a finding or recommendation on this matter because it is beyond the terms of reference for this inquiry, but notes the subsidies should be based on the externalities avoided, not 'infant-industry' arguments or favouring particular industries in a manner suggested by the waste hierarchy.

Tradeoffs with other objectives

Imposing waste-related EPR or PS requirements on firms may come at the cost of compromising other objectives, such as product safety and energy efficiency. For example, with respect to appliances, AEEMA noted:

> … in addition to waste management, the design of electrical products is influenced by other areas of public policy, intended to achieve desirable outcomes for our community. Principal areas are safety and energy efficiency, both of which are the subject of regulation in a number of jurisdictions. Often the aims in the different policy

> areas are in conflict as they influence the design of products. For example, the increased use of foam insulation in fridges and water heaters (in order to achieve the mandated improvements in energy efficiency) has the potential to cause an increase in the volume of shredder floc created when the product reaches its end of life. Likewise, improvements in appliance design aimed at achieving the safety outcomes required by regulation can increase the amount of waste generated. It is important that the correct balance is struck between all areas of public policy having an impact on the design and manufacture of electrical products. (sub. DR182, pp. 1–2)

It is also possible for one waste-related stewardship scheme to conflict with another. For example, the Cement Industry Federation claimed that Australia's oil recycling scheme undermines the viability of the ChemClear scheme for rural chemicals:

> … the majority of the chemicals collected through the ChemClear program end up in cement kilns as a blend component of a liquid kiln fuel, thereby providing an eminently suitable recovery method. The ChemClear program owes its success to the viability of this downstream energy-from-waste recovery operation. Quite perversely, the Product Stewardship for Oil Program, another PS scheme, through its differentiation of subsidy rates is impacting another critical blend component of the same kiln fuel — waste oil, effectively threatening the ongoing viability of the ChemClear program. (sub. DR174, p. 3)

Is there a net benefit to the community?

The above analysis indicates the benefits and costs of an EPR or PS scheme are very dependent on the characteristics of the relevant product and industry, as well as the chosen administrative structure and policy instruments. Thus, the existence of a net community benefit from an EPR or PS scheme should never be taken for granted. Such schemes should only be adopted after very careful consideration of what is the problem and what is the cost of doing something about it.

While it is not possible to reach a general conclusion on whether EPR and PS schemes have a net community benefit, there are certain characteristics that provide a strong indication of the likely outcome. From the above analysis, it is clear that important indicators will be how hazardous the waste is; the administrative structure and policy instruments used; how difficult it is to measure and enforce compliance; and the ease with which relevant firms can be identified and made accountable, and their likelihood of remaining in the industry.

Recent government activity suggests that policy makers are currently interested in a number of mandatory co-regulatory schemes for products that are not prescribed as being hazardous. As noted previously, governments are currently developing a national policy framework along such lines.

The Commission considers that mandatory co-regulatory schemes for many of the products targeted by governments are likely to have a net cost. The above analysis indicates the cost of mandatory requirements tends to be high, particularly when it is difficult to identify relevant firms; they can rapidly enter and exit the market; and it is difficult to monitor and enforce compliance. In contrast, the benefit from curtailing waste from the targeted products may be small (chapter 4 and appendix B).

Schemes that are genuinely voluntary — in the sense they allow free riding and are not created in response to government coercion — will tend to impose lower costs than mandatory ones. However, the ability of firms to opt out of voluntary arrangements can reduce the benefits. Nevertheless, there are examples of effective voluntary schemes for non-hazardous wastes. These include arrangements adopted by individual manufacturers of office equipment (Fuji Xerox) and athletic shoes (Nike), as well as Australia's stewardship scheme for newsprint.

Various participants supported the view that stewardship and EPR schemes are only likely to deliver a net benefit in a narrow range of circumstances (for example, Federal Chamber of Automotive Industries, sub. DR141; Product Stewardship Council, sub. DR161; Shoalhaven City Council, sub. DR189). However, there were also many parties that had a contrary view. For example, the DEH claimed:

> … product stewardship approaches, developed according to best practice policy guidelines, can deliver economic and environmental benefits in a wider range of circumstances [than claimed by the Commission]. (sub. DR214, p. 2)

To support its argument, the DEH cited the positive experience of a single manufacturer under the National Packaging Covenant, the expected benefits from computer and tyre schemes that are still being formulated, and the positive outcomes from Australia's stewardship scheme for newsprint. The Commission is not convinced these examples adequately support the DEH's argument:

- While some firms may have benefited from the National Packaging Covenant, the Commission's overall assessment is that the Covenant has major deficiencies (discussed further in section 10.6 and appendix C).
- The anticipated stewardship schemes for computers and tyres have yet to be finalised, and in any case it appears that advocates of those schemes have tended to overstate the benefits of keeping computers and tyres out of landfills (as noted above and in section 10.6).
- The stewardship scheme for newsprint is essentially a private arrangement entered into by a handful of large firms, and so is unlikely to be representative of the co-regulation approach that the DEH advocates.

The DEH (sub. DR214) also stressed that its favoured model for stewardship schemes — a system of nationally uniform co-regulation — would deliver benefits relative to the likely alternative of states and territories introducing different schemes for the same product. The Commission accepts the latter is a possibility, but the likelihood of it occurring may be constrained by the inability of states and territories to legally enforce policy instruments such as advance disposal fees and take-back requirements (DEH, sub. 103; BRSD, sub. 70). In any case, a sounder approach for the Australian Government would be to take a leadership role in encouraging states and territories to base their actions on clear objectives and sound evidence, as well as cost–benefit analysis, rather than facilitating what may be inappropriate policies. This issue is discussed further later in this chapter (and in chapter 14).

The SA Government was also critical of the Commission's conclusion:

> In finding that mandatory product stewardship and product responsibility schemes are largely unlikely to deliver net benefits, the Commission does not mention environmental benefits of such schemes and therefore the whole point of such schemes must necessarily be undervalued in the Commission's approach. In general, the Commission's view regarding extended producer responsibility (EPR) and product stewardship seems to be inconsistent with contemporary international experience and has little regard to the resource impact of landfill disposal of these materials. (sub. DR217, p. 6)

However, the points made by the SA Government misrepresent the Commission's analysis:

- The Commission has considered environmental benefits, as mentioned earlier in this section.
- The Commission has noted international experience in this chapter, and found much of this experience reinforces the concern that, in many cases, the cost of an EPR or PS scheme would outweigh the benefits (for example, Germany's Green Dot scheme for packaging and the European Union's directive for NiCad batteries).
- The Commission has taken account of the impact on *all* resources of landfill disposal versus other options, such as recycling and energy-from-waste (chapter 4 and appendix B). This is in contrast to the partial approach advocated by some, where the focus is on a subset of all resources, particularly physical materials, at the expense of other resources.

The SA Government also noted:

> … given the growing international acceptance of EPR schemes, businesses may be subject to these requirements through the import and export of their goods. (sub. DR217, p. 6)

The Commission accepts that other countries' schemes could affect firms operating in Australia. However, this does not justify Australian governments automatically adopting similar schemes. In the first instance, the decision to follow the requirements of other countries should be left to individual firms to judge. If other countries' policies would not benefit Australia, as seems likely in many cases, they should not be adopted by Australian governments.

FINDING 10.1

Mandatory extended producer responsibility and product stewardship schemes — involving either industry–government co-regulation or government regulation — tend to be costly. They are unlikely to deliver a net benefit unless:

- *there are considerable benefits to the community from avoiding the product's inappropriate disposal, for example because it is hazardous;*
- *the relevant parties can be readily identified and held accountable; and*
- *compliance with the requirements can be readily measured and enforced.*

The Commission is not convinced that many of the products currently being targeted by governments — including office paper, packaging, tyres, computers, televisions and other electrical appliances — satisfy all of these requirements.

10.6 Problems with specific schemes

The Commission considers that policy makers have not made a convincing case for Australia's stewardship scheme for consumer packaging. Nor have they substantiated the case for new schemes on many of the products they have targeted, such as office paper; computers, televisions and other electrical appliances; and tyres.

Consumer packaging

Australia's stewardship scheme for consumer packaging is based on co-regulation and thus has two elements:

- The National Packaging Covenant — an agreement between governments and firms — specifies the self-regulation component of the scheme.
- The National Environment Protection (Used Packaging Materials) Measure (NEPM) specifies the supporting government regulation, which is implemented by individual states and territories.

The National Packaging Covenant stipulates three ‘overarching targets’ (box 10.3). Each signatory of the Covenant has to produce an action plan outlining how they intend to contribute to achieving these targets. The Covenant specifies a long list of performance indicators that signatories must report on annually to demonstrate they are meeting their commitments (details provided in appendix C). Among other things, firms have to report the weight of packaging sold, energy and water used to produce packaging, and what proportion of packaging is manufactured from recycled content.

Box 10.3 The National Packaging Covenant’s overarching targets

The National Packaging Covenant specifies three overarching targets that signatories are expected to work together to achieve:

1. Recycle 65 per cent of post-consumer packaging by 2010. Sub-targets are also set for specific materials (paper and cardboard 70–80 per cent, glass 50–60 per cent, steel 60–65 per cent, aluminium 70–75 per cent, and plastics 30–35 per cent).
2. By 2010, recycle 25 per cent of plastics coded (4) to (7) and ‘nonrecyclable’ paper and cardboard packaging.
3. No increase in packaging going to landfill, compared to the 2003 level.

Source: NPCC (2005).

The supporting NEPM requires parties that are not Covenant signatories to ensure the collection of their packaging and its reuse, recycling and/or energy recovery. The extent to which this is required is supposed to reflect the material-specific targets in the Covenant. Individual jurisdictions have the option of recovering collection costs from non-signatories, who have to keep detailed records of their activities. The NEPM also requires local governments to provide data on their recovery activities, including the weight of recyclable materials collected.

Why is a stewardship scheme needed?

Reports of Australia’s growing volume of packaging waste and lower recycling rate than other countries are regarded by some people as evidence that action is needed. However, growing waste volumes and relatively low recycling rates do not necessarily justify a scheme as elaborate as the Covenant and supporting NEPM.

The National Packaging Covenant Industry Association (NPCIA, sub. 92) noted the disposal of used packaging in modern, well-regulated landfills probably has few adverse impacts. The upstream benefits of recycling — such as from using fewer virgin resources — appear to have been significantly overstated, especially in the widely-quoted study by Nolan-ITU and SKM Economics (2001) (chapter 4 and appendix B). The case for waste avoidance — such as requiring suppliers to use less packaging — is also questionable, as it could lead to problems such as increased losses, contamination and in-transit damage of goods. In any case, firms have a commercial incentive to economise on packaging use, balanced against marketing and other objectives. Consumers also have the option to refuse products they believe are excessively packaged.

Nevertheless, the Covenant and associated NEPM strive to increase recycling and encourage waste avoidance:

> The objective of the Covenant is to reduce environmental degradation arising from the disposal of used packaging and conserve resources through better product design and production and the re-use and recycling of used packaging materials. (NPCC 2005, p. 15)[8]

The Covenant also refers to the waste hierarchy, claiming wastes should be managed in the following order of preference: avoidance, re-use, recycling, energy recovery, and disposal. This is not an appropriate basis for policy as it ignores the real-world tradeoffs between benefits and costs that can arise between different waste management options (chapter 7).

A sounder basis for curtailing packaging waste would be that consumers do not face cost-reflective disposal charges. Consumers can typically put an extra item of packaging in their bin at zero additional cost to themselves, due to the flat disposal fees usually imposed by local governments. This is likely to lead to an inefficiently high amount of waste, since additional disposal is not costless from the perspective of the community as a whole (chapter 9).

In formulating Australia's stewardship scheme for consumer packaging, it appears other policy options, such as cost-reflective disposal fees and advance disposal fees, were not adequately considered. Such options were mentioned in the RIS for the Covenant but their consideration was inadequate (discussed further below).

Kimberly-Clark Australia (sub. DR263) questioned the basis for including resource conservation as a goal in the Covenant and NEPM. It noted the objects clause of the enabling legislation mentions protecting people from air, water, soil and noise pollution, but not conserving resources.[9] However, the NEPM does refer to another part of the legislation that enables an environment protection measure to be made in

8 A similar objective is specified in s.6 of the National Environment Protection (Used Packaging Materials) Measure.

9 *National Environment Protection Council Act 1994* (Cwlth), s.3.

relation to ‘the re-use and recycling of used materials’.[10] If packaging re-use and recycling protects people from litter-related pollution, as seems possible, it could be argued that the Covenant and NEPM are consistent with the objectives of the relevant Act. Nevertheless, there is a strong case for explicitly aligning the objectives of the Covenant and NEPM with the enabling Act. In particular, the Covenant and NEPM should not include resource conservation as a goal, since it appears to be beyond the scope of the enabling legislation. It is also an inappropriate objective for government intervention, as discussed in chapters 5 and 6.

RECOMMENDATION 10.1

The objectives of the National Packaging Covenant and National Environment Protection (Used Packaging Materials) Measure should be amended so they are consistent with the objects clause of the National Environment Protection Council Act 2004. This should include removing the goal of resource conservation as a reason for government intervention.

Is there a net benefit?

Prior to implementing the current National Packaging Covenant, a cost–benefit analysis was provided in a draft RIS released for community consultation (Nolan-ITU 2005). Unfortunately, this consultation RIS had major deficiencies and so provided little insight into whether the Covenant would deliver a net benefit to the community (some specific criticisms are outlined in box 10.4). Similarly, an impact statement was released for the supporting NEPM (NEPC 2005a) that, in the Commission’s view, had an inadequate analysis of benefits and costs.

10 *National Environment Protection Council Act 1994* (Cwlth), s.14(1)(f).

Box 10.4 **The consultation RIS for the National Packaging Covenant**

Prior to the adoption of the current National Packaging Covenant in July 2005, a consultation RIS was prepared by Nolan-ITU (2005) to document the likely impacts. There were numerous deficiencies in the RIS, some of which are listed below.

- **Inadequate consideration of other policy options** — Policy options other than the Covenant were dismissed on the basis of a ranking technique that is not objective and does not recognise that some criteria are more important than others (Access Economics 2005).
- **No consideration of compliance methods** — Nolan-ITU just assumed that any target specified in the Covenant would be achieved. The implementation steps and practical constraints on achieving targets were ignored, despite their significant bearing on the resulting benefits and costs (NPCIA, sub. 92; PACIA, sub. 120).
- **Inflated estimate of environmental benefits** — Environmental benefits were based on those estimated by Nolan-ITU and SKM Economics (2001) in an earlier study of kerbside recycling. Gerard van Rijswijk (sub. DR191) criticised that study for having numerous deficiencies, including the overestimation of collection yields and underestimation of collection costs. He concluded the 'study suggests recycling is good and more recycling is better — this contradicts other studies and economic theory which suggests an optimum level should exist for each material — this level may well be zero for some materials' (Gerard van Rijswijk, sub. DR191, p. 29). Similarly, the Commission has concluded on the basis of its own analysis that the study by Nolan-ITU and SKM Economics (2001) significantly overstated the benefits of recycling (appendix B).
- **Understatement of kerbside recycling costs** — It was claimed that kerbside recycling costs would fall by $16–$55 million per annum despite collecting more material. It was also claimed the Covenant would lead to an efficiency gain of up to $3 million per annum in kerbside recycling systems. The assumptions used to derive such estimates were very speculative, being based on little or no evidence, and tended to bias the results towards understating the costs to the community as a whole. For example, avoided landfill levies were treated as a benefit (rather than as a transfer from one level of government to another), the marginal cost of collecting more material was claimed to be zero, and it was assumed the additional materials collected would be more valuable than average.
- **Understatement of costs to firms** — It was claimed that firms' annual administration costs from complying with the Covenant would only rise by $1–2 million in aggregate. The Commission considers this to be an implausibly low figure, given the onerous data reporting requirements of the Covenant. More broadly, the estimated impacts on the private sector were largely based on discussions Nolan-ITU had with just ten firms. Nolan-ITU acknowledged this small sample was biased in favour of firms that were relatively big, and tended to report large benefits from the Covenant.

In late 2006, the Office of Best Practice Regulation (formerly the Office of Regulation Review) will, as part of its annual reporting function, reveal its overall assessments of the RIS and impact statement. It should be noted the Office is an advisory body and its assessments would not have prevented the Covenant and supporting NEPM from being implemented under the regulatory requirements applying at the time.

The NPCIA and the Plastics and Chemicals Industries Association (PACIA) also raised major concerns with the RIS:

> … the setting of targets [in the Covenant] and the consideration of the social, environmental and economic impacts were not linked to business-specific actions. Accordingly, a robust and rigorous cost–benefit analysis, as required under the RIS process, was not undertaken. The targets were set based on inaccurate and shallow (at best) investigation into the actual impacts on business. (sub. 92, p. 9; sub. 120, p. 15)

In a report for the NPCIA, Access Economics (2005) noted some of the problems with the RIS, but nevertheless considered it a ‘prudent evolution’ to impose detailed reporting requirements on firms. It argued this would enable a more robust evaluation of the Covenant in the future:

> Access Economics reaches this conclusion partly because of the difficulty of evaluating the current performance of the NPC [National Packaging Covenant], and sees merit in the recommended option partly as an improved data-gathering process facilitating better quantitative evaluation of the performance of the NPC in future. (Access Economics 2005, p. 2)

This is not a sufficient basis for the Covenant’s detailed data-reporting requirements. Those requirements involve a large number of indicators that will be costly for firms to collect data on; may overburden municipal staff, particularly in small regional councils; and could overwhelm interested parties with information. The requirements also include a number of qualitative indicators that do not appear to be particularly meaningful. Furthermore, the data are being collected primarily to measure the Covenant’s effectiveness in achieving its targets, which will do little to inform policy makers about whether those targets are justified on net community benefit grounds.

The targets specified in the Covenant can only be described as arbitrary. Many participants in this inquiry — including supporters of the Covenant — conceded the likely costs and benefits of different target levels were not thoroughly considered (for example, Australian Food and Grocery Council, sub. 93; DEH, trans., pp. 627–8; NPCIA, sub. 92; PACIA, sub. 120; Packaging Council of Australia, sub. 67).

There is also considerable doubt about the accuracy of the benchmarks against which performance will supposedly be measured (Access Economics 2005; Nolan-ITU 2005). The Packaging Council of Australia (PCA) noted:

> Australia has no reliable, national system for measuring what is happening now. Some States collect some packaging data but these are incomplete and there is no consolidated data on the amounts of empty or filled packaging imported. How do you set appropriate targets if you do not have a reliable national measure of where we stand at the moment. And if you cannot measure it, how do you enforce it? (sub. 67, p. 27)

In 2008, the body responsible for administering the Covenant — the National Packaging Covenant Council — is due to report on how effective the Covenant has been in reaching its targets. Amcor (sub. DR167) was concerned that, if the review found the targets had not been achieved, this could be used to justify more draconian regulation. Such a policy response would be inappropriate, given that the targets are arbitrary and the case for existing arrangements has yet to be substantiated in a robust cost–benefit study.

The Commission considers the nature of the 2008 review should be changed to one that focuses on whether sufficient evidence exists to justify the Covenant and supporting NEPM. Such a review should be independent, draw on objective and scientific evidence about the consequences of landfilling or creating energy from packaging waste, and consider all costs and benefits.

The DEH (sub. DR214) questioned whether this was feasible, since a decision to change the nature of the 2008 review would have to be made by consensus by members of the National Packaging Covenant Council. However, the DEH later conceded (trans., p. 996) this was not an insurmountable problem, particularly if the Australian Government was willing to fund a broadening of the 2008 review.

RECOMMENDATION 10.2

The terms of reference for the scheduled 2008 review of the National Packaging Covenant should be expanded by the Australian Government beyond an assessment of effectiveness. An independent review should consider all relevant evidence about whether the Covenant (and supporting regulation) delivers a net benefit to the community.

Office paper

In March 2006, the NSW Government nominated office paper — defined as printing and writing-grade paper — as a priority for its EPR policies and demanded action from industry within months. The Government based its decision on there currently being a low level of recycling and high rate of disposal:

> The Minister for the Environment has instructed the DEC [Department of Environment and Conservation] to elevate 'office paper' to a high priority on the basis of its continued low recycling and high disposal rate which represents a significant waste of a high quality resource.
>
> The Minister has sought from the office paper sector a draft product stewardship concept by 23 June 2006 and a detailed product stewardship plan by October 2006 …
>
> The office paper sector has also been requested to provide annual reports commencing from the end of FY2005-06, on the industry's initiatives to 'close the loop' through increased production or importation or use of paper with recycled content and the establishment and expansion of other markets for post consumer office paper. (DEC 2006b, p. 11)

To support its decision, the Government cited an estimate showing a low rate of office paper recycling in New South Wales:

> Consumption [of office paper] in New South Wales in 2003 was 620 000 tonnes, with about 83 000 tonnes or 13.4 per cent recovered. In comparison, 17 per cent of printing and writing paper is recovered in Victoria. (DEC 2006b, p. 10)

However, the Australasian Paper Industry Association (APIA, sub. DR199) claimed the NSW Government had significantly underestimated the rate of recycling. It observed that A4 copy paper makes up the bulk of office paper usage, and estimated that NSW offices consume about 70 000 tonnes of this product each year. To reach the NSW Government's estimate of total office paper usage (620 000 tonnes) would, on APIA's calculations, therefore require use of other office paper to be 550 000 tonnes, or almost eight times the use of A4 copy paper:

> We simply cannot agree that in any office, for every carton of copy paper used, there's 8 times the volume of some combination of other paper grades consumed.
>
> Aside from the factual error, this incorrect reporting causes massive distortion to the recycling percentages. The priority statement reports that there was 83 000 tonnes of office paper recovered in New South Wales. That number looks very significant when considered in conjunction with realistic usage numbers. (APIA, sub. DR199, p. 11)

But Australian Paper noted:

> … the NSW figures are office papers inclusive of the print that's made, so an annual report, a quarterly report, a magazine produced by an office is included in those figures and they're not too far off the mark if you add both office and print paper together. (trans., p. 1155)

In any case, the NSW Government has not provided clear evidence that increasing the rate of office paper recycling is in the community's interest. There are costs associated with recycling, as well as benefits. Furthermore, the NSW Government has acknowledged that an EPR scheme cannot be justified on other grounds:

> This product [office paper] is not toxic or hazardous; is not generally illegally dumped or littered; and is not currently the subject of significant community concern. (DEC 2004b, p. 13)

The Commission considers that the NSW Government needs to review its rationale for pushing for an office paper EPR scheme. If the Government chooses to maintain its current policy, it should clearly articulate a soundly-based case for a scheme before demanding action from industry. Similarly, the EPHC and Australian Government should resist any exhortations to establish a national scheme for office paper without a substantive case for doing so.

Computers, televisions and other electrical appliances

The computer, television and other electrical appliances industries are currently considering product stewardship schemes. As noted previously, governments have been pressuring these industries to introduce schemes, and computers and televisions may be incorporated in the proposed national approach for product stewardship (DEH, sub. 103).

Governments have cited various reasons why electrical products should be subject to EPR or PS schemes. These include concerns about potentially hazardous components, the use of non-renewable resources, illegal dumping, and contamination of other waste streams. For example, the Australian and NSW Governments have noted the following about televisions:

> Televisions contain potentially-hazardous materials including lead in cathode-ray tubes, mercury and cadmium in printed circuit boards and brominated flame retardants in plastics. While there is some scientific uncertainty about the impacts of these substances in landfill and beyond, the weight of evidence from international research is that the disposal of electrical and electronic appliances poses significant environmental risks (for example, Nordic Council of Ministers 1995; Swedish Environmental Protection Agency 1995; European Commission 2000b; Five Winds International 2001; AEA Technology 2004). (DEH, sub. DR214, pp. 26–7)
>
> Circuit boards, standby batteries and the glass in cathode-ray tubes [CRT] contain hazardous materials, such as lead, cadmium, mercury and chromates, that may have an adverse impact on human health and the environment when televisions are disposed of, or limit opportunities to recover and recycle materials. The average CRT television screen contains two kilograms of lead (although this is decreasing) and this could contribute to leakage of heavy metals from poorly managed landfills. Brominated flame retardants are commonly used in the plastics and on printed circuit boards.
>
> The rapid obsolescence of televisions is inefficient, as is the use in their manufacture of nonrenewable resources that cannot be readily reused or recycled. (DEC 2004d, p. 34)

However, a frequent message from some participants in this inquiry was that governments need to present a more thoroughly-researched and clearly-articulated case for having EPR or PS schemes for electrical products. For example, the industry body established to negotiate and implement PS schemes for televisions and other appliances observed:

> [The current policy debate] … seems to lack a scientifically-robust justification as to why certain types of electrical and electronic products should be recovered, processed and recycled at EoL [end of life] … The actual scientific research that should underpin or substantiate … waste priorities (and the required actions) is generally absent which subsequently provides a weak foundation for ongoing policy development, as well as industry responses and solutions. (PSA and CESA, sub. 66, p. 6)

Governments have tended to express their concerns about electrical products in broad terms, with little specific evidence of actual or likely harm to the Australian community from not currently having an EPR or PS scheme. In addition, the governments' stated concerns often imply that waste avoidance and resource recovery will always deliver a net benefit to the community. These activities have costs that may outweigh the benefits.

Another example of the approach currently used to justify schemes is the NSW Government's stated concerns about computers:

> Computer components, such as lead, cadmium and flame retardants, can have adverse impacts on human health and the environment. For example, mercury can leach out when circuit breakers are destroyed and metallic mercury is able to vaporise, adding to air emissions. Lead in waste computers can dissolve in acidic ground water and contribute to heavy metal leakage from poorly managed landfills. Despite collection and treatment of leachate at controlled landfills, contaminated sludge is still being landfilled. Hazardous components … can also limit opportunities for material recycling and waste treatment.
>
> The rapid obsolescence of electronic equipment is inefficient, as is the use in their manufacture of non-renewable resources that cannot be readily reused or recycled. There is some illegal dumping of obsolete computers. (DEC 2004d, p. 28)

Similarly, Western Australia's Waste Management Board commented:

> Computers are complex products made in most instances from non-renewable resources. The average computer contains more than 700 substances including hazardous materials such as lead, cadmium, mercury, hexavalent chromium and brominated flame retardants. (WMB 2006, p. 10)

However, as noted previously, Planet Ark has argued that concerns about hazardous materials in computers tend to be overstated, and the test often used to demonstrate problems with landfilling CRT monitors is misleading (AIIA and Planet Ark 2005). Similarly, a peer-reviewed US study found that disposal of CRT monitors would make the community better off than recycling or bans on disposal:

We find that the benefits of avoiding the health effects associated with CRT disposal appear far outweighed by the costs for a wide range of policies. For the stock of monitors disposed of in the United States in 1998, we find that policies restricting or banning some popular disposal options would increase disposal costs from about $1 per monitor to between $3 and $20 per monitor. Policies to promote a modest amount of recycling of monitor parts, including lead, can be less expensive. In all cases, however, the costs of the policies exceed the value of the avoided health effects of CRT disposal. (Macauley, Palmer and Shih 2002, p. 13)

Governments have also tended to express their concerns about other electrical appliances, including whitegoods, in broad terms with little apparent consideration of the costs of resource recovery:

About 70 per cent of white goods are collected for recycling, mainly because of the value of the ferrous metals in these products. However, a significant amount of shredder floc, which contains a number of hazardous substances and glass, plastics, foam, rubber, circuit boards and other materials, is left over from the recycling process. Shredder floc is disposed of in landfills.

Very few consumer electronics and lighting products are recovered for recycling. Some consumer electronics contain a number of hazardous substances, including lead, mercury and cadmium. Some electronic products, such as cordless phones, shavers, handheld vacuums, power tools and toys are a significant source of Nickel Cadmium (NiCad) batteries. Lighting products may contain toxic substances, such as mercury, polychlorinated biphenyls and phosphors. An average fluorescent tube contains 30 milligrams of mercury. Emergency lighting products use NiCad batteries. (DEC 2006b, p. 23)

In contrast, AEEMA (sub. 59) claimed a large body of scientific research indicates relatively minor environmental impacts from landfilling electrical and electronic equipment waste. With respect to ‘major appliances’, it questioned the NSW Government’s basis for targeting the product:

AEEMA … has concluded that the problem as perceived [by the NSW Government] … is one or a combination of the following three factors:

- Too many appliances are going to landfill without pre-processing.
- Shredder floc from major appliances contain unacceptably high levels of substances deemed to be hazardous.
- The weight/volume of shredder floc going to landfill is unacceptably high …

Anecdotal evidence available to AEEMA suggests that very few appliances go straight to landfill …

Based on their own records, manufacturers of major appliances believe that the hazardous content of appliance shredder floc is likely to be lower than that from items from any other mechanical or electrical sector. The industry has generally set about eliminating substances shown to be hazardous without the need for compelling legislation.

> If the issue is an unacceptable weight/volume of shredder floc going to landfill, action should focus on investigating viable ways to reduce it … Experience … has shown that while various levels of dismantling may increase the price for better segregated recovered metals, most of the remainder still has to be dumped … If … alternatives [such as energy-from-waste] are not acceptable, it may be that the present quantity going to landfill will need to be accepted. (AEEMA, sub. DR258, p. 3)

AEEMA (sub. DR258) also questioned how the NSW Government could justify its demand for the major-appliances industry to take action, given there is very little evidence available about current practices, including the rate of recycling. AEEMA has written to the NSW Government proposing the terms of reference for a study, co-funded by industry and government, to establish the facts:

> While there have been a number of studies into the life cycle, recycling and waste disposal of e-waste — including major appliances — in Australia, there remains a lack of hard data regarding the real environmental impact of disposal of major appliances.
>
> The percentage of these recovered for recycling is not known. It is generally assumed that 70 per cent of major appliances are recycled …
>
> AEEMA considers that before any decision can be made on what actions need to be taken, a rigorous study of current practices and options should be undertaken. It is expected that the study will provide the basis for sound decisions. (AEEMA, sub. DR258, p. 8)

It is of considerable concern that the NSW Government has not done or published any such research on its own initiative before making firm demands on industry to take action.

Another issue that does not appear to have been adequately considered by governments is how the characteristics of the computer and television industries tend to reduce the likelihood of a net benefit from a mandatory stewardship scheme.

Most televisions and computer components are imported and so Australia will have little influence over the resources used to produce them. Furthermore, the dominance of imports suggests the low-skill and labour-intensive task of disassembling televisions and computers to recover resources would not be viable in Australia without substantial financial support. The option of exporting such products to a low labour-cost country for resource recovery is made very difficult by restrictions associated with the Basel Convention (chapter 12).

In addition, computers are often assembled by small businesses that can rapidly enter and exit the industry, making it difficult to detect and penalise non-compliance, and to prevent suppliers from leaving a legacy of orphaned products for others to deal with. Governments have not clearly articulated why they are so certain these problems can be overcome at reasonable cost, or conversely, why the benefits or risks are so high as to justify the considerable costs likely to be involved.

The AIIA is currently developing a recycling scheme for computers in conjunction with governments (Campbell 2006). Details of this scheme have yet to be finalised. In broad terms, the AIIA has proposed that, in order to prevent firms from free riding, all imported computers and components would be listed on a national register that is matched against customs registration data. When an item is recycled, the cost would be apportioned back to the relevant importer. The Commission is concerned that such an arrangement would be costly to administer, and difficult to enforce down to the level of individual computer components.

Tyres

Negotiations to establish a tyre recycling scheme started in 1999, and are expected to lead to a proposal that could be part of the foreshadowed national approach for product stewardship (DEH, sub. 103). As noted previously, tyres are also one of the priority products targeted by the NSW and WA Governments.

In 2001, a report for the Australian Government concluded that increased tyre recycling could address various problems — including tyres floating to the surface in landfills and becoming a breeding ground for mosquitoes — but the key benefit was reduced risk of uncontrolled burning:

> Waste tyres contain a number of organic toxic materials as well as metals, but these are bound (at least in the medium term) in a stable matrix. In the absence of results from very long-term testing, the broad view is that waste tyres pose little direct threat to the environment. Certain past applications have been implicated in several problems such as accelerated stream bank erosion, disturbance of marine ecology (artificial reefs) and visual impacts.
>
> However, by far the greatest environmental threats come from uncontrolled burning of tyres which liberates large volumes of toxic and unsightly emissions. The runoff from fighting tyre fires pollutes local waterways and soil. Waste tyres can also provide breeding grounds for mosquitoes and vermin. (Atech Group 2001, p. xiii)

The Australian Tyre Importers' Group (ATIG, sub. DR270) noted that regulation has now reduced the risk of uncontrolled burning to a level where it is probably no longer the most significant externality:

> Regulation has reduced the risk of [tyre] fire around Australia, and the externalities of landfills themselves, so that the major external costs are probably now related to legacy and transitional sites and illegal dumping and storage. (ATIG, sub. DR270, p. 5)

Similarly, regulation has reduced the likelihood of tyres floating to the surface of landfills. In particular, Victoria, South Australia, Tasmania and Western Australia require tyres to be shredded before being placed in a landfill (URS 2006).

Recent research commissioned by the Australian Government suggests the largest externality associated with used tyres now comes from illegal disposal and stockpiling. It was estimated that 9 per cent of used tyres are illegally dumped each year and the cost of cleaning them up would be over $4 million per annum (URS 2006).[11] The cost would roughly double (in net present value terms over a ten-year period) if illegally-stockpiled tyres were also cleaned up. Nevertheless, the estimates indicate that externalities associated with used tyres are not enormous, especially after taking account of how regulation has reduced the risk of uncontrolled burning. Consistent with this view, ATIG (sub. DR270) and URS (2006) suggested the case for further government intervention may be based largely on three other sources of market failure:

- poorly-informed market participants
- ‘public-good’ aspects of research and development
- an inability for existing markets to provide ‘collective goods’.

The Commission is not convinced these issues are a sound basis for government intervention in tyre markets, particularly if it involves an EPR or PS scheme (in-principle concerns are outlined in box 10.5). URS (2006) claimed that consumers would lose up to $280 million over a ten-year period (in net present value terms) if the issues were not addressed. However, this overstates the case for government intervention. It was derived by comparing current tyre-disposal fees paid by consumers with an alternative (and much smaller) advance recycling fee designed to ensure most tyres are recycled.[12] Shifting to the latter would involve a loss of revenue for retailers, and so the net gain to the community as a whole would be much less than $280 million (that is, most of the $280 million would be a transfer

[11] The 9 per cent estimate was derived by converting different types of dumped tyres into a standard unit of measurement based on weight (termed an ‘equivalent passenger unit’). This provides a better indicator of externalities than an unadjusted count of tyres, since the latter would overstate the significance of an illegally-dumped small tyre relative to a large tyre.

[12] URS (2005, p. 103) noted that ‘generally speaking a cost of $2.50 [per equivalent passenger (tyre) unit] is charged to consumers by tyre retailers to dispose of their end-of-life tyres’. In comparison, an advance recycling fee of $0.85 per equivalent passenger (tyre) unit was estimated to be sufficient to ensure 90 per cent of used tyres were recycled.

from one group to another).[13] Indeed, recycling most tyres could impose a net cost on the community, since recycling has costs as well as benefits.[14]

Furthermore, it is not clear that the three alleged sources of market failure have led to the disparity between current disposal fees and the advance recycling fee URS (2006) considered appropriate. The most plausible explanation for the disparity — assuming URS's estimate of the advance fee is accurate — is that (well-informed) consumer demand is largely insensitive to the size of a disposal or recycling fee, given it is a relatively small part of the cost of replacing a tyre, and this has enabled retailers to incorporate a profit margin into the fee they charge. There may be a potential efficiency gain from driving down this profit margin, but it would not be large.

Nevertheless, there is a legitimate concern that current arrangements could enable a disposal fee to be charged even when the relevant tyres are illegally dumped. This possibility arises because it is difficult for consumers and retailers to monitor the actions of tyre collectors, who could find it more financially rewarding to illegally dump tyres than to take them to a landfill or recycler. There are various possible means of addressing this issue, including stricter licensing of tyre collectors and strengthened enforcement of regulations on dumping. This would probably be less costly and would more directly address the key remaining problem with used tyres — illegal dumping and stockpiling — than an EPR or PS scheme designed to recycle virtually all tyres.

13 The economics underlying this point is somewhat complex, but is broadly as follows. If a lower fee did not change the consumption of replacement tyres, the revenue lost by retailers would equal the amount gained by consumers (termed a 'transfer'). Hence, there would be no net gain to market participants (retailers and consumers) combined. A net gain would have to come from the additional demand stimulated by a lower fee (after subtracting the cost of the additional tyres). However, consumption of replacement tyres is unlikely to grow much in response to a lower fee, since current disposal fees already tend to be a relatively small part of the cost of replacing a tyre. The net gain to the community is, therefore, likely to be very small compared to the transfer of existing benefits to consumers. The argument would be more complex if the advance recycling fee caused recyclers to become more efficient. However, modelling by URS (2005) did not anticipate such efficiency improvements, and in any case the broad conclusion about the $280 million estimate is likely to remain valid.

14 URS (2005) predicted a relatively small net benefit from adopting the advance recycling fee ($7 million over a ten-year period in net present value terms), which would probably turn into a net loss with a slight change in assumptions.

Box 10.5 **Claims about other tyre-related market failures**

ATIG (sub. DR270) and URS (2006) claimed that, in addition to externalities, government intervention in markets for tyre-derived products may be justified because market participants are poorly-informed, there are 'public-good' aspects of research and development, and 'collective goods' are undersupplied. The Commission is not convinced that these other alleged problems justify an EPR or PS scheme for tyres.

Poorly-informed market participants

With respect to information, ATIG noted:

> Consultancy reports for the DEH and the tyre industry have indicated that [tyre] collectors are not well informed about market opportunities … The frequent entry and exit of collectors means that they tend to be inexperienced in the markets for used tyres, and potential sellers and buyers do not know each other well ... This makes it difficult for reprocessors to access supplies of tyres and particularly for specialised markets to develop. (sub. DR270, p. 6)

This is not a sound basis for intervention. In a market economy such as Australia's, price signals provide the primary means of communicating information to market participants. If used tyres are being transformed into profitable products, it should be evident in the prices offered to used-tyre collectors and the prices achieved by producers of tyre-derived products (assuming there is no anticompetitive behaviour that needs to be addressed by competition regulation). Furthermore, there are probably many experienced parties in tyre-related industries who can make reasonably well-informed judgements about developing new markets.

URS (2006) noted that some consumers may not be aware of the tyre-disposal fee retailers typically charge. However, this fee is relatively small — around $2.50 per passenger-vehicle tyre in metropolitan areas (URS 2005) — and so making it more transparent is unlikely to markedly change consumer behaviour, and thus is unlikely to drive major efficiency improvements in tyre collection and processing.

Public-good aspects of research and development

ATIG claimed that tyre recyclers were unable to protect their intellectual property, and URS (2006) provided a specific example:

> The Australian tyre industry is aware of a number of examples where inability to protect intellectual property has been a disincentive to [the] introduction of innovative uses of used tyres or tyre-derived products. (sub. DR270, p. 7)
>
> For example, a company developed the technology to create rubberised trays for mining trucks using tyre-derived products. It decided not to launch the product, despite the time and money invested, as it was concerned that its idea would be copied by competitors. (URS 2006, p. 4-6)

This issue is not unique to tyre recycling. Australia has a well-developed system for protecting intellectual property that innovative tyre recyclers could use to capture a large proportion of the benefits of their inventions.

(Continued on next page)

Box 10.5 (continued)

Collective goods

ATIG defined collective goods and provided examples:

> Collective goods are a special form of public goods, where the benefits accrue to the group, rather than the public as a whole … Well established industries often provide a range of collective goods, such as statistics and quality standards, for themselves. The tyre-derived products industry is relatively new and immature, and is not yet in a position to provide such services.
>
> The lack of industry statistics affects the development of all uses of used tyres. Information is inadequate about potential supplies to would-be users, and about potential uses themselves. Such information is vital to the development of markets …
>
> The lack of independent quality standards is impeding acceptance of tyre-derived products as substitutes for virgin materials. An example is the difficulty producers of rubberised asphalts have had in gaining acceptance of their products by certain state road authorities. (sub. DR270, p. 7)

However, industry statistics are costly to collect and are not a prerequisite for developing or improving the efficiency of markets. Price signals provide the key means of communicating information to participants in existing markets, and there is probably sufficient experience in tyre-related industries to develop new markets.

There may be a case for intervening to ensure standards — such as those for road construction — recognise the benefits of tyre-derived products. However, it would be less costly to do this directly — such as by revising the procurement standards used by road-construction authorities (chapter 12) — rather than via an EPR or PS scheme.

URS claimed that generic marketing of tyre-derived products was another type of collective good that would be underprovided without intervention:

> One major area where transformers do not currently cooperate, but where they thought it would be beneficial to all players, is in the generic marketing and advertising of tyre-derived products to potential users and the broader population. Individual producers would not be able to appropriate the benefits of such generic services, so in the absence of collective action they will be underprovided. (URS 2006, p. 4-7)

If this is a genuine problem, there are less costly ways of addressing it than an EPR or PS scheme.

Full details of the foreshadowed tyre-recycling scheme have yet to be announced, but reports commissioned by the tyre industry and Australian Government suggest it would involve:

- an advance recycling fee applied to new tyres, with the revenue used to subsidise consumption of tyre-derived products;
- the fee would be set so as to achieve a recycling target of 90 per cent; and

- the fee would be applied for a period of about eight years, to enable markets for tyre-derived products to mature, and would then cease (URS 2005, 2006).

Governments and industry appear to be using an 'infant-industry' rationale for the foreshadowed scheme by suggesting the advance recycling fee is a short-term measure that would cease once markets for tyre-derived products have matured. Such a rationale has long been discredited in the area of industry policy and is unlikely to be any more valid in the case of tyre recycling.

The Australian Tyre Recyclers Association (sub. DR169) noted a recycling target of 90 per cent was being considered because industry research indicated it was 'achievable'. This is not the same as choosing a target that maximises net benefit to the community, which may be less than 90 per cent, given that recycling has costs as well as benefits. ATIG (sub. DR270) claimed the 90 per cent was not a target. However, the modelling it commissioned on the scheme (in conjunction with government and other industry groups) suggests otherwise:

> The [government and industry] Roundtable has a strong preference for a defined scheme that … will achieve at least 90 per cent utilisation of used tyres for approved end uses. (JWGT 2005, p. 8)
>
> The ARF [advance recycling fee] was set to achieve target numbers that recover 90 per cent of end-of-life tyres ten years into the scheme. (URS 2005, p. 84)

The DEH (sub. DR214, p. 27) claimed the tyre-recycling scheme would 'deliver to the Australian consumer a saving of $130 million over the 10-year life of the scheme and eliminate ongoing costs associated with tyre disposal'. However, that estimate was generated by URS (2005) using a similar methodology to its previously-mentioned quantification of market failures ($280 million). Thus, it is also likely to significantly overstate the case for government intervention. Indeed, this is evident from URS's overall assessment of the tyre-recycling scheme — it estimated the scheme would only generate a net benefit of $7 million over a ten-year period (in net present value terms). This borderline result is based on many heroic assumptions, and so there could be a net loss in practice.

The Cement Industry Federation (trans., pp. 71–2) suggested its members were interested in using more tyres in their cement kilns, irrespective of whether there was a tyre-recycling scheme. However, uncertainty associated with the lengthy negotiations for the foreshadowed tyre-recycling scheme had discouraged the necessary investment in plant.

The DEH (sub. DR214, p. 27) asserted the forthcoming scheme had 'the full support of the representatives of the tyre industry and other key product stewards in the value chain of a tyre, including governments, tyre dealers, tyre recyclers and users of tyre derived products'. However, the Federal Chamber of Automotive Industries (FCAI) — representing motor vehicle manufacturers — disagreed:

> FCAI holds significant reservations about the proposed tyres product stewardship agreement and the associated proposal to introduce an advance recycling fee, levied on tyre importers and manufacturers.
>
> FCAI notes that the proposed agreement establishes a target to divert 90 per cent of used tyres to 'approved end markets' within ten years. This target has been arbitrarily determined and there is no evidence that we are aware of to indicate that it represents an optimal balance between disposal and alternative uses for 'end-of-life' tyres …
>
> If it can be demonstrated that more significant negative externalities are likely to be associated with illegal dumping of used tyres, then it would be our view that appropriate efforts to minimise this type of behaviour should be the first priority of any proposed intervention. (sub. DR141, pp. 1–2)

In any case, the industry's support for the proposed scheme has to be viewed in the context of the pressure applied to the tyre industry over many years, and public perceptions about its products. Some firms may also support the proposed scheme because they believe their costs would increase by less than those of existing and potential competitors.

In summary, if there is to be further government intervention on used tyres, it should focus on directly addressing the externalities associated with illegal dumping and stockpiles, rather than seeking to recycle virtually all tyres, as is envisaged under the foreshadowed stewardship scheme. Most claims about tyre-related market failures other than externalities are dubious, and their magnitude has been significantly overstated.

10.7 Reforming the policy-making process

The above case studies illustrate how governments have participated in — and sometimes demanded — the development of an EPR or PS scheme without first providing a thoroughly-researched and clearly-articulated case for such intervention. This approach is likely to lead to a proliferation of poorly-justified schemes, given that some state governments are currently pressuring numerous industries.

The most prominent example of inappropriate intervention is in New South Wales, where the state government publishes annual EPR priority statements demanding action from industries. As noted previously, the Commission has in-principle concerns about the criteria the NSW Government uses to select products. Furthermore, it appears the NSW Government has been less than thorough in applying its own selection criteria (box 10.6).

Box 10.6 The NSW Government's selection of products for its EPR priority statements

The NSW Government's EPR priority statements (and supporting documents) show little evidence the Government has:

- thoroughly reviewed scientific evidence on a product's environmental and public health impacts, including the reasons why research results contrary to the government's case can be dismissed (for example, contrary evidence from Macauley, Palmer and Shih (2002) on computers);
- considered how a lack of supporting data and research weakens the case for targeting a product (for example, concerns mentioned by APIA (sub. DR199) for office paper, and by AEEMA (sub. DR258) for appliances); and
- investigated potentially less-costly policy options before pushing for an EPR or PS scheme (such as pay-as-you-throw disposal charges to discourage packaging waste).

As a result, the NSW Government rarely provides specific details about the problems it is seeking to address, or why an EPR approach is superior to other options. Instead, its priority statements tend to make broad statements about, for example, waste volumes, the materials used in a product and their recyclability (specific examples were provided in section 10.6).

There are also questions about transparency and accountability. In particular, there is no clearly-defined process for industries to get off the NSW Government's EPR priority list after responding to its concerns.

Reflecting the above-mentioned deficiencies, targeted industries have expressed uncertainty about the precise problems they are supposed to be addressing and how they will satisfy the NSW Government's demands (for example, APIA, sub. DR199; AEEMA, sub. DR258; Treated Timber Products Stewardship Group, sub. DR262). Some have felt it necessary to write to the NSW Government calling for greater clarity and offering to co-fund research to assist the Government in clearly defining the problem.

Sources: DEC (2004b, 2004d, 2006b); EPA NSW (2003a); EPR Expert Reference Group (2005).

The Product Stewardship Council also noted deficiencies in the NSW Government's approach, and attributed this to various factors, including a lack of clear objectives in the relevant legislation and inadequate resourcing:

> We have advised New South Wales that we see their EPR priority statements as reflecting neither EPR nor prioritisation, this is especially problematic in that New South Wales is seen as a leader on EPR and has been copied directly by Western Australia …
>
> We believe that many of the difficulties in New South Wales result from a clear lack of objectives [in] the underpinning legislation, a lack of independent objective information on products and impacts as well as an apparent lack of resources to effectively evaluate

> and develop product stewardship schemes has resulted in politics exerting undue influence in New South Wales calls for EPR on a broad range of products. These facts also make the program especially difficult to implement for government and for affected industries. (trans., p. 901)

The Commission has reviewed the objectives that governments across Australia have set for their EPR and PS policies, and concluded they are often inappropriate and unclear. The overall objective should be to manage waste so as to reduce risks to human health, the environment and social amenity to acceptable levels (that is, where the expected benefits of further reducing the risk are less than the costs of doing so) (chapter 6). Waste avoidance and resource recovery may be outcomes of achieving this goal, but they are not objectives justifying government intervention in themselves.

Another factor contributing to the problems in New South Wales and elsewhere may be the government's source of advice. The NSW Government has appointed an Expert Reference Group to advise it on which products to target, the adequacy of proposed schemes, the effectiveness of existing industry actions, and whether regulation is required (DEC 2006a). However, the membership of this group may not be a totally independent and objective source. For example, some members are employed in the recycling industry. Another is currently campaigning for an alternative computer recycling scheme to the one being developed by the industry, which the Expert Reference Group may be called on to assess in the future (Lebihan 2006). The Commission notes that computer manufacturers (and other targeted producers) are not represented on the Expert Reference Group. A further weakness in the Group's composition appears to be limited experience in conducting scientific research on the targeted products' environmental and health impacts. It appears that the WA Government intends to follow the NSW approach by appointing a 'technical reference panel' to advise it on product stewardship matters (WMB 2006).

The Commission has concluded that governments, and particularly the NSW Government, should be taking a far more considered approach than they have, given significant uncertainty in the data and research necessary to justify EPR and PS schemes on many of the targeted products. The level of potential threat to the environment and humans from traditional disposal methods for most of these products does not appear to justify the costly and risk-averse approach taken by governments. In addition, governments should adopt clearer objectives and establish transparent procedures for how industries can be removed from any EPR priority list. It is of concern that the WA Government (2006a, 2006b) has modelled its foreshadowed EPR policy on the flawed approach used in New South Wales.

The approach used in New South Wales is symptomatic of an apparent tendency among policy makers across Australia to accept arguments in favour of an EPR or PS scheme at face value, and devote most of their efforts to designing and implementing a scheme. This was clearly the case for packaging, and it appears to be being repeated with foreshadowed schemes for computers and tyres.

The Product Stewardship Council noted that governments seem to be motivated by 'policy envy' that causes them to copy policies from other jurisdictions without questioning their suitability for local circumstances or even studying their cost effectiveness from overseas experience:

> It is unfortunate that a number of Australian jurisdictions have sought to mandate the introduction of EPR schemes without clear policy objectives and without full consideration of costs, benefits and risks of such schemes. All too often, there seems to be 'policy envy' in wanting to copy programs from other jurisdictions, including other countries, without fully understanding the implications of introducing those policies in a local context. (sub. DR161, p. 1)

Ideally, the RIS process should, by providing decision makers with sound advice, help prevent poorly-justified schemes from being adopted. However, not all schemes are subject to a RIS cost–benefit study — particularly when no regulation is involved — even though they may be significantly influenced by governments. For those that are subject to RIS requirements, this has not been an insurmountable barrier to inappropriate schemes. The National Packaging Covenant was adopted despite having a RIS that is widely acknowledged as being inadequate.

The Australian Government (2006) recently announced measures to strengthen its RIS process. However, there is still a risk that inappropriate EPR and PS schemes will be adopted, particularly if they are not subject to the Australian Government's strengthened RIS requirements and/or there is pressure for a scheme from vocal community groups.

Another reason why inappropriate schemes may still be adopted is that, by the time a proposal for an EPR or PS scheme has been finalised, considerable momentum has built up to implement the scheme. It is not unusual for a proposal to be the result of several years of negotiation and much effort from industry, community groups and government. Understandably, the parties are reluctant to see this investment come to nothing at the final stage. In practice, this has meant that, once a proposed scheme has been developed, it is too late to be testing whether there is a real problem justifying government intervention.

To deal with the above-mentioned issues, there needs to be a greater onus on governments to demonstrate the problem an EPR or PS scheme might address, and for them to do this *before* intervening to either design or encourage a scheme. This would require the:

- articulation of a specific and clearly-defined environmental and/or public health problem to be addressed;
- provision of supporting evidence from a thorough review of scientific research relevant to local conditions, including why contrary evidence is dismissed; and
- a preliminary assessment of whether the level of risk involved could justify the likely cost of government intervention.

Ideally, the NSW Government's EPR priority statements would provide such an up-front identification of the problem. In practice, they have failed to do so. The NSW experience demonstrates the pitfalls of unclear objectives, a less-than-thorough approach, and a reliance on advice that is unlikely to be objective, independent or informed by the necessary scientific expertise.

Thoroughly investigating a product's alleged environmental and public health problems requires specialist scientific expertise. It is not a task that policy makers or representatives from industry and community groups are necessarily qualified to undertake. The Commission, therefore, proposes that governments assign the task of investigating a product's alleged problems to independent panels of scientists, formed on an ad hoc basis as required, who have a history of peer-reviewed research that is objective and relevant. It would be desirable for such investigations to be transparent and to provide an opportunity for the community (including other scientists and the targeted industry) to have an input.

The Commission considers that the Australian Government could play a key leadership role in this regard. Constitutional and other constraints appear to be a major barrier to the states implementing EPR and PS schemes without the Australian Government's assistance. The Australian Government could therefore use its position and leadership role to insist on clear objectives and that a thorough up-front identification of the problem precedes the development or encouragement of an EPR or PS scheme. This would complement the measures it has already taken to strengthen the RIS process. It would also be a more appropriate approach than the current strategy of facilitating national EPR and PS schemes largely because it avoids the worse alternative of state-based schemes.

In summary, government actions on EPR and PS have rarely followed one of the fundamental principles of good policy making — clearly articulate the problem you are seeking to address before you develop and then implement a new policy. To make matters worse, governments have been pressuring industries to cooperate in this flawed policy process, or face the prospect of more draconian government intervention and/or inconsistent regulation across jurisdictions. When industries buckle under such pressure, or seek to minimise the costs by advocating a national approach, it tends to be presented to the public as a case of firms 'voluntarily' supporting and helping to design a scheme.

The Commission has concluded that urgent reform of the policy-making process is required to prevent an imminent proliferation of poorly-justified schemes. In particular, there should be a greater onus on governments to justify their interventions, since EPR and PS schemes can be costly and are only likely to deliver a net benefit in limited circumstances (section 10.4). The proposed reform involves the use of independent specialists to confirm there is an environmental, public health or social amenity problem, and the risks are likely to be sufficient to justify the likely costs of government intervention, before governments design or encourage an EPR or PS scheme.

RECOMMENDATION 10.3

The Environment Protection and Heritage Council, and its member Governments, should adopt the following two reforms to their product stewardship and extended producer responsibility policies.

First, the objective should be reformulated to focus on reducing risks — to human health, the environment and social amenity — from waste to acceptable levels (that is, where the expected benefits of further reducing the risk are less than the costs of doing so). Objects that detract from this focus, such as those relating to resource conservation and upstream environmental protection, should be removed.

Second, adopt a prerequisite that, before intervening, governments must consider the findings of a thorough review of scientific evidence on a product's alleged environmental and public health impacts. Such reviews should:

- ***be conducted by independent panels of scientists, formed on an ad hoc basis as required, who have a history of peer-reviewed research in respected academic journals that is objective and relevant;***
- ***consider public and relevant industry comment before being finalised; and***
- ***make a preliminary assessment of the level of risk compared to the likely costs of intervention (informed by relevant economic and financial expertise).***

Such a panel should answer the questions 'Does a comprehensive review of all relevant scientific research indicate that the product's existing or anticipated production process, reuse, recycling and disposal in Australia has the potential to cause significant harm to the community and/or the environment? If so, define

exactly what the problem is, attempt to quantify its magnitude, and describe what actions might address the problem, and at what likely cost'.

A panel's report should always be completed and published before the relevant government(s) begins to design or encourage a product stewardship or extended producer responsibility scheme.

11 Government information provision and procurement practices

Key points

- Governments have a legitimate role in using education and moral suasion to encourage the adoption of better waste management practices.
- Government provision of general information and education programs can improve waste management practices, provided the information is accurate and relevant, would not otherwise be supplied by private markets, and there is a reasonable prospect of the information producing net benefits to the community.
- Effective recycling labels are difficult to design and implement. Mandatory labelling schemes are likely to be costly, and effective only when complemented by government and industry-supplied awareness raising and information programs.
- The case for government support of web-based waste exchanges, as a means of reducing transaction costs and assisting the development of recycling markets, is weak. This intermediary role is best left to private markets.
- The case for governments to provide information specific to firms about decreasing waste and increasing recycling is weak. Firms already have an incentive to obtain information about improved practices where such practices are likely to be privately cost effective.
- Programs that rely on moral suasion, or use moral suasion as a complement to other policy instruments, can be effective in influencing waste generation and disposal practices. But such programs should focus on major policy objectives, and be based on sound assessments of the costs and benefits of the course of action being promoted.
- The Australian, State and Territory Governments at times use procurement policy to pursue waste minimisation and resource recovery objectives. This may create a small demonstration effect for the broader community and assist the development of markets for recovered materials. However, such policies are an indirect and, most likely, relatively ineffective way of pursuing those objectives.

Government involvement in waste disposal and resource recovery markets has not been limited to the use of regulatory and market-based instruments. Historically, governments have played an active role in providing information and community education programs. More recently, governments have also sought to align their activities and, particularly, their procurement practices, with broader waste policy objectives.

This chapter analyses some of the issues associated with utilising information programs and government procurement practices in waste management policy.

11.1 Information and moral suasion instruments

Markets require information to work efficiently. Markets underperform when firms, investors and consumers have insufficient, or inadequate, information about such matters as the price, quality and availability of goods and services to make informed decisions (chapter 5). An example of imperfect information in waste management is when consumers are unaware of how to properly dispose of hazardous items, and instead dispose of them in ways that lead to adverse environmental outcomes.

There may be a role for governments to provide information to address a market failure if:

- the information has public good characteristics (and therefore there is little incentive for the market to provide it);
- information asymmetries exist in the market; or
- there are potential positive demonstration effects for others from making this information available (chapters 5 and 9).

Governments may also decide to educate and persuade firms and consumers to change behaviour they consider detrimental to the community. Persuasive information campaigns, or moral suasion, might be used by governments to complement other measures, such as regulation, or be used in their own right.

Each of the different levels of government have particular strengths in providing information about their core responsibilities and services. Responsibility for the provision of information, education and moral suasion programs should reflect these strengths where it is efficient and effective. For example, because local governments have responsibility for the collection of waste and recyclable materials, they are naturally best placed to inform the public about the frequency and features of their collection services. They could also provide households with more explicit information on the cost effectiveness of these services (chapter 13). However, local governments are not well placed to advise on the environmental costs and benefits of different waste management options. This role would be best left to a higher level of government.

Provision of general information

General information includes any knowledge that is not specific to the activities of a particular firm or industry. It includes information about how the waste management system works, what the waste management options are, and the size and characteristics of the costs and benefits of each option to the community.

Should governments provide general information?

Governments often supply general information to the community about waste generation, disposal and resource recovery because it has public good characteristics and would, therefore, be underprovided by the market (chapter 5). Firms will have a reduced incentive to provide such information at a cost to themselves if they cannot capture the full benefits of its provision and it benefits other firms.

Most state and territory governments run programs that provide information to the community about how to reduce waste and the operation of kerbside recycling. For example, the New South Wales Government provides free online guidelines for reducing waste in office buildings and runs the Murfy recycling education program (in partnership with local councils and industry) to inform householders about the operation of the kerbside recycling system.

Some state governments, such as those of South Australia and Western Australia, also provide fact sheets on ways to reduce or recycle different types of waste. Some also run online directories of recyclers and recycling services (for example, Zero Waste SA 2006; Zero Waste WA 2006). In Victoria, the Sustainability Victoria website contains an extensive range of advice for householders, firms, local governments and schools on waste reduction and recycling.

Firms and industry groups often engage in community education initiatives for corporate reputation and other commercial reasons. For example, Visy Recycling operates a free email inquiry service for students on packaging and recycling issues (Visy Industries 2006). Similarly, the Packaging Council of Australia (sub. 67) has recruited an education officer to communicate with schools and the wider community on packaging issues.

Though some firms and industry groups provide general information, it is unlikely that it will be sufficient to meet the community's needs. Governments may provide general information at a lower cost where they have greater economies of scale or scope. In addition, governments may be seen to be a more credible source of some information than private providers. Private firms may have, or be perceived to have, a biased viewpoint.

Governments, despite perceptions, are not always a source of accurate or complete information. For example, much of the current state and territory government provision of general information is underpinned by an undue emphasis on the waste hierarchy. The waste hierarchy does not always accurately reflect the net benefits to the community of the different waste management options (chapter 7). For information on waste disposal and resource recovery to benefit the community, it must be based on correct information about the relative costs and benefits of the various options.

Governments have a role in providing credible and appropriately validated information to the community regarding the social and environmental externalities of waste disposal and recycling (chapter 4). This information is unlikely to be provided by market participants (due to its public good characteristics) and is important for informing policy makers and the general community.

Improved information could also address popular community misconceptions about waste management issues. A number of such misperceptions have been identified in this inquiry, including:

- support for policy priorities based on the waste hierarchy;
- negative perceptions of the environmental and social costs of disposal to properly-located, engineered and managed landfills; and
- opposition to the recovery of energy from waste.

The Plastics and Chemicals Industry Association (PACIA) argued:

> … one of the major hindrances to the increased use of EfW [energy from waste] in Australia is a lack of understanding of EfW which has led to concern and a negative attitude toward the technology by the general public. This has been, in some instances, further fuelled by the activities of some environmental advocates. The government at all levels has a key role in supporting the legitimacy of alternatives and in educating all parts of the community of the benefits of applying complementary alternatives such as EfW. (sub. 120, p. 18)

The Business Roundtable on Sustainable Development also called for the community to be better informed about waste issues:

> Currently, little effort is being made to correct popular misconceptions about waste management ... Sensationalising waste issues also misinforms the community and does not contribute to rational debate. This practice of misinforming or under-informing the community about waste issues should cease. (sub. 70, pp. 17-8)

Are general information programs effective?

The Department of the Environment and Heritage (DEH, sub. 103) observed that general information programs were relatively ineffective in changing the behaviour of individuals and firms. On the other hand, several participants argued that information programs were important in improving the general awareness of the community about waste-related issues and could drive changes in behaviour (for example, Green Planet Environmentals, sub. 89; Municipal Association of Victoria, sub. 113).

KESAB Environmental Solutions (sub. 20) argued that the effectiveness of information programs depended to a large extent on whether the information was presented in an accessible way and on the method of its delivery. It observed that, in South Australia, waste-related information materials were commonly only available online. But surveys show that only 26 per cent of householders sourced their information about waste disposal and recycling from the internet, compared to 78 per cent doing so from their local councils. The Local Government Association of the Northern Territory (sub. 19) observed that education programs should be locally adapted to reflect special training needs and cultural considerations.

The DEH observed that the effectiveness of information programs aimed at firms could be jeopardised by negative perceptions about the agency providing the advice:

> Most programs have been sponsored and/or delivered by or on behalf of environmental agencies. Given that these agencies are primarily viewed as regulators, well-intended advice may not be accepted and acted upon by the regulated firms. (sub. 103, p. 51)

To overcome perceptions of bias, there may be a role for partnerships between governments and industry, community groups, or other non-government organisations to deliver general information programs.

General information programs might not change behaviour substantially in the short term, but may still be justified if they lead to longer-term behavioural change and can be delivered cost effectively.

Conclusion

There is a role for governments to provide general information on waste management issues, providing that this information accurately reflects the net benefits to the community of the different waste management options and is likely to be undersupplied by the market.

Each of the different levels of government have particular strengths in providing information about their core responsibilities and services. Responsibility for the provision of information should reflect these strengths, providing it is cost effective to do so. For local governments, this includes information about the availability of waste management services in their area. For state and territory governments, this is likely to cover information about the regulatory requirements of waste operators. For the Australian Government, this includes facilitating the development of soundly based information on the level and characteristics of national waste disposal and resource recovery activity, and research into disposal externalities. This information would help policy makers and the community to assess the costs and benefits of different waste management options and make sounder decisions.

All levels of government have a responsibility to ensure that the information they provide is not only factual and impartial, but relevant to the policy issues of concern to the community. Currently, much of the debate about policy options is characterised by misinformation about the environmental and social impacts of some waste management options. Identifying and directly addressing some of the major concerns — such as the notion that energy-from-waste options are inherently harmful, or that electronic waste in landfills necessarily causes major problems — would encourage more informed debate.

RECOMMENDATION 11.1

Australian governments should identify any major misunderstandings the community may have about the risks, costs and benefits of waste management issues and address these by ensuring the supply of factually accurate, relevant and accessible information to the public.

Waste exchange services

Some inquiry participants called for governments to establish waste exchanges to facilitate markets for recovered resources (Municipal Association of Victoria, sub. 113; PACIA, sub. 120). They were concerned that the high search costs faced by buyers and sellers limited market development, and that these search costs may be reduced through government intervention.

In response to these concerns, governments might provide, or assist in providing, online directories on what products can be recycled in a particular location, and waste exchanges to directly facilitate markets for recovered resources. Whereas online directories provide consumers with the address and contact information of recyclers in their area, waste exchanges offer a consolidated catalogue of recovered materials offered for sale or wanted by potential purchasers. Government-run waste exchanges currently operate in Victoria and Tasmania.

Should governments provide waste exchange services?

A number of participants argued that governments should provide a waste exchange service in recycling markets. For example, PACIA noted:

> Web-based exchanges provide a very time and cost-efficient way of matching waste with solutions, or materials with processors. PACIA sees government as having a long-term role, initially through providing assistance in the design and setup of the data base, and subsequently playing the role of 'honest broker', thus ensuring that the unavoidable monopolies associated with some wastes and treatment processes do not adversely affect the fairness, efficiency and viability of the process. (sub. 120, p. 6)

The Municipal Association of Victoria (MAV) also noted:

> There is a clear need for a national approach to resource exchange, which 'the market' has failed to establish. The Australian and State Governments need to provide leadership in this area to help facilitate, where feasible and practicable, the exchange of waste resources. (sub. 113, p. 7)

On the other hand, the Waste Contractors and Recyclers Association (WCRA) of New South Wales contended:

- Government should leave the market place to sort out web-based waste exchanges.
- WCRA is of the view that web-based exchanges are more of a feel-good tool than a significant answer to the issues facing the waste management industry. (sub. 15, p. 2)

It is not clear that governments have a comparative advantage in the provision of intermediary services. Private markets can and do provide these services to facilitate markets when there are strong incentives, such as profit, for markets to work. Some examples are the broad range of privately-provided online and print-based classifieds services that are available in Australia.

If a private exchange cannot operate profitably, it may be because there are other impediments to the development of markets for recovered resources (chapter 5). This may include distances between waste generators and recyclers (which affect costs and profit margins), low (or falling) market prices for recovered materials, or unnecessarily restrictive government regulations.

Also, web exchanges are not the only medium for exchanging information. Firms may work directly between themselves to facilitate the reuse and recycling of recovered resources. A case in point is the work of the Kwinana Industries Council to facilitate the development of a market among its members for the reuse of their industrial wastes (Business Roundtable on Sustainable Development, sub. 70; Kwinana Industries Council, sub. DR166) (chapter 4).

There is no clear evidence that government provision of waste-exchange services will lead to significant development in the market for recovered resources. In reference to the Victorian Waste Exchange Database, the MAV stated:

> It is unclear how widely this database is used, however only a limited number of material sources were listed at the time of writing. (sub. 113, p. 7)

There is also little evidence of government-sponsored waste exchanges having been successful overseas. The OECD (2005d) reported that an evaluation of the waste exchange scheme that operated in Chicago showed that the scheme failed to generate significant trading in recovered resources. It also noted that many government-run waste exchanges in other OECD countries have closed.

Conclusion

The case for governments to provide waste exchanges is weak. Private markets can and do provide this service to facilitate markets where there are strong incentives for markets to work. Search and transaction costs influence the operation of all markets, not just the market for recovered resources. Such costs may be higher in recycling markets due to the dispersed nature of waste generation and recycling activities in many areas and the heterogeneity of the waste. But this is not a reason for government intervention.

RECOMMENDATION 11.2

Governments should leave the provision of waste-exchange services to private markets.

Recycling labels

Some inquiry participants called for the introduction of packaging recycling labels to increase resource recovery rates (Australian Local Government Association, sub. 77, p. 2; the Local Government Association of South Australia, sub. 102, p. 2). Labels that indicate whether a container is recyclable aim to overcome an information barrier by informing consumers about what is recyclable, and assisting recyclers with sorting.

Should governments mandate the labelling of products?

There may be a role for governments to introduce product labelling schemes for recycling where this information is not being provided, there is little private incentive for firms to provide it (they are not the main beneficiary of the recycling effort), and it is likely to result in net benefits to the community.

Firms, however, already provide some information about the ability of products to be recycled. Many packaging products use the internationally-consistent three chasing arrows, known as the mobius loop, to indicate that they can, potentially, be recycled. An example is the plastics industry's incorporation of the mobius loop symbol into its plastics identification code system (box 11.1). This coding system identifies what a product is made of, and while it was not intended to be an environmental label, is often used by local governments to inform people about which items can be placed in municipal recycling bins (PACIA 2003).

Even where recycling labels have not been used, most recyclable containers — such as aluminium cans and glass bottles — are identifiable by their size, shape and colour, so a recycling label might not be necessary for such products. In the case of plastics, a US survey found that most containers tend to be sorted by appearance because, by the time the containers reach the sorting line, they may be squashed, and the coding symbol may be difficult to see (PACIA 2001a).

Firms, also, may be able to gain a marketing advantage from making such information available to consumers. The Australian Environmental Labelling Association awards special eco-labels to products that meet or exceed voluntary international standards for environmental performance (ISO 14024). The label is awarded to, for example, plastic containers that contain a recycled content of more than 30 per cent (AELA 2005).

While the case for compulsory recycling labelling of containers is weak, there may be a better case for labelling products that have the potential to contaminate or otherwise cause problems in the waste stream. In this case, the label could provide the contact details of an information service — for example, a telephone hotline — that would allow consumers to find out how to appropriately recycle or dispose of particular waste not accepted in the kerbside collection system. Labels may, thereby, facilitate a reduction in risks for collectors and landfill operators if they led to hazardous waste being correctly disposed or recycled, and not contaminating the kerbside system.

Box 11.1 **The plastics identification code**

The plastics identification code is a series of symbols that identify the most common plastic material used in the manufacture of a product or packaging. The symbols are usually embossed or otherwise imprinted on to the bottom surface of plastic containers. Each symbol in the plastics coding system consists of a mobius loop with a number from 1 to 7, as shown below.

Code	*Material*	*Common applications*
1 PET	Polyethylene terephthalate	Beverage bottles, food packaging.
2 HDPE	High density polyethylene	Milk bottles, freezer bags, milk crates.
3 V	Polyvinyl chloride	Plumbing pipe, cordial bottles.
4 LDPE	Low density polyethylene	Water tanks, squeeze bottles, bread bags.
5 PP	Polypropylene	Microwave ware, automotive parts, plant pots, compost bins.
6 PS	Polystyrene	Safety helmets, shock absorbers, fresh-food boxes, drinking cups.
7 OTHER	Includes: polyurethane, polycarbonate, nylon, degradables.	Airbags, seatbelts, computer cases.

The coding system was first developed by the Society of the Plastics Industry in the United States in 1988. The system is now mandatory in most US states, and has since been adopted by the European Union, Japan, Hong Kong and Australia.

The scheme was introduced in Australia in 1990. The Plastics and Chemicals Industries Association (PACIA) manages the voluntary coding system. In 2001, PACIA conducted a review that resulted in a revised Code of Practice about the use of the coding symbols. For example, the revised Code of Practice recommends that containers intended for the carriage of dangerous goods do not carry the Plastics Coding System, and instead, should be labelled with instructions for decontamination and disposal (PACIA 2001b). In this regard, when deciding whether to affix the codes to containers, manufacturers should consult with recyclers as to whether their particular containers would contaminate the recycling stream.

The coding system appears to have contributed to the large increase in recycling over the past 10 years. The amount of plastics recycled more than tripled from 59 kilotonnes in 1992 to 189 kilotonnes in 2003.

Sources: EcoRecycle Victoria (nd); PACIA (2001a, 2001b).

Are labelling schemes effective?

Labelling needs to be complemented by other information-provision programs in order to be effective. Consumers could be misled by general recycling labels into thinking that some containers are recyclable when there is no infrastructure for recycling to occur. While there are seven common types of recyclable plastics that bear the mobius loop symbol, historically only three types of plastics (codes 1, 2 and 3) have been widely recycled in Australia. The Packaging Council of Australia (sub. 67) supported packaging recycling labels, but noted it would be helpful for consumers to know both that the packaging is recyclable and that a system for recycling exists.

Given this potential for confusion, the Australian Competition and Consumer Commission (ACCC 1995) has ruled that the plastics coding system should not be used by manufacturers as an environmental claim. In addition, PACIA (2003, p. 2) stated that the 'code is not intended to be a guarantee of recycling or to provide companies with a platform for environmental claims'. However, consumers may misinterpret the information and incorrectly think that all material bearing a plastics identification code is recyclable. In this regard, the Local Government Association of South Australia (sub. 102, p. 3) stated that the labelling of all plastics will mean that consumers 'infer recyclability, although this may not be the case'.

Labelling may be ineffective if important information is not disclosed. In particular, single-attribute environmental claims on containers may cause problems if the container contained hazardous material. For example, clear plastic containers that had contained, and perhaps absorbed, products such as poisons should not be marked with a plastics identification code under the PACIA (2001b) code of practice used in Australia.

The costs of labelling some products should also be considered. Where labels can be printed on the product (such as paper and cardboard), the costs would be low. However, where labelling requires changes to product tooling, as might be the case for some products made from aluminium, steel and plastic, costs could be more substantial.

A voluntary, self-regulated scheme is likely to be the least costly regulatory form for a labelling scheme (chapter 8). However, if industry coverage were important, as in the case of labelling hazardous products, then co-regulated and explicitly-regulated schemes may need to be considered. Such schemes would impose extra costs, including the cost to government for the program development and administration.

Ultimately, any form of recycling labelling scheme would need to be supported by a comprehensive cost–benefit analysis. It is also important that recycling labelling presents information that is accurate and relevant and does not mislead users.

FINDING 11.1

There are significant practical difficulties in designing and implementing an effective system of labelling for recycling, and any mandatory scheme would need to be supported by a comprehensive cost–benefit analysis. Where labelling schemes are adopted, they should be complemented with government and industry-supplied awareness-raising programs and information hotlines.

Industry best-practice programs

Governments provide a range of information and advisory services to firms to encourage them to reduce their generation of waste, and increase their reuse and recovery of resources. This information includes best-practice guidelines, self-audit and certification schemes, advisory services, and the publication of case studies. Many governments also provide subsidies or grants for research and development into better practices and technologies (chapter 9).

The New South Wales, Victorian, and Queensland Governments all provide best-practice guidelines to firms in specific sectors. For example, Sustainability Victoria (2006) provides guidance specific to firms in the construction and demolition, and hospitality industries, as well as to organisers of public events.

Sustainability Victoria (2006) and EPA Queensland (2006a) also operate certification programs for firms that have shown a commitment to minimise waste and increase resource recovery. The Waste Wise program in Victoria and the EcoBiz Waste Wise program in Queensland aim to support the implementation of waste-minimisation and resource-recovery action plans for firms. The sponsoring agencies also provide advisory services to help participants plan for and meet their waste-reduction and resource-recovery goals.

Governments have also used case studies of firms that have successfully reduced their generation of waste, increased resource recovery, and/or used more recovered resources to convince other firms that these measures are privately cost effective.

Should governments directly advise on industry best practice?

Firms use a variety of resources and generate waste in the production and supply of goods and services. In a competitive market, firms are constantly looking for new opportunities to reduce costs (including by reducing the waste they generate and/or the amount of resources they use) and improve the quality of their outputs. They can also be expected to look out for ways to cost-effectively meet any government requirements, such as environmental regulations.

However, the DEH (sub. 103, sub. DR214) argued that firms may not implement measures to reduce waste generation or increase recycling, even where measures are privately cost effective:

> Awareness by industrial and commercial waste generators of even the direct costs of their wastes may be limited by the fact that such costs are often not clearly identified in their accounts. Because waste management costs often constitute only a small percentage of a business's overall costs, they tend to be bulked in with other 'overheads'. This is despite the fact that (as various case studies have shown) the potential savings through waste reduction may significantly increase marginal profitability … (sub. 103, p. 34)

The DEH also argued that there are 'institutional barriers to waste reduction and recycling such as a resistance to change, a lack of expertise and capacity and competing business priorities' (sub. DR214, p. 18).

However, the identification of an unrealised waste management opportunity does not provide strong grounds for government intervention. Nor does it necessarily mean that a firm's managers have misplaced priorities (chapter 5). Instead, it may mean that they are using their limited resources to pursue more promising opportunities for the firm.

As discussed earlier, governments can have a role in providing general information to firms (and consumers) where there is little private incentive for it to be provided (it is a public good), and its provision is likely to create net benefits for the community. Some of the information provided to firms by governments may fit this criteria, especially where it assists firms to meet their regulatory requirements. EPA NSW (2006), for example, provides guidance material to firms in a range of sectors on how to properly store, recycle and dispose of potentially hazardous materials. This information may not only help firms to meet their regulatory requirements but also reduce monitoring and enforcement costs for the regulator.

It is, however, not clear that governments have a role in providing advisory and certification schemes for firms on reducing waste generation, increasing recycling and using more recovered materials. These services are already provided by private environmental consultants and accreditation services. Where the cost savings, or marketing advantages, from improved practices are significant, it is likely that firms will seek out these services themselves. Just because firms do not address these issues does not necessarily make it a market failure requiring government intervention (chapter 5).

The MAV also suggested that governments could establish an information exchange (or library) of ways for firms and governments to improve their waste and recycling practices:

> Information exchanges and databases on waste minimisation and resource recovery for consumers, industry, business and governments can be an effective means to share ideas and 'lessons learnt'. Local government has identified a clear need for a web-based information exchange to share case studies, best-practice examples of new implementations of waste management systems and 'lessons learnt' ... However, exchanges require significant resources to establish and maintain, which requires assistance from the Australian and State Governments. (sub. 113, p. 7)

But while such an exchange might offer some advantage to local (and perhaps state and territory) governments, it is not clear that this would apply to the private sector. Firms (and industries) already have an array of incentives to conduct their own research into best-practice processes and have an incentive not to release the particulars of this (proprietary) information to their competitors (chapter 9).

Even where governments publish case studies of particular firms' research and process innovations, it is unlikely that the information provided would be sufficiently detailed to significantly benefit other firms in the industry.

Conclusion

The identification of an unrealised waste management opportunity does not provide strong grounds for government intervention. Nor does it mean that firm managers' priorities are misplaced. For many firms, waste management is only a small part of their total costs, and the benefits of introducing new waste management practices are likely to be small.

While governments may have a legitimate role in providing general information to firms, it is not clear that they have a role in providing more specific information such as advisory and certification services, or an information-sharing database.

Moral suasion

Government information programs can also have an element of moral suasion. That is, they aim to change people's behaviour by influencing their values and preferences. Community awareness-raising campaigns and school-based education programs to reduce waste generation and littering, and increase resource recovery efforts, have elements of moral suasion in them.

Moral suasion programs in waste policy take a number of forms that utilise many different information delivery mechanisms — provision of brochures to householders, display of posters and signage in public places, presentations at schools, businesses and community centres. Advertising in the media has also been commonly used.

Should governments conduct moral suasion programs?

Moral suasion programs may be introduced where particular behaviours result in outcomes detrimental to the community (such as social or environmental harm) and other measures are less cost effective. They may also be used to complement other measures, such as government regulation, to increase compliance, and reduce enforcement costs. Moral suasion may be especially useful where it is difficult to link problems with the individual(s) or group(s) that created them, and thus financial incentives, or criminal sanctions, are difficult to apply. In the case of litter, for example, although littering fines are in place throughout Australia, it is simply not possible to catch all the litterers.

Are moral suasion programs effective?

The DEH claimed that moral suasion programs were relatively ineffective in changing business behaviour:

> … surveys repeatedly show that many business owners do not see their businesses as having a considerable impact on the environment, and therefore are not susceptible to environmental messages. (sub. 103, p. 51)

In contrast, some programs aimed at the general public seem to have had a positive impact. A community survey on the impacts of the ‘Don’t Be a Tosser’ campaign that was run during 2000–03 in New South Wales to discourage littering behaviour, found:

- over 90 per cent of people understood its key anti-littering messages;
- greater concern about the effect of litter on the environment and increased awareness of the social unacceptability of littering; and
- growing awareness that personal actions were needed to reduce littering (New South Wales Government, sub. 95).

The program's predecessor — the 'Do the Right Thing' awareness-raising campaign that ran during 1978–90 — was credited by EPA NSW (1996a) with reducing littering in public places by 70 per cent.

US experience also indicates that moral suasion programs have an effect on littering behaviour (FCSHWM 1997; Syrek 2003).

Moral suasion, however, is not sufficient on its own to deal with many of the problems to which it is targeted. In the case of litter, other intervention may be required:

> … the management of litter is complex. It's not a straightforward, 'Do A and you get B.' We understand that generally the management of litter requires at least three things: education, infrastructure and enforcement, not necessarily in equal parts. (PACIA, trans., p. 1119)

The prevalence of littering behaviour in particular areas is the result of a range of factors (BIEC 2004). These include not only whether anti-littering education campaigns are in place, but also whether the area in question had appropriate waste disposal facilities, and was well-maintained. It is not just in litter prevention that governments complement moral suasion with other measures. For example, education and moral suasion, regulation and enforcement all operate hand-in-hand to enforce speed limits, the wearing of seatbelts in cars, and to encourage people not to smoke cigarettes.

Conclusion

Government programs that rely on persuasion can be effective in addressing waste policy objectives where they complement other regulation and education initiatives. However, such programs should focus on major policy objectives and be based on sound assessments of the costs and benefits of the course of action being promoted.

11.2 Government procurement programs

The general aim of government procurement policy is to obtain value for money. However, Australian governments have, to varying degrees, also required that government purchasing decisions take into consideration objectives to minimise waste, recover resources and purchase recycled products. The New South Wales, Victorian, and South Australian governments have adopted specific procurement policies or programs to achieve these objectives. In other states and territories, waste management considerations are incorporated into a general procurement policy, most commonly as a separate environmental sustainability criterion.

Australian Government procurement policies are less explicit with respect to waste management and recycling issues (box 11.2).

Government agencies are typically required to consider the life-cycle cost of their purchases, including the private and social costs of disposal and potential for resource recovery.

Box 11.2 **Australian Government green procurement policies**

The Australian Government does not have mandatory environmental procurement requirements for products and services, with the exception being for energy efficiency. Chief executive officers are given some latitude as to how procurement is conducted in their agencies, provided it is consistent with requirements established under the *Financial Management and Accountability Act 1997* and the Commonwealth Procurement Guidelines and Best Practice Guidance. Key requirements are that procurement follow the principles of value for money, and that it is conducted in accordance with relevant government policies.

Some of the environmental policies officials and agencies need to consider in their purchasing decisions include:

- the National Greenhouse Strategy and Measures for Improving Energy Efficiency in Commonwealth Operations;
- Government fleet targets;
- the National Government Waste Reduction and Purchasing Guidelines;
- the National Packaging Covenant Commonwealth Action Plan; and
- the *Environment Protection and Biodiversity Conservation Act 1999*.

Only the greenhouse and energy efficiency measures are mandatory for Australian Government agencies. The DEH does, however, provide voluntary checklists to agencies to encourage them to incorporate environmental considerations into their procurement decisions.

Sources: AELA (2004); ANAO (2005); DOFA (2004).

At the local government level, procurement policies can also be influenced by waste-reduction objectives. Two local government schemes that have this effect are currently in operation — ECO-Buy in Victoria (box 11.3) and the Buy Recycled Alliance in New South Wales.

Box 11.3 **ECO-Buy**

The ECO-Buy program was established in 2000 as a joint initiative between the MAV and EcoRecycle Victoria to implement ‘green purchasing’ practices by Victorian local governments. Green purchasing refers to giving preference to products that have a lower effect on human health and the environment on the basis of characteristics that include the source of raw materials, the potential for reuse and recycling, and the costs of disposal.

In 2004, 58 Victorian councils (73 per cent) were members of the program. Members are required to adopt a green purchasing policy, develop an action plan, monitor the purchasing of green products, and report on progress every 12 months.

The ECO-Buy website contains various guidelines and advice on implementing a green purchasing policy as well as a continually updated database of over 500 suppliers and their products that meet the definition of a green product.

The program also initiated a national ECO-Alliance of local governments committed to establishing a green purchasing program. Members include the local government associations of New South Wales, Western Australia and Queensland.

In 2004, local governments in New South Wales established a similar program called the Buy Recycled Alliance.

Source: AELA (2004).

Should governments use procurement policies to meet their waste reduction and recycling objectives?

Government procurement policy can influence the market in the following ways:

- It can directly assist market development through purchases of particular products. When governments constitute a significant proportion of the market for a particular product, their purchasing behaviour has implications for the development of that market.
- It can provide a demonstration effect for others. Government purchasing behaviour may provide information to the community about the quality and cost effectiveness of particular products or services.

Several participants emphasised the importance of government procurement activity on waste management in Australia. For example, the National Packaging Covenant Industry Association claimed:

> Government and business procurement are equally fundamental to creating stable demand for recovered materials and to demonstrating leadership by example. (sub. 92, p. 11)

The Australian Tyre Recyclers Association (sub. 51) noted that increased government procurement of recycled tyre products could play a significant market development role, as well as create a strong demonstration effect for private industry. Green Planet Environmentals (sub. 89) and the Product Stewardship Australia and Consumer Electronics Suppliers Association (sub. 66) also advocated greater use of government procurement practices to achieve waste policy objectives.

There is little evidence about the effectiveness of government procurement policies in reducing waste generation and increasing resource recovery. An evaluation of the performance of the New South Wales Waste Reduction and Purchasing Policy in the period from 2003 to 2005 (DEC 2006c) showed that the policy had some influence on the purchasing behaviour of government agencies. However, results varied significantly between product types, and there were reductions in purchases of a number of products targeted by the policy. The ECO-Buy program reported that Victorian local government expenditure on green products increased from $5.9 million in 2001 to $36.9 million (representing around 2 per cent of total expenditure on materials and contracts) in 2004 (ECO-Buy 2004).

A number of participants argued that current government procurement policies were ineffective in promoting waste-related policy goals. The ACT Department of Urban Services observed:

> … attempts to utilise ‘value for money’ principles that integrate environmental criteria have had little impact on changing procurement outcomes. While much work has gone into sustainable procurement initiatives they are yet to become mainstream or effective. (sub. 36, p. 6)

The Australian Environmental Labelling Association (AELA 2004), in a report on ‘green’ procurement in Australia, also concluded that government procurement practices were largely ineffective in achieving their objectives.

For procurement policy to have significant demonstration effects to the broader community, these purchasing decisions need to also be privately cost effective. To the extent that government procurement policy is guided by including unpriced environmental or social benefits of waste reduction and resource recovery, the incentives for individuals and firms to adopt similar practices are likely to be reduced.

Purchasing decisions by individuals and firms could create a stronger demonstration effect than government procurement policy because those purchasing decisions may provide a more credible signal about private cost effectiveness. That information may also be more relevant for other individuals and firms. Thus, publicising success stories from current industry and household practices may be a more effective demonstration policy. Though, as discussed earlier (and in chapter 5), unless a significant market failure were identified regarding the availability of information to the firm, government intervention is unlikely to be warranted.

Barriers to using government procurement to advance waste policy

There appear to be significant limitations on the effectiveness of procurement policy in promoting waste-related policy goals. Some of the problems are summarised below.

Time and expertise constraints of purchasing officers

'Green' procurement adds to the complexity of purchasing decisions. The limited ability of purchasing officers to cope with the complex information requirements involved in 'green' purchasing was a common problem identified in a survey of green procurement policies in Australia (AELA 2004).

Incorporating considerations of life-cycle environmental costs into the purchasing decision is difficult, and the tradeoffs between financial and environmental costs are not well understood, even by those who specialise in these areas. Yet most of the small order purchasing by government agencies is highly devolved to a large number of procurement officers, for whom purchasing constitutes only a part of their job (AELA 2004). Strategic Initiatives (sub. 58, p. 4) observed that 'Devolution has the effect of lowering the expertise available for consideration of new technology'. While training of purchasing officers may address the problem to some extent, it is likely to be expensive and difficult, given the large number of purchasing officers (AELA 2004).

Information asymmetries

There are likely to be significant information asymmetries between purchasing officers and suppliers about the environmental characteristics of a product. This problem is likely to be exacerbated by the time constraints, and lack of appropriate expertise of procurement officers. Suppliers would have a strong incentive to exploit this information advantage if it increased the likelihood of their product being purchased (as in the case of procurement policies that explicitly favour a particular product characteristic). AELA (2004) claimed that 'greenwashing' of products, where suppliers misrepresented the environmental characteristics of their products to obtain a government contract has been a significant problem for procurement officers in a number of states including Victoria, Queensland and South Australia.

Conflict with other objectives

Incorporating waste reduction and resource conservation objectives in procurement policies is likely to clash with other objectives of government agencies. Most significantly, all public sector agencies are budget constrained, and have strong incentives to minimise the cost of their purchases. This may limit the purchase of products containing recycled materials, because they are often more expensive than their virgin material equivalents. Budgetary and internal constraints were also identified as a barrier to 'green' procurement in a recent audit of Australian Government purchasing (ANAO 2005). And as the Local Government and Shires Association of New South Wales commented:

> The dilemma for government and the private sector alike is that … [purchasing recycled materials] often represents an increased financial commitment. Put simply, recycled mulch, roadbase, bitumen, [and] paper often cannot compete with the cost of producing virgin materials. (sub. 98, p. 12)

Some recycled products, such as paper, are also of lower quality than their virgin substitutes, and thus their attractiveness to government agencies may be limited:

> People want to use brighter, smoother papers that require virgin pulp. There's some exceptions but essentially the more secondary fibre you put in the sheet, the lower the brightness and the lower the tear values. Commercially, most mills have had the same experience, that it costs more generally to produce product with higher recyclable content and the end product isn't quite as good. So from the point of view of trying to sell these products … it is not a very good sell for the converting industry. (Australasian Paper Industries Association, trans., p. 1059)

The time taken to consider and verify disposal and resource recovery characteristics of different products also imposes additional administrative costs on government agencies.

Another potential problem is that there can be tradeoffs between different environmental objectives often found in procurement policies. Prioritising between water, energy and virgin material-saving features would be difficult for purchasing officers. For example, AELA (2004) noted the potential difficulty involved in choosing between 100 per cent recycled chlorine-bleached paper and 50 per cent recycled non-bleached paper.

A number of participants (for example Resourceco, sub. 46) noted considerable frustration that government procurement policies and related standards sometimes discriminated against recycled materials in favour of virgin raw materials, without consideration of relative performance. As discussed in chapter 12, this is inappropriate and governments at all levels should ensure product standards do not impair the development of markets for recycled products in this manner.

Conclusion

The Commission considers that the scope for applying government procurement to cost-effectively promote waste policy goals is limited. It is not clear that such policy is likely to deliver a significant demonstration effect to individuals and firms. Other more direct policies, such as information provision and subsidising some research, development and demonstration projects are likely to deliver stronger demonstration effects (chapter 9). Further, the many procurement officers involved in small-order purchasing have limited time with which to assess such complex cost, performance and environmental tradeoffs.

With regard to the market development effect of procurement practices, the Commission considers that without a strong requirement for cost effectiveness, such practices are unlikely to lead to efficient outcomes. This approach is likely to distort markets by favouring firms that would not be sustainable without government support, and lead to rent-seeking behaviour by firms (of which 'greenwashing' is one example).

Even if market development were a valid objective, procurement policy is unlikely to be the best instrument. The problems identified above, including decentralised purchasing by officers with limited time, information asymmetries and conflicting objectives, are likely to significantly hinder the effectiveness of government procurement policy in developing recycling markets. Other instruments, such as in some cases directly subsidising the recycling activity are likely to be more effective.

FINDING 11.2

Using government procurement practices to create demonstration effects for the broader community and assist the development of markets for recovered materials is an indirect and, most likely, relatively ineffective way of pursuing those waste policy objectives.

12 Institutional and regulatory impediments to waste management

Key points

- Local governments face conflicts of interest in setting landfill charges. State and Territory Governments should ensure that all government landfills charge users the full costs of waste disposal.
- Some local governments are finding it increasingly difficult to fulfil their waste management responsibilities. State and Territory Governments should consider:
  - making land-use planning and development approvals for major waste disposal and resource recovery facilities matters of regional or even state significance, and the responsibility of the minister, where this is not already the case; and
  - shifting the responsibilities for waste disposal and resource recovery to appropriately-constituted regional waste authorities, particularly in those larger urban centres in cases where local governments do not have sufficient scale or resources to efficiently and effectively handle such roles.
- Different approaches to defining, classifying and regulating wastes are leading to ambiguity and confusion. The processes for exempting some recyclables from regulation are unclear and inefficient. As a result, some firms are experiencing increased costs in complying with these requirements and when seeking relevant exemptions.
- The Australian Government should work with State and Territory Governments to improve existing definitions, classifications and exemption processes for recyclables. They should also explore ways to achieve greater consistency in regulatory standards for waste.
- Product standards that specify the use of virgin materials can frustrate the development of markets for recovered resources. Australian governments should review all product standards that potentially obstruct the use of recycled products and/or call for the use of virgin materials, with a view to replacing them with performance-based equivalents where this is feasible.
- Australian firms are required under the Basel Convention to obtain permits to export hazardous resources for recycling. Current processes, however, can impede such exports. The Australian Government should ensure that permits are issued expeditiously, and commence from the day the Minister grants approval rather than from the date of application unless the applicant requests otherwise.

The terms of reference for this inquiry required the Commission to examine the institutional and regulatory factors that impede the efficient use of resources and the development of markets for recovered resources. The focus of this chapter is on a range of institutional and regulatory arrangements that can impede the efficient operation of the waste management industry.

12.1 Are governance arrangements adequate?

Governance arrangements are the authority and systems used by ministers and government agencies to control and supervise public organisations (PC 2005a). A feature of good governance is that it should minimise the opportunities for conflicts of interest to emerge.

There are a number of government agencies in each jurisdiction involved in environmental protection and waste management that undertake:

- policy making and planning
- regulation and approvals
- provision and contracting of waste management services.

Conflicts of interest can arise when an agency performs more than one role, such as policy making and regulatory enforcement. Conflicts of interest can also be present where policy development and regulation are not separate from the operation of commercial entities. Government trading enterprises operate (primarily) on commercial objectives that can be inconsistent with other policy objectives of government (PC 2005a). If the conflicts of interest are sufficiently large or not well managed, the objectives of governments and their agencies become blurred and, as a result, the efficacy of government policy is diminished.

Separation of environmental policy making and regulation

A number of inquiry participants and commentators pointed to the apparent conflicts of interest within some state and territory environment departments. For example, the NSW Department of Environment and Conservation is both the environmental policy maker and regulator. The Waste Management Association of Australia (WMAA), Tasmanian Branch argued that there is a conflict inherent in the structure of the Tasmanian Department of Tourism, Arts and the Environment (formerly, the Department of Primary Industry, Water and the Environment):

> The current structure of the Environment Division has been discussed formally and informally for many years. Regulation and enforcement go 'hand in hand' and need to

> be separated from the policy maker in any organisation because they come into conflict with each other at some stage.
>
> We believe the challenge faced by individual officers of the department is to advise a client on policy on one occasion but then to be involved in a potential conflict situation when issuing an Environmental Protection Notice … on the next. (WMAA, Tasmanian Branch, sub. 29, p. 24)

The Commission notes these concerns but observes that there can be offsetting considerations for some jurisdictions. Having a single department can reduce costs by sharing overheads and can allow for the sharing of expertise. These factors are likely to be important in the smaller jurisdictions. Moreover, environmental regulators should have their roles and responsibilities well defined in legislation. Such legislation, if properly observed and, wherever practical complemented by administrative separation, should adequately address these conflicts.

Government ownership of commercial entities

A number of inquiry participants pointed to problems caused by state, territory and local government ownership of commercial waste management operations.

State and territory governments

Collex (trans. pp. 321–2) claimed that the NSW Government's ownership of WSN Environmental Solutions is a competitive neutrality issue. Collex (sub. 80, p. 5) noted:

> The operations of government-owned waste management enterprises are also a concern where they enjoy a privileged position vis-à-vis the private sector. Competitive neutrality should be built into the operation of government-owned enterprises.

Collex (sub. 80) argued that the NSW Government favoured WSN Environmental Solutions by imposing restrictions on the volume of waste that Collex's landfill at Woodlawn can take. Visy Industries (sub. 53) also observed that restrictions were placed on Collex's landfill at Woodlawn.

Collex's facility at Woodlawn is not the only landfill subject to a regulatory constraint on the amount of waste it can accept. The NSW Department of Environment and Conservation said:

> There's a limitation on what all landfills can take … Putrescibles landfills all have limitations on their planned capacity … That's actually determined at the planning approval process, taking into account the impacts that will arise in operation. (trans., p. 460)

Collex (sub. 80) and Visy Industries (sub. 53) also alleged that WSN Environmental Solutions engaged in pricing practices that would not be justifiable for normal commercial operators. The alleged practices are consistent with violations of competitive neutrality.

WSN Environmental Solutions argued that it is operating in accordance with the NSW government guidelines:

- WSN operates profitably and in accordance with the NSW Government's Guidelines for Competitive Neutrality.
- All of WSN's business is fully contestable, it receives no funding from NSW taxpayers and pays dividends and tax equivalent payments to the NSW Government. (sub. 104, p. 3)

It is not the place of this inquiry to test the veracity of these claims. Firms that believe competitive neutrality is a problem should take their complaint to the appropriate forum, which in the case of New South Wales, is the responsibility of the NSW Treasury.

Local governments and landfill pricing

Some inquiry participants argued that local governments face conflicts of interest in setting landfill gate fees. As the WMAA, Tasmanian Branch noted:

> The conflict of interest local government has to deal with, when reviewing landfill charges, [is] to allow for true cost recovery, as opposed to satisfying the potential political backlash from ratepayers when fees and charges are increased. (sub. 29, p. 14)

Several commentators and inquiry participants observed that many local governments were undercharging for their landfill operations (GRD Limited, sub. 41; PAEC 2004; WMAA, Tasmanian Branch, sub. 29). As the Local Government Association of South Australia noted:

> Historically, regional councils in particular have not accounted [for] costs of disposal in their own landfills and landfills have either been left open for the public or charged a minimal fee. (sub. 102, p. 2)

Local governments may find it difficult to comply with their landfill licence conditions if they underprice their services — since they will have insufficient revenue to spend on compliance. Underpricing also diminishes the incentives for resource recovery itself and for new operators to enter the disposal and resource recovery markets and reduces the incentive for innovation in these markets.

Underpricing can also lead to cost shifting onto future generations who might have to pay for the aftercare costs of landfills (Local Government Association of South Australia, sub. 102). The Department of Premier and Cabinet (Tasmania) noted:

> Local government operates most landfills in Tasmania and there are strong suggestions of subsidisation by ratepayers in some circumstances. This may become even more apparent at the end of the life of the landfill site where ratepayers may bear substantial rehabilitation costs at or near the end of the revenue raising life of a landfill. (sub. 114, p. 3)

State and Territory Governments should ensure that local governments charge users for the full costs of operating municipal landfills. SITA Environmental Solutions (sub. DR143) said that this would require State and Territory Governments to specify the method of full cost accounting for landfill operations — including how to provide post-closure remediation costs in the balance sheet of the operating company and the gate price.

Local governments may be reluctant to implement full cost recovery where they are concerned about illegal dumping or disadvantaging particular groups in the community (Municipal Association of Victoria, sub. DR179). In general, illegal dumping should be addressed directly through an adequate enforcement effort. If the purpose of underpricing is to provide financial relief to particular disadvantaged groups, explicitly funded community service obligations are a preferable and more transparent approach (IC 1997).

RECOMMENDATION 12.1

State and Territory Governments should ensure that all government-operated landfills charge users the full costs of waste disposal.

12.2 Who should be responsible for waste management?

Local governments are normally responsible for land-use planning and development approvals within their boundaries. They are also responsible for the collection and disposal of municipal solid waste. Some inquiry participants were concerned about the appropriate level of government at which waste management land-use planning and waste disposal services should be undertaken within Australia (for example, Alex Fraser Group, sub. 42; SITA Environmental Solutions, sub. DR143).

A generally accepted rule for apportioning responsibilities for providing public services among the different tiers of government, called the subsidiarity principle, is that decisions whose impact is restricted to a local area should be made at the local level. If the impact of waste management responsibilities goes beyond local government boundaries — for example, because of scale economies — there is a case for assigning these responsibilities to a higher level of government.

Land-use planning and development approvals

A number of inquiry participants expressed concern over the difficulty of finding and getting approval for suitable locations for major waste disposal and resource recovery facilities in urban areas (box 12.1).[1] Although many participants and most communities appear to support resource recovery and waste minimisation, they seem reluctant to have them located nearby. Yet close proximity to services and markets can be crucial to keeping costs of transportation low and ensuring the viability of resource recovery, particularly where low value and dense materials, such as concrete, are concerned.

These tensions are creating real problems for local governments. The Local Government Association of Tasmania (sub. 60) noted that siting issues had become divisive for local governments. The Municipal Waste Advisory Council observed:

> As awareness of a number of popular waste issues increase, local governments are increasingly subjected to significant scrutiny, pressure and criticism for their waste management responses. Community outcry against landfills, recycling plants, composting operations and incinerators, is typically directed against local governments. (sub. 52, p. 31)

Local governments are also subject to various state and territory land-use planning requirements. In most states and territories, the planning minister has the authority to declare certain types of projects to be of regional or state significance.[2] In some jurisdictions, local governments are also required to prepare waste management plans to identify future waste management and resource recycling facilities for their area (chapter 3).

Local government land-use planning and approvals processes are intended to address local issues. In cases where the costs and benefits of a proposal accrue to the local community, its local government is the appropriate authority to make planning decisions.

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[1] Major waste disposal and resource recovery facilities could be defined as those that typically serve more than one local government area. These facilities would not normally include transfer stations or material recycling facilities that only serve one municipality.

[2] For example, in New South Wales, *major* infrastructure projects, including waste and resource recovery facilities, can be deemed to be of regional or state significance (s. 775A, *Environment Planning and Assessment Act 1979* (NSW)).

Box 12.1 Participants' views on siting waste disposal and resource recovery facilities

A number of inquiry participants argued that finding suitably located land was important for their waste disposal and resource recovery operations. This issue is particularly important for construction and demolition recyclers who, for freight-cost reasons, prefer to locate as close as possible to demolition sites and their customers. The Alex Fraser Group noted:

> The future of C&D [construction and demolition] recycling is dependent on the ability to locate facilities within close proximity of the feedstock and market area. It is absolutely critical to the future direction of reprocessing and recycling operations that they be located in mainstream well planned out precincts and not isolated at the farthest boundaries of a metropolis. (sub. 27, p. 14)

Many inquiry participants noted that community pressure was one of the greatest barriers to the development of new waste management facilities (Australian Council of Recyclers, sub. 50; SITA Environmental Solutions, sub. 42). As the WMAA, NSW Alternative Waste Treatment Working Group observed:

> The siting and approval of waste and resource recovery infrastructure has been and still is seen by industry as one of the greatest barriers to the delivery of (essentially environmental) services ... (sub. 30, p. 14)

Community concerns also extend to existing waste disposal and resource recovery facilities. Resourceco observed:

> Often as the venture develops and other business[es] locate along side … the venture[,] it is only a matter of time before the venture is pushed out of the area as was the case with the Jeffries group in Adelaide. (sub. 46, p. 20)

Several inquiry participants argued that opposition to facilities by local communities will raise the cost of waste disposal and resource recovery. The Waste Contractors and Recyclers Association of New South Wales noted:

> The community needs to be made to better understand that if they continue to maintain 'a not-in-my-backyard attitude' to the siting of waste facilities — then there will be greater transport costs which will result in higher waste management fees. In some cases there even may be … reductions in recycling rates as it will … become uneconomical to travel long distances to recycling centres. (sub. 15, p. 5)

It would seem, however, that often today, the scale economies of many modern waste disposal and resource recovery facilities benefit a wider region but many of the external costs (such as noise, dust, odour, traffic congestion and litter) are directly experienced in the local government area where such facilities are located. As a result, planning laws that only take into account local issues could lead to development applications for such major facilities being rejected even if they were to bring net benefits to the wider region.

What are the alternatives?

State and Territory Governments recognise this problem and have been adopting policies to address it. In some jurisdictions, local governments have retained responsibility for land-use planning and approving development applications for waste disposal and resource recovery facilities, but are required to take into account the provisions of a state or regional waste management plan or policy, as in Victoria.

While this approach can give waste disposal and resource recovery facilities greater certainty, it fails to fully address the underlying problem. Even if every local council is required to take into account an overarching plan or agreement, it would still be possible for each of them to reject a major development application. Local government councillors are still accountable to their rate payers and may not always give adequate regard to the broader regional interests, even though the local government is an instrument of the jurisdiction. For example, the Southern Sydney Regional Organisation of Councils (trans., pp. 350–1) pointed to the difficulties of getting waste management facilities approved in the region even though its councils agreed to locate a facility somewhere within it.

Some inquiry participants argued that waste disposal and resource recovery facilities should be declared to be of regional or state significance (for example, SITA Environmental Solutions, sub. 42). As the Alex Fraser Group noted:

> The siting of these [resource recovery] facilities should be recognised as an 'issue of state significance', as indeed are quarries and landfills. (sub. 27, p. 14)

Declaring major waste disposal and resource recovery facilities to be of regional or state significance allows for a range of non-local factors to be included in the planning and approval of the facility — thereby preventing the likelihood of a major project being blocked by local interests. But the WMAA, NSW Branch contended that it should not be necessary to require ministerial involvement in planning and approving facilities:

> … we should be able to get waste infrastructure built through normal planning mechanisms rather than having to go to the State Minister for a call-in and that applies everywhere … we really need some framework for waste planning; for waste zones where it's a permissible use; tonnages where it's a permissible use; and that we don't necessarily have to go through the kind of hurdles with local government that we have at the moment. (trans. p. 851)

Depending on the breadth of these impacts, major waste disposal and resource recovery facilities might be of regional or even state significance. Where they are regional in nature and not of state significance, the experience in England provides a useful perspective of regional planning and approvals (box 12.2).

Box 12.2 **Examples of regional land-use planning and approval arrangements**

England

England's nine regional assemblies are responsible for setting out regional land-use plans (regional spatial strategies) for their region (*Planning and Compulsory Purchase Act 2004* (UK)) (PCPA 2004).

In the rural parts of England, about 50 county councils are responsible for planning and development approvals of waste disposal and resource recovery facilities in their area, in accordance with the regional plans. The 284 non-metropolitan district councils in these counties do not have any role in planning and approving waste disposal and resource recovery facilities (s. 16, PCPA 2004).

There are about 68 metropolitan district councils in England. While many are responsible for land-use planning and development approvals, in a number of cases, these responsibilities are taken up by specially constituted authorities that represent more than one metropolitan district council.

Western Australia

The Planning Commission, a statutory authority established under the *Planning Development Act 2005* (WA), is responsible for:

- preparing Statements of Planning Policies — with the approval of the Minister;
- preparing regional planning schemes for the metropolitan and nine non-metropolitan regions in the State;[3] and
- approving regional developments in accordance with the regional plans.

South Australia

The SA Government is responsible for preparing regional planning strategies — one for metropolitan Adelaide, the other for the rest of the state. Local governments then prepare local development plans in accordance with the Government's strategies. The Development Assessment Commission, a statutory authority established under the *Development Act 1993* (SA), is responsible for approving waste management facilities in accordance with the relevant local development plan (Planning SA 2002).

Northern Territory

The NT Government is responsible for determining the Northern Territory Planning Scheme and the planning schemes for each of the Territory's seven divisions. The Development Consent Authority, a statutory authority established under the *Planning Act 1999* (NT), is responsible for approving development applications covered by each of the seven schemes. The authority is also responsible for conducting hearings to amend planning schemes and for reporting to the minister (DIP nd).

3 The non-metropolitan regions include the Gascoyne, Goldfields–Esperance, Great Southern, Kimberley, Mid West, Peel, Pilbara, South West and Wheat Belt regions.

Elements of regional planning and/or approvals can also be seen in some Australian jurisdictions. In South Australia, the Development Assessment Commission is responsible for approving development applications for waste disposal and resource recovery facilities. In Western Australia, the Planning Commission can develop regional plans and approve certain regional projects — but not for general waste facilities. In the Northern Territory, the Development Consent Authority is responsible for approving development applications for waste facilities in accordance with the relevant regional land-use plan.

Whether major waste disposal and resource recovery facilities are treated as matters of regional or state significance, there is a strong case for ensuring that the associated land-use planning and development approval processes are transparent, efficient, timely and accountable to the electorate of the area. Such processes will also need to be capable of effectively and efficiently resolving the inevitable conflicts surrounding the location of these facilities and lead to net benefits to the wider community. The waste management industry and the community need greater clarity and certainty in waste-related land-use planning processes in order to deliver net community benefits.

The operational capacity of local government

Local governments are responsible for the kerbside collection of waste and recyclables, and waste disposal. Some participants questioned their capacity to undertake these tasks. For example, the Packaging Council of Australia noted:

> While local government has played an important role in establishing and evolving waste recycling and recovery, the efficient and environmentally optimal provision of this service is beyond its operational and statutory capacities. Local government authorities have an important role to play in enhancing the welfare and quality of life of local communities. Managing utilities should not be part of this role. (sub. 67, p. 23)

Other participants in this inquiry questioned the capacity of local governments to adequately deal with tendering practices for major waste disposal and resource recovery contracts (Paper Round, sub. DR178; SITA Environmental Solutions, sub. 42; Victorian Waste Management Association, sub. DR170; Waste Contractors and Recyclers Association of New South Wales, sub. 15; WMAA, NSW Alternative Waste Treatment Working Group, sub. 30). Not surprisingly, some local governments had different views about these issues (ACT NOWaste, sub. DR139; City of Ryde, sub. DR176).

Waste disposal and resource recovery are becoming increasingly complex

Technical and regulatory developments are resulting in larger, more sophisticated, recovery and disposal facilities and this is making it more difficult for local governments to efficiently supply waste management services. These developments are also making it harder for smaller local governments to assess major waste management technologies and negotiate contracts.

Part of the problem appears to be one of resourcing and expertise. In the case of rural councils, the Municipal Association of Victoria noted:

> The difficulty in attracting and retaining professional staff increases … the greater [the] distance from metropolitan areas. While traditional civil engineers have been equipped to deal with landfill disposal, many require professional development and training in newer resource recovery approaches and behaviour change tools. (sub. 113, p. 11)

Some larger urban councils did not feel that they lacked the necessary resourcing or expertise. Ipswich City Council (sub. DR198) argued that it had sufficient expertise and planning resources. ACT NOWaste[4] noted:

> The ACT Government is confident that it is the right body to be managing the Territory's waste given its role in service provision, the scale of the volume of waste generated in the Territory and its responsibilities and capacities in planning, siting and technical issues. (sub. DR139, p. 25)

ACT NOWaste (sub. DR139) noted, however, that it was not able to obtain the scale economies necessary for recovering certain resources such as tyres.

While economies of scale and access to technical expertise are making waste disposal and resource recovery difficult for some (and in particular, smaller) local governments to deal with, waste collection appears to be more manageable. While waste collection is a natural monopoly, in the sense that it is cheaper for a single provider to supply a level of service to all households in a particular street or municipality, there seems to be limited benefits in scaling the collection services up to a regional level. Collection appears to be best provided by local government (chapter 5). The Australian Services Union (sub. DR157) contended that local governments were best placed to deliver waste collection services. The City of Ryde noted:

> Removal of the waste [collection] responsibility from local government to a state level may create difficulties in maintaining service levels and addressing service issues amongst the public if the new body did not possess detailed local knowledge of the area

4 The ACT Government is a member of the Australian Local Government Association since it undertakes local government functions as well as its territory functions.

being serviced. This lack of familiarity would make resolving any service level issues more difficult. (sub. DR176, p. 4)

Partnerships have provided benefits

To overcome their resourcing problems and to take advantage of the economies of scale of major waste disposal and resource recovery facilities, many local governments have entered into formal and informal partnerships to share existing facilities and negotiate contracts. The WMAA, National Landfill Division observed that the pooling of resources has been occurring for years:

> Local government operated landfill sites in large urban areas are usually managed in a regional context. Local governments have been operating regional sites for years and pool resources and expertise to meet the same [environmental-performance] standards as major privately owned sites. (sub. DR159, p. 2)

Where partnerships are used to negotiate waste contracts, local councils usually retain the responsibility for entering into the contract with the tenderer. Examples of such partnerships include the regional organisations of councils in New South Wales, and regional waste management groups in Victoria.

A number of inquiry participants provided evidence of the benefits of partnerships (City of Whitehorse, sub. 26; Municipal Association of Victoria, sub. 113 and sub. DR179; Resourceco, sub. 46; Southern Sydney Regional Organisation of Councils, sub. 84). The NSW Government reported that collaboration among local governments contributed:

> … to infrastructure improvements and consolidation, reduced environmental impacts, collection service efficiencies and savings through cost sharing, stabilised pricing and the provision of price certainty over the period of a contract, and increased processing capacity and capability. (sub. DR195, p. 3)

But partnerships have limits

Partnerships, however, do not always overcome the contracting problems of local governments. Some partnerships are simply not large enough and the infrequent nature of major contracts means that it is hard to justify retaining the necessary expertise in-house. For example, in describing a proposed alternative waste technology (AWT) contract for the former Western Regional Waste Management Group in Victoria, Councillor Dick Gross, City of Port Phillip, noted:

> This is a huge contract for the region. It’s a 20-year, $400 million contract. The rule of thumb is that you have to spend about one per cent of the value of a contract assessing a contract and we are completely out of our league. It’s incredibly exciting for us, but it is very challenging. Assessing the technology is beyond us. (trans., p. 100)

Partners can also find it difficult to agree to a single strategy for the entire region. The Eastern Metropolitan Regional Council contended that partnerships:

> … are too loose to withstand any tension that might arise between member councils. To reduce these tensions, the groups then shy away from addressing difficult issues, rendering them of limited effectiveness. (sub. DR155, p. 8)

The looseness of partnerships also poses a risk to tenderers, who will be less willing to enter into contracts with multiple councils if there is a possibility that any of them might pull out of the contract. The Eastern Metropolitan Regional Council noted:

> A loose grouping undermines the ability for a tenderer to be sure that it will get the critical mass it seeks to provide the prices sought. This places an extraordinary amount of risk on the tenderer. (sub. DR155, p. 8)

These risks are particularly acute for some AWT investments that can involve large upfront costs and payback periods of 20 years or more. GRD Limited (trans., p. 780) argued that local governments were unfamiliar and uncomfortable with entering into long-term contracts that required them to share some of the project risk.

What are the alternatives?

There appear to be two broad approaches to address concerns over the operational capacity of local governments and partnerships. One is for state and territory governments to ensure that local governments and regional partnerships can access the necessary technical and contracting expertise. State and territory governments could:

- Provide financial assistance so that local governments and partnerships can buy in the necessary expertise.
- Provide the expertise directly to local governments and partnerships. GRD Limited (trans., p. 779) said that in the UK Government assists groups of councils to negotiate and prepare waste management contracts.
- Ensure that partnerships are of sufficient size so that they can provide their own expertise.

In an example of the last approach, the Victorian Government announced the formation of the Melbourne Metropolitan Waste Management Group in July 2006. The group is a statutory authority that brings together the previous four metropolitan regional waste management groups. The group is chaired by a board comprising both member councillors and waste management experts. Its responsibilities include:

- waste management planning; and

- assisting local councils to procure multi-council waste management and resource recovery services (box 12.3).

Box 12.3 Metropolitan Waste Management Group

In July 2006, the Victorian Parliament passed legislation establishing the Metropolitan Waste Management Group which replaced the earlier four metropolitan regional waste management groups (*Environment Protection (Amendment) Act 2006* (Vic)).

The group is a statutory authority comprising an eight-member board (half of whom are councillors nominated from the member councils, and half are skills-based nominees of the Minister for Environment). It will be funded from landfill levy distributions previously allocated to regional waste management groups.

A key function of the group is to assist its thirty metropolitan councils to procure multi-council regional waste services. The group will identify waste disposal and resource recovery services and undertake plans. Each of the thirty metropolitan councils will continue to be responsible for the waste management of their local community. They will retain responsibility for determining the option that best meets their needs and circumstances.

According to the Minister for Environment, procurement direction and/or guidelines will be developed by the Victorian Government to manage the risks associated with waste management contracting.

Sources: DSE (2005); Government of Victoria (sub. DR187); Thwaites (2006a).

However, addressing the shortfall of technical and contracting expertise alone will not address the problem of a group of local governments failing to agree to a binding long-term waste disposal and resource recovery contract. For example, even though the Melbourne Metropolitan Waste Management Group is likely to provide the critical mass necessary for it to maintain a pool of expertise (GRD Limited, trans. p. 781), it is still a partnership, thus doing little to improve contractual certainty.

The second approach is to transfer the responsibility for waste disposal and resource recovery to a fully constituted and appropriately capitalised regional body to deliver these services. In Western Australia, regional bodies constituted by local governments have the power to enter into waste management contracts, and to own and operate commercial waste management facilities (box 12.4). For example, the Eastern Metropolitan Regional Council owns and operates the Red Hill landfill and transfer stations (Eastern Metropolitan Regional Council, trans. p. 743). The group's member councils are the shareholders of the commercial entity. Similar provisions exist in South Australia, where fully constituted regional bodies are responsible for waste disposal in Adelaide (SA Government, sub. DR217).

Under the Western Australian model, the commercial entity has the authority to enter into waste disposal and resource recovery contracts. The regional council's members do not have to use the facilities but, as the entity's shareholders, would presumably choose to support them. The arrangement in effect aligns the interests of member councils with the region's interests. The Eastern Metropolitan Regional Council noted:

> The member councils aren't obliged to use the facility, but that risk is borne by us and they own us, so it's sort of in their interests to be part of it. (trans. p. 738)

The consequence of the Western Australian model is that it helps to manage better the risk faced by tenderers. According to the Eastern Metropolitan Regional Council:

> The Western Australian structure for regional councils is, we believe, an exemplary model. By making the regional council an entity in itself which is controlled by member councils, the risk for tenderers is better partitioned, and the council is able to provide better service to its member councils. Rather than being a talk-fest where action is eschewed, it can take on the difficult waste management problems that the individual member councils do not have the personnel or financial resources to manage. (sub. DR155, p. 8)

Moreover, regional councils entering into long-term contracts can also be underwritten by their member councils, further reducing the risk to a private tenderer.

However, not all local governments are in a position to own and operate waste disposal and resource recovery facilities. An alternative solution can be found in England. The responsibility for waste management in England is divided between two entities. In rural areas, county councils are responsible for managing the waste collected by their member district councils. In larger urban areas, specially constituted waste disposal authorities are responsible for managing the waste collected by their member district and borough councils (box 12.4). County councils and waste disposal authorities charge their member councils the costs of managing waste, and member councils in turn charge their rate payers.

Assigning the responsibility to a regional body for waste disposal and resource recovery offers some advantages over partnerships because:

- it lowers the tenderer's counterparty risk because the regional body will have the responsibility of negotiating a binding contract on behalf of its member councils;
- if adequately capitalised, it helps provide more financial security that the regional body will be able to honour its side of the contract;
- only a single waste disposal contract needs to be negotiated, which reduces transaction costs; and

- it should improve access to resources which can provide appropriate technical and contracting expertise.

Box 12.4 **Regional waste management groups**

Western Australian regional local governments

Western Australian regional local governments were first formed in the early 1980s in response to the need to improve their waste management services. Their roles and responsibilities are defined in the *Local Government Act 1995* (WA). Regional local governments are statutory authorities and have the power to enter into waste management contracts.

A regional council comprises councillors from its member councils. Local councils can refer any number of powers to regional local councils (such as the authority to make by-laws). The regional council can enter into contracts under its own name, though its members bear any liabilities incurred by the regional council.

South Australian regional subsidiaries

Under the *Local Government Act 1999* (SA), two or more local governments have the authority to form regional subsidiaries to provide, among other things, waste collection and disposal services. The subsidiaries can own and operate assets, and have their roles and responsibilities defined in legislation.

English local government and waste disposal authorities

Rural counties in England traditionally have a two-tier local government structure. The county council is concerned with providing, among other things, waste disposal services. In Lancashire, the county council serves a population of 1.1 million. District councils are responsible for providing waste collection services, among other services (Environment Agency (UK) nd). Each Lancashire district council serves almost 100 000 people on average.

Towns and cities only have one tier of local government. In larger metropolitan areas, such as Merseyside, Greater Manchester and London, a specially constituted waste disposal authority is responsible for providing waste disposal services for several borough councils. For example, waste disposal in the Greater Manchester area is managed by the Greater Manchester Waste Disposal Authority. It serves a population of about 1.9 million people. Each of its borough councils are responsible for waste collection services for about 200 000 people on average.

The boards of county councils and waste disposal authorities comprise district and borough councillors. County councils and waste disposal authorities have the power to enter into waste disposal contracts. District and borough councils can contract for the collection of waste but that waste must then be disposed by the county council or waste disposal authority. County councils charge the district council for their waste disposal services (ss. 30(2) and 48, *Environment Protection Act 1990* (UK)). District councils cannot bypass their county council or waste disposal authority to dispose of their waste.

Conclusion

The case for assigning the responsibility for waste disposal and resource recovery to a properly constituted regional waste authority in most large urban centres seems compelling. This approach would provide the necessary technical and contracting expertise, as well as the governance structure to manage the risks associated with long-term contracting.

State and Territory Governments should consider options for transferring the responsibility for waste disposal and resource recovery to such an authority where they have not already done so. It should be governed by its member councils. Member local councils could choose to retain responsibility for providing waste collection services. Such an approach would be most applicable in large urban centres where the majority of relevant local governments do not now have the scale or resources to efficiently and effectively handle waste disposal and resource recovery. However, a few local governments in Australia, such as Brisbane City Council and the ACT Government, might well be exceptions since they may already have the appropriate scale and resources to handle these roles efficiently and effectively themselves.

The idea of regional authorities might also be entertained for some rural areas — although the benefits of increased scale economies and pooling of resources would be offset by the higher freight costs in these areas. State and Territory Governments should consider the feasibility of grouping rural authorities on a case-by-case basis, but in any case, should continue providing technical and other advisory services to these areas.

State and Territory Governments should also consider declaring major waste disposal and resource recovery facilities to be projects of regional or even state significance for waste management land-use planning, where this is appropriate. The Commission notes that this is already the case for a number of jurisdictions. The processes adopted would need to be transparent and accountable to the electorate of the area.

RECOMMENDATION 12.2

State and Territory Governments should:

- ***consider making land-use planning and development approvals for major waste disposal and resource recovery facilities matters of regional or even state significance, and the responsibility of the relevant minister, where this is not already the case;***
- ***ensure that land-use planning and development approvals for major waste disposal and resource recovery facilities are handled efficiently and effectively,***

providing transparency and consultation for the relevant communities but also clarity and certainty for the waste management industry; and

- ***consider shifting the responsibility for waste disposal and resource recovery from local government to appropriately-constituted regional waste authorities, particularly in those larger urban centres in circumstances where the relevant local governments do not have sufficient scale or resources to efficiently and effectively handle these roles.***

12.3 Improving waste definitions and classifications

The environment protection legislation of each jurisdiction defines which materials are considered to be wastes, how they are classified for the purpose of regulation, and how they should be managed to minimise their effects on the environment and human health. Differences between jurisdictions in these areas can lead to increased compliance costs for waste management firms operating in more than one jurisdiction, and reduce the scope for resource recovery.

Differences in waste definitions and classification systems

There are differences between states and territories in the way waste is defined in legislation (box 12.5). There are also differences in how wastes are classified. In New South Wales and Victoria, environmental regulators have comprehensive classification systems for waste, although they differ between the two jurisdictions (box 12.6). In other states and territories, only hazardous waste is formally classified and the remainder are regarded as general waste.

There are also a number of wastes that are classified as hazardous in some jurisdictions but not in others. For example, fly ash is listed as a hazardous waste in Victoria, Queensland and Western Australia. It is not a hazardous waste in South Australia. In most jurisdictions, whole used tyres are hazardous wastes and cannot be landfilled, but are not hazardous if they are shredded (see for example, EPA SA 2003).[5]

A number of inquiry participants commented on the lack of consistency in waste definitions and classification systems throughout Australia. For example, the CSIRO (sub. 24, p. 4) noted that there are ‘a variety of waste

[5] Despite these differences, there is a degree of consistency in the way most hazardous wastes are classified. This is achieved through the 1994 National Strategy for the Management of Scheduled Waste and the National Environment Protection (Movement of Controlled Wastes between States and Territories) Measure (NEPC 2004)

classifications … presently used in Australia' and that 'waste definitions are inconsistently used in the absence of nationally agreed waste classification standards'. The Alex Fraser Group noted:

> All Federal, State and Local legislation has different interpretations for the terms relating to waste, recycling and resource recovery. (sub. 27, p. 9)

Box 12.5 **The definition of waste**

In environmental protection legislation in Australia, waste is generally defined to include any material that is discarded, rejected, unwanted, surplus or abandoned by its owner — whether of value or not, whether intended for sale or not, and whether or not intended for recycling, reprocessing, recovery or purification by a separate operation from that which produced the substance (for example, s. 4, *Protection of the Environment Operations Act 1997* (NSW)).

However, there are some exceptions:

- in Queensland, waste does not include material that is deemed to have a beneficial reuse, such as that intended for recycling (s. 13, *Environmental Protection Act 1994* (Qld));
- in Western Australia, waste includes any matter 'whether useful or useless, which is discharged into the environment' (s. 3, *Environmental Protection Act 1986* (WA)); and
- in the ACT, there is no formal definition of waste in the *Environment Protection Act 1997* (ACT).

Differences in definitions and classification systems can lead to marked differences in how similar (hazardous and non-hazardous) waste is managed. According to SITA Environmental Solutions:

> The same waste can be classified differently and therefore have different costs of disposal depending on which state it is in. For example in Victoria quarantine waste goes to deep burial whereas in other states it must be treated in an autoclave. In Western Australia some classes of medical waste can still be disposed … to landfill. (sub. 42, p. 29)

Classification and regulatory differences lead to ambiguity and confusion, and raise the compliance costs of firms operating in more than one jurisdiction. The Cement Industry Federation (CIF) argued:

> … significant regulatory differences exist between jurisdictions in areas including waste definitions and classification systems; transport, storage and handling requirements; as well as planning and licensing requirements. These differences result in duplication of effort by our member companies in undertaking resource efficiency programs — particularly those involving the use of secondary materials. The costs

> involved are incurred by duplication of management effort, in some cases unnecessary duplication of monitoring and/or evaluation trial effort. (sub. 71, p. 9)

Box 12.6 Classification of hazardous and other waste in New South Wales and Victoria

In New South Wales, the classification has a bearing on the way that the waste is generated, transported, stored and disposed. There are four broad classifications:

- *hazardous* — any waste that meets the requirements of the Australian Code for the Transport of Dangerous Goods by Road and Rail (for example, flammables and explosives); pharmaceuticals and poisons; clinical waste; cytotoxic waste; sharps waste; certain radioactive waste; and quarantine waste;
- *industrial* — includes stabilised asbestos in bonded sheets; asbestos fibre and dust waste; and certain non-liquid radioactive waste;
- *solid* — includes household domestic waste; certain forms of biosolid waste; waste contaminated with lead; drained and mechanically-crushed oil filters; cleaned pesticide, herbicide, biocide or fungicide containers; disposable nappies, pads and sanitary napkins; food waste; vegetative waste generated from agriculture or horticulture; and other non-chemical waste generated from manufacturing; and
- *inert* — includes virgin excavated natural material; building and demolition waste; asphalt waste; certain biosolid waste; used, rejected or unwanted tyres; and office and packaging waste not mixed in with other waste.

In Victoria, solid waste is classified into five categories to determine Environment Protection Authority requirements and to choose an appropriate management option:

- *prescribed waste (non-soil)* — listed in the prescribed waste regulations, which includes general and industrial waste;
- *prescribed waste (soils)* — includes both low-level and high-level contaminated soils;
- *putrescibles* — includes domestic garbage, commercial waste, vegetables, supermarket processing, delicatessen and butcher waste, garden clippings and prunings;
- *solid inert* — includes demolition material, concrete, bricks, timber, plastic, glass, metals, bitumen, trees and shredded tyres; and
- *fill material* — includes soil (sand, clay and silt), gravel and rock contaminated at levels less than for prescribed waste (soils).

Sources: DEC (1999); EPA Victoria (2004a, 2005c).

The Ash Development Association of Australia (ADAA) noted:

> What is costly from the current fragmented state-based system is the range of classification systems which result in various jurisdictions and differing laboratory test procedures, multiplying the costs of analysis, interpretation and reporting, as well as industry management time. (sub. DR149, p. 4)

Is there a case for greater consistency of definitions and classifications?

Some inquiry participants argued there is a case for greater consistency in the definition and classification of waste between states and territories (ADAA, sub. DR149; SITA Environmental Solutions, sub. DR143). The Alex Fraser Group noted:

> To remove the ambiguity, confusion and lack of consistency of the terms it is essential that the Federal Government provide the framework and clarity for state legislation and local bylaws to be developed. (sub. 27, p. 9)

There is likely to be an upfront cost in developing a common definition of waste and a national waste classification system. However, the CIF contended that the cost was likely to be small:

> The existence of a number of classification systems within the areas of both virgin materials and wastes, and within government regulatory circles and standards organisations would, to us, suggest that development of a classification system might not be costly. (sub. DR174, p. 3)

There is also likely to be some cost to states and territories as they will need to modify their environment protection legislation and regulations to ensure that their definitions and lists of scheduled wastes conform to the agreed definitions and classifications.

The Commission notes that there are likely to be offsetting benefits. Since common definitions and standards ensure that there is a common understanding of the hazards that each type of waste poses, the main benefit is the reduction in ambiguity and confusion that currently surrounds how different wastes should be regarded. This would reduce the compliance costs faced by firms active in more than one jurisdiction.

The Commission also notes that the availability of waste data and its comparability between jurisdictions depends to some extent on regulatory reporting requirements. A national waste classification system that is the basis for regulatory reporting would improve the accuracy and comparability of waste data reported by each jurisdiction (chapters 2 and 13).

Is there a case for more consistent regulatory standards?

A common definition of waste and a national classification system would not, however, address the ambiguity and confusion that arises from differences in regulatory standards. It is entirely conceivable that, should governments agree to a common understanding of the hazards posed by a category of waste, they could still adopt different regulatory responses. This in turn would raise the compliance costs of firms active in more than one jurisdiction.

The Commission notes that interjurisdictional differences, theoretically, should only reflect differences in what is genuinely appropriate for that jurisdiction, but in practice they are often simply due to the uncoordinated development of approaches.

Several inquiry participants supported more harmonised regulatory standards. The CIF (sub. DR174, p. 3) noted that they hoped, over time, ‘regulatory approaches might also converge’. The ADAA contended:

> We strongly support the goal to develop a national classification system that is both ‘low cost’, and balances the needs of state jurisdictions thus leading towards, over time, regulatory convergence. (sub. DR149, p. 4)

Greater consistency in regulatory standards could be achieved by any number of approaches — from mutual recognition on the one hand to strict uniformity on the other. Each approach offers its own costs and benefits. Under any approach, one of the costs is the effort to modify existing standards. Another is the transition costs of firms complying with the new standards.

Another perceived cost is the reduction in the freedom of State and Territory Governments to develop standards that they believe best suit their needs. The extent of this problem, however, may not be as large as it seems. Environmental planning can be used by regulators to tailor the licence conditions of waste facility operators to account for the needs of different environments. For example, Ipswich City Council (trans., p. 928) pointed to the Queensland Environmental Protection Agency’s efforts to tailor landfill licences to suit local conditions.

More consistent regulatory standards will, over time, yield benefits to firms, particularly those operating in more than one jurisdiction. Greater consistency in environmental standards is already a feature of national environmental policy. The purpose of the *National Environment Protection Council Act 1994* (Cwlth), for example, through the use of national environment protection measures, is to offer people throughout Australia the benefit of equivalent protection from pollution and to reduce any distortions to firms and markets from differences between states and territories in their environment protection measures (s. 3, NEPCA 1994; chapter 3).

The Commission considers that it is not in a position to draw a firm conclusion as to how far regulatory standards should be made consistent — due to inadequate information on the net benefits and the variety of possible approaches. There is, however, a good *prima facie* case for the Australian Government to work with the states and territories to review whether and how environmental regulatory standards could be made more nationally consistent to the benefit of the Australian community.

Improving existing exemption procedures

A concern put to the Commission is that environmental protection legislation can impede resource recovery or impose additional costly requirements because it can misclassify recoverable resources as waste. As the Alex Fraser Group noted:

> Construction and demolition materials should not be regarded as a waste as they have a sustainable and real secondary value. Legislation treats this material stream as a waste and, as such, places significant legislative and financial pressure on the industry. (sub. 27, p. 13)

Resourceco reported:

> We have some sites in Adelaide that require waste management licences because they receive 'waste' that is clearly not a waste for example cardboard bailing facilities. (sub. 46, p. 11)

The CIF also claimed that Queensland regulations have poorly transposed the Basel definition of hazardous waste with the effect that fly ash was misclassified in Queensland as hazardous even though it did not possess hazardous characteristics.

> The introduction of the new Environmental Protection Regulations in Queensland in 1998 used the then current Basel Convention to nominate materials to a new … classification of 'Regulated Wastes' … [for] restrictions on … tracking etc. Although fly ash is conditioned within the Basel convention as being an Article 1 hazardous waste only where hazardous characteristics are displayed, such caveats did not transfer to the Environmental Protection Regulation [in Queensland], which provided no exemption where named materials did not in fact exhibit hazardous properties.
>
> The Queensland ash industry has well established that fly ash generated from black-coal fired power stations is indeed non-hazardous, but has suffered from being branded as an industry dealing in a regulated waste — in practice exempted from prosecution only by a non-legally binding policy statement.
>
> The fly ash industry is one of the most significant recycling industries in Australia and, as a supplementary cementitious material, saves almost an equivalent tonnage of carbon dioxide emissions as is used in blended cements. (sub. 71, p. 4)

These concerns arise for two reasons. First, environment protection legislation in general tends to define any byproduct material that is surplus to requirements as waste, even if can be sold to a recycler (box 12.5). The CIF noted:

> The majority of relevant Australian legislation that currently exists takes the approach of classifying virtually anything deemed to be no longer useful by some party and then consigns those wastes to the scrap heap of landfill …

> The end result is a regulatory approach which classifies materials as wastes regardless of any realisable or latent value and then takes a simple prohibition approach to their subsequent management. (trans., p. 62)

Second, waste classification systems are mostly prescriptive in nature rather than risk or performance based. Materials are listed according to their constituent contaminants or the waste stream from which they were sourced. For example, any potentially recyclable material sourced from a household waste stream is deemed to pose some degree of risk because household waste normally contains some putrescible waste.[6]

The Business Roundtable on Sustainable Development (BRSD) contended:

> … inappropriate labelling of resources as a waste, [is] leading to the impost of environment protection regulations that would not otherwise be warranted if a risk-based approach had been adopted with that resource and competing resources. (sub. 70, p. 10)

State and Territory Governments provide for exemptions

Most states and territories attempt to address this problem by allowing recoverable resources to be exempted from regulatory controls. For example, the Queensland exemption process requires applicants to demonstrate that there is a beneficial reuse for the recovered resource[7] — that is, there is a productive use for the recovered resource that does not also pose an unacceptable risk to the environment or human health.

While these changes allow for materials to be reclassified, impediments still remain. Several inquiry participants argued that the processes and criteria required of applicants remain unclear and that this is leading to excessive testing requirements (box 12.7).

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[6] There are some exceptions to the prescriptive approach of classifying waste. In New South Wales, a waste can be classified as hazardous if it demonstrates certain characteristics such as being explosive or flammable. An unknown waste (a waste that has yet to be prescribed) must undergo tests of the concentration levels of its contaminants to determine its degree of hazard (DEC 1999). Similarly, in Victoria, once a material is prescribed to be hazardous, it is then tested to determine its degree of hazard (EPA Victoria 2005c).

[7] s. 13, *Environmental Protection Act 1994* (Qld); r. 66E, Environmental Protection (Waste Management) Regulation 2000 (Qld).

Box 12.7 Participants' views about processes for gaining regulatory exemption for recovered resources

In some cases, the criteria by which a byproduct can be exempted from regulatory controls are unclear. The Kwinana Industries Council (KIC) noted:

> The KIC is currently liaising with the Western Australian Government to address this important issue and highlight the current barriers that can prevent the diversion of … products to useful applications. This includes the lack of [a] clear framework which can raise concerns amongst generators and users when trying to demonstrate a project's implementation value from both an environmental and economic risk perspective. (sub. DR166, p. 1)

With regard to used asphalt, the Australian Environment Business Network noted:

> Again there is a regulatory vacuum in environmental criteria for use of wastes in asphalt, portland cement and other civil works projects. The NSW Department of Environment and Conservation has not been able to define a set of criteria for what is equivalent to virgin excavated material. (sub. DR138, pp. 7–8)

The absence of clear regulatory arrangements can lead to excessive testing requirements, that can exceed those applying to virgin materials. The Eastern Metropolitan Regional Council noted:

> Requirements to test recycled product [are] far in excess of what would be required of virgin product, even though the virgin product is just as likely to be contaminated. This is exemplified and particularly damaging in markets for recycled aggregate and soil, where the margins are thin and excessive testing can make a business unviable. (sub. DR155, p. 5)

The Ash Development Association of Australia noted that the regulatory problems one developer experienced in attempting to use coal combustion product for fill material perversely led it to use virgin material instead.

> To illustrate our view of an inappropriate application of regulation, during early 2005 a very large development project in close proximity to a fly ash source site required some 500 000 tonnes of engineering fill. The design engineers agreed that fly ash met the physical and chemical properties of the project. Regardless, additional testing requirements at some considerable additional cost, were called for from the local regulator. These additional requirements were above and beyond that required of virgin materials. These additional test requirements were met. Subsequently the regulator deemed and required that 'landfill levies' were payable if the prescribed waste material was to be used as the project required more than 20 000 tonnes. The resulting levy impost made the proposed use of … coal combustion products … commercially unviable resulting in the use of traditional quarried and virgin excavated natural materials. (sub. DR149, p. 3)

The NSW Department of Environment and Conservation (trans., p. 886) noted that it is in the process of simplifying its regulations to allow, for example, greater use of certain industrial residues as fill, fertiliser and fuel.

The Environment Protection and Heritage Council (EPHC) listed a number of factors that inhibited the application of industrial residues (and products derived from them) to land:

> These include the absence of clear guidance on what information is needed to determine if industrial residues are fit for reuse, the potential for chemical contaminants to have adverse effects on the environment, agriculture and human health, limited research and lack of knowledge in this area, economic drivers such as transport and storage costs, and public concerns. (EPHC 2005b, p. 7)

An example of the shortcomings of exemption processes was also evident in the way that certain materials were exempted in Victoria, but were not recognised in Queensland. The CIF said:

> … the Victorian EPA had made a decision that because all of the wastes that were coming to Geocycle[8] were … [being processed] to a specification, they no longer deemed that to be a waste of any type. They considered it as a fuel and it was not subject to any tracking, any other transport requirements. So we had this situation where the material that was coming out of Victoria as a fuel, when it crossed the border into Queensland, it suddenly became a regulated waste again.
>
> … under the memorandum of understanding between the states, the state of origin was [required] to initiate the tracking process. So we had a situation where Victoria, which didn't even consider this to be a waste, had to initiate a tracking process for the waste so it could be accepted into Queensland. (trans., p. 77)

What are the alternatives?

The cement industry Strategic Industry Leaders Group, an advisory body to the Australian Government comprising representatives from the Australian cement industry, government and scientific experts, argued that the states and territories need to standardise and coordinate their procedures for exempting potential recyclable cementitious material.

> There is a need for exchange of information and cooperation between different regulatory authorities, and mutual recognition of the scientific and technical evaluations that have been undertaken, to avoid 'reinventing the wheel' and to expedite approvals. All licensing authorities should have standard procedures for dealing with proposed process changes to non-traditional materials as a means of providing certainty for companies seeking to innovate and take advantage of new opportunities. (SILG 2006, p. 48)

Another approach would be to adopt a more risk or performance-based approach to classifying waste. As noted, current waste classification systems are mostly

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8 Geocycle SBF Pty Ltd (formerly Teris Aust Pty Ltd) produces alternative fuels for cement kilns (SILG 2006).

prescriptive-based. If a material were to be classified on the basis of the risk it posed to the environment or community, it would reduce the reliance on a separate exemption system and would lessen the likelihood of waste being misclassified. It would also assist in making transparent the testing requirements to be used in any exemption application.

The downside of such an approach is that it may be more expensive for firms and regulators to demonstrate compliance with the standards. Prescriptive-based standards are often relatively straightforward and may only require certification of the type or source of the waste.

A combination of these two approaches seems warranted. A risk-based framework would provide a mechanism for classifying waste and improved procedures would allow for a more efficient exemption process for recoverable resources.

RECOMMENDATION 12.3

The Australian Government should work with the State and Territory Governments to:

- ***develop and implement a national definition of waste and a national waste classification system;***
- ***review the appropriate balance between prescriptive and risk-based classifications of waste;***
- ***standardise, coordinate and improve the efficiency of current processes for granting exemptions to recoverable resources from irrelevant environmental controls; and***
- ***explore opportunities to achieve further consistency in regulatory standards applying to waste.***

12.4 Other regulatory impediments

There are several other government regulatory requirements that can impede the efficient recovery of resources. Some of the issues identified by inquiry participants include:

- skip bin policies in metropolitan areas
- specification of product standards
- adverse outcomes of certain regulations.

Skip bin policies

Waste management operators are subject to a variety of government policies governing skip waste bins, especially in metropolitan areas. The Waste Contractors and Recyclers Association (WCRA) of New South Wales noted:

- Within the Sydney Metropolitan Area there are approximately 40 local councils.
- Each of these councils invariably has a different skip waste policy that involves different deposits, bonds, application fees, durations, forms, number of skips etc.
- Recently Roads and Traffic Authority came up [with] another variation and even more recently WorkCover … [has] … announced to us that they intend to issue their own Code.
- This variety of Regulations and Codes is very confusing for the industry, it is an administrative and financial burden and needs to be centralised into one policy. (sub. 15, pp. 6–7).

Not only can the inconsistencies between policies can raise the compliance costs of waste contractors, they can also result in duplication, which require the contractor to make a separate permit application every time they supply a skip waste bin.

The inconsistencies between the various policies have been largely addressed in Victoria. VicRoads (2001), in consultation with other parties, has developed a voluntary code of practice for the licensing and placement of skip waste bins. The code specifies the permitting requirements, placement and visibility of skip waste bins. For example, the code provides a standard application form to be used in all licensing applications. However, the code only contains guidelines that are common to all municipalities. Local governments may choose to provide additional policies (VicRoads 2001) or even not adopt the code.

WCRA (trans., p. 916) noted that a common policy has not arisen in New South Wales. The City of Ryde (trans. p. 868) contended that for this to happen, the NSW Government would need to produce a model code and either regulate or strongly encourage councils to adopt it.

But common guidelines, such as the VicRoad code, will not address problems of duplication. Waste contractors still need to apply for a permit for every skip bin. Another approach would be to allow waste contractors to be formally accredited.[9] Under such a scheme, a contractor would pay a bond on accreditation, but would be exempted from applying for a local government permit every time a bin is delivered.

[9] Under the VicRoads code, some councils may require skip bin suppliers to be accredited, that is, to demonstrate they have a minimum of $5 million of public liability insurance (VicRoads 2001).

The current approaches to skip bin policies are raising the costs of waste collection. These costs could be overcome by developing a uniform skip bin policy to reduce inconsistencies between local governments, and introducing a system for accrediting waste contractors to reduce the need for multiple permitting applications.

RECOMMENDATION 12.4

State and Territory Governments should direct their agencies and local governments to develop uniform skip bin policies, and to augment current permitting processes with an accreditation system for skip bin suppliers to reduce the need for multiple permitting applications.

Specification of product standards

Various government bodies are responsible for setting the standards for a range of products in order to meet other objectives, such as product and food safety. According to the Office of Regulation Review, two ways in which product standards can be specified include:

- *prescriptive-based standards* — which specify the technical means for attaining the specified outcome; and
- *performance-based standards* — which specify the desired outcome in precise terms and allow individual organisations to determine how to achieve the outcome (ORR 1998).

Some inquiry participants argued that the use of prescriptive-based standards is an impediment to the development of markets for some recovered building and construction materials, and post-consumer food packaging materials.

Building and construction

In a number of jurisdictions, the standards for building and construction materials are specified in terms of their performance. For example, Transport SA allows a range of materials to be used in the construction of road pavement, provided they meet performance based standards (Transport SA 2006).

In other cases, standards are specified on the basis of the source of the material — that is, in prescriptive terms. For example, Resourceco reported that the SA Department of Administrative and Information Services has a requirement that building and construction work for the Department of Education, Training and Employment must use quarried material (sub. 46, p. 11).[10]

Specifying product standards in terms of the source of the material, rather than the product's performance, can prevent the use of recovered resources. The Australian Council of Recyclers argued:

> Recovered resources are often discriminated against on the basis of being 'recycled', rather than being assessed on their performance. This is a significant barrier to local market growth. (sub. 40, p. 13)

Concrete recycling companies were particularly concerned about the use of prescriptive-based standards for road base in main roads construction (Alex Fraser Group, sub. 27). C&D Recycling noted:

> Many specifications for road construction require quarried products, thereby precluding any RCA [recycled concrete aggregate]. (sub. 44, p. 12)

A number of participants argued that virgin quarried material is favoured over recycled material, despite evidence suggesting that recycled material can match, or be demonstrably superior to, virgin material (for example, C&D Recycling, sub. 44; Resourceco, sub. 46). For example, the Alex Fraser Group argued that recycled concrete aggregate can:

> … outperform competing domestic and imported resources, but is not chosen because of 'waste' connotations. All materials should be selected on their ability to conform to a performance specification. (sub. 27, p. 13)

Concrete recycling companies called for performance-based standards to be used in the specifications for road bases. The Alex Fraser Group recommended that there is a need to 'identify and review regulations and/or product specifications that inhibit the use of recycled materials' (sub. 27, p. 17).

Packaging standards for food safety

Prescriptive-based standards governing the use of packaging (to protect the health of consumers) can impede the market for recovered resources. Food Standards Australia and New Zealand (FSANZ) is the statutory body that specifies the standards for a range of food packaging materials to minimise the risk of food

10 These standards are defined in DAIS (2000).

contamination. For Australia, FSANZ's standards relating to the hygienic packaging of food are described in Australian Standards 2070–1999 (FSANZ nd).

FSANZ's standards clearly state that 'post-consumer recycled material shall not be used in direct contact with food' (section 4.2.1, AS 2070–1999; Standards Australia nd).

M2W2 Professional Services noted that FSANZ did not regard recycled plastic as a suitable food packaging material because of the possibility of contamination of the plastic feedstock:

> … the use of recycled consumer packaging materials, other than metals and glass, is potentially a problem because of contamination, since there are no controls on the treatment procedures or the uses to which these materials are put. It is inevitable that some recycled materials would not be acceptable for use in many food packaging applications. (sub. 49, p. 15)

However, Visy Industries was granted an exemption to use post-consumer recycled polyethylene terephthalate (PET) plastic in 2001 (Porter 2001). The exemption was granted by FSANZ on the grounds that an objective of the Australian standard is to achieve harmonisation with the US Food and Drug Administration's standards (Preface AS 2070–1999). The relevant US standard is performance-based (21 US Code of Federal Regulations, Parts 170–199). It stipulates how packaging must perform when comes into contact with food. By convincing the US Food and Drug Administration that its use of recycled PET plastic was safe for food packaging, Visy Industries was able to gain exemption from the Australian standards.

By being harmonised with the US Food and Drug Administration's standards, Australia's standards are in effect also performance-based. However, this is not immediately obvious from section 4.2 (AS 2070–1999). Greater clarity in this regard would be helpful.

Conclusion

There is scope to improve the efficient recovery of resources by moving to performance-based standards for a range of materials, including those used in building and construction. Some advantages of using performance rather than prescriptive based standards include:

- *flexibility* — firms have more flexibility in meeting their requirements if they can use any material that complies with the performance requirement;
- *innovation* — firms have more freedom to innovate and use new solutions that meet the performance requirements if they are not constrained to comply with a single prescribed solution; and

- *cost savings* — firms can reduce their costs if they can choose how best to meet the performance requirement (PC 2004).

As noted, the downside of performance-based standards is that it may be more expensive for materials suppliers to demonstrate compliance (section 12.3). A combination of performance-based standards and deemed-to-satisfy provisions would address these concerns. Where there are existing provisions to grant exemptions to prescriptive-based standards on the basis of performance, these exemptions should be clearly stated.

RECOMMENDATION 12.5

Governments responsible for specifying the use of materials for products, including building and construction materials, should review all product standards that unjustifiably frustrate the use of recycled products and/or call for the use of virgin materials, with a view to replacing them with performance-based equivalents where this is feasible.

Implications of other regulations

Government regulations outside of waste management or Australia can have adverse (and sometimes perverse) consequences for the markets for recovered resources. Some areas of concern raised by inquiry participants include:

- the European Union WEEE and RoHS directives
- occupational health and safety regulations
- fuel efficiency labelling schemes
- energy efficiency standards.

European Union WEEE and RoHS directives

The European Union (EU) directives relating to the use of hazardous materials in electrical and electronic equipment illustrate how well-intended regulation can lead to perverse environmental outcomes. In 2003, the European Parliament and the Council of the European Union issued directives on Waste Electrical and Electronic Equipment (Directive 2002/96/EC) ('the WEEE directive') and the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (Directive 2002/95/EC) ('the RoHS directive').

The directives limit the use of certain hazardous materials in electrical and electronic equipment, to improve the environmental performance of their waste

(NetRegs nd). An effect of the directives is to ban the use of lead solder in consumer electronic equipment.

Although lead can give rise to environmental and human health problems, it is not clear that a ban on the use of lead solder will lead to environmental improvements because alternatives to lead solder (such as tin and silver) are not as reliable. It was alleged that the adoption of lead-free solder in Japan led to higher rates of equipment failure, which in turn led to an increase in the amount of waste — contrary to the objectives of the directive (Australian Electrical and Electronic Manufacturers' Association, trans., p. 468; BRSD, sub. 70).

Occupational health and safety regulations

Occupational health and safety (OH&S) regulations have had a significant impact on the operations of the waste disposal and resource recovery industry. Some work practices are labour-intensive and prone to injuring workers. Over time, regulations in this industry were gradually tightened and led to changes in work practices. For example, the OH&S risks associated with manual lifting in part led to the replacement of 55 litre garbage bins with 'wheelie bins' between the 1970s and 1980s (Packaging Council of Australia, sub. 67).

OH&S regulations have also influenced the range of services offered by the industry. For example, Collex observed:

> It is accepted that many councils have elected to pursue commingling of different recyclables to minimise collection cost[s] and to address OH&S issues. (sub. 80, p. 13)

The comingling of recyclables has tended to increase the amount of recyclables collected, as households undertake less sorting, but has tended to increase contamination. It is difficult to determine the net effect on the recovery of kerbside recyclables from pursuing OH&S objectives.

Fuel efficiency labelling schemes

The Australian Government's Fuel Consumption Labelling Scheme provides consumers with information about the fuel efficiency of motor vehicles as a means of promoting fuel efficiency. Growing public awareness and a range of other factors (most notably, increasing fuel prices) have created a demand for more fuel efficient motor vehicles.

It is likely that such schemes, and other factors, have affected the level of resource recovery. To achieve improved fuel efficiencies, automotive manufacturers have, among other things, substituted heavier metal components, which were generally cost effective to recycle, with lightweight materials such as plastics. When such materials are reduced to shredder floc, they are costly to recycle and are currently landfilled (although they are a good candidate for energy-from-waste).

Energy efficiency standards

The Australian, State and Territory Governments have implemented, and are considering strengthening, a range of energy efficiency standards for household appliances, industrial equipment and housing construction (PC 2005b). An objective of these standards is to reduce greenhouse gas emissions by conserving energy.

The Australian Electrical and Electronic Manufacturers' Association (AEEMA) (trans., p. 473) said that improved energy efficiency standards for refrigerators have resulted in an increased use of insulation material. AEEMA noted that this:

> … can result in increased quantities of insulation. Thus in order to comply with one government compliance regime, an industry may be adding to shredder floc. (sub. 59, p. 6)

The adoption of tighter national energy efficiency standards for housing is also favouring the adoption of concrete slab floors over suspended wooden floors (PC 2005b). But this means that more earth needs to be removed to level the site, particularly when the site is sloping, which is likely to be disposed to landfill.

Conclusion

Government regulations and standards that address other policy objectives, such as energy efficiency standards, can have unintended consequences on markets for recovered resources. When governments are considering a policy proposal (such as in a non-waste related area), they should assess the overall net benefits to the community. This would reveal if there might be any (unintended) adverse consequences (chapter 6).

12.5 International agreements

The terms of reference require the Commission to examine the effects of international trade agreements on the level and disposal of waste in Australia. There are two types of agreements that can influence the waste management industry:

- the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989) ('the Basel Convention'); and

- international trade agreements, such as Article XX on the General Agreement on Tariffs and Trade.

The Basel Convention

The Basel Convention is a multilateral environmental agreement, the objective of which is to prevent the uncontrolled movement of hazardous and municipal solid waste. As at August 2005, there were 168 signatory countries to the agreement, including Australia.

The Basel Convention is given force within Australia through the *Hazardous Waste (Regulation of Exports and Imports) Act 1989* (Cwlth) (HWA 1989) and its regulations (such as the Hazardous Waste (Regulation of Exports and Imports) (OECD Decision) Regulations 1996) (HWR 1996). They are enforced by the Department of the Environment and Heritage (DEH).

The objective of the HWA 1989 is to control the trade (the export, import and transit) of hazardous waste (including municipal solid waste) in an environmentally sound manner so as to protect people and the environment.[11]

Generally, Australian firms are prohibited from exporting hazardous waste for final disposal, except in exceptional circumstances (DEH 2001a). Australian firms wishing to export hazardous waste to a signatory country for resource recovery must apply for a permit — although export permits are not required for certain electronic recyclables going to OECD countries (DEH nd).

The relevant Australian Minister will grant a permit to export hazardous waste for resource recovery if, among other things, the Minister is satisfied that the material will be exported in an environmentally sound manner and the relevant authority overseas has granted its written consent.[12] The HWA 1989 and HWR 1996 set time frames on how soon the Minister must respond to an application, but the actual time taken in part reflects how quickly overseas authorities can respond to requests from Australia.[13]

The DEH (sub. 103) noted that 20 kilotonnes (or 20 per cent) of lead acid batteries had been exported under the HWA 1989, and that approximately two million used

11 s. 3(1), *Hazardous Waste (Regulation of Exports and Imports) Act 1989* (Cwlth) (HWA 1989).

12 s. 17, HWA 1989; r. 16 Hazardous Waste (Regulation of Exports and Imports) (OECD Decision) Regulations 1996, (HWR 1996).

13 ss. 15A–16, HWA 1989; rr. 12–15, HWR 1996.

computers were exported each year, about half of which are obsolete models sold for scrap.

Are current exemption processes too onerous?

Some participants were concerned that the procedures for gaining exemptions to the Act might be too onerous. Examination of the DEH's guidelines regarding the export of used electronic equipment suggests that the requirements placed on firms are relatively clear and easily accessible (box 12.8).

Box 12.8 Hazardous waste criteria for exporting electronic equipment

The criteria used by the DEH in its guidelines as to whether electronic equipment can be exported, include:

- *Is the equipment waste?* The guidelines define waste to mean any item intended for recycling or disposal. Used equipment that is still working (intended for direct reuse or upgrading) is not waste and not covered by the *Hazardous Waste (Regulation of Exports and Imports) Act 1989* (Cwlth). The guidelines also describe in detail the types of faults the equipment would need to make them waste. For example, a computer is considered to be waste if it does not power up, perform internal set-up routines or if its self-check fails.
- *Is the waste hazardous?* The guidelines describe the components and assemblies of electronic equipment that are regarded to be hazardous and subject to the Act. For example, assemblies that contain accumulators, mercury-switchers, or glass from cathode ray tubes are considered to be hazardous.
- *Where is the waste being sent?* The guidelines state that exporters of electronic scrap (such as printed circuit boards) and reclaimed electronic components do not require an export permit if the material is to be sent to an OECD country for resource recovery — though they would need transit permits if the material were being shipped via third countries.

Sources: DEH (2001a, nd)

The DEH contended that any failure of a firm to obtain an export permit may simply reflect unwillingness to meet the application requirements:

> … it is difficult to say whether exports have not gone ahead because of an exporter's lack of determination to do so — for example, unwillingness to meet the application requirements — or for some other reason. (sub. DR214, p. 25)

However, comments from other participants suggest the problem is that permits are issued for too short a period given the time that it takes for exporters and the relevant authorities to submit and consider them. The problem arises from the way in which permits are granted and then take effect. In the majority of cases, an export permit will be issued for a relatively short period of time from the date of application. (In the case of exports to the OECD, permits are usually issued for up to a year).[14] But a firm can only commence exporting once the Minister is satisfied that all the regulatory requirements are met. Given that the Minister needs to receive written consent from all the relevant authorities in each of the transit and destination countries, this process can take many months, and the timing of which is uncertain. As a result, permits are only useable for a short time (and in many cases, only a few months) before a firm has to apply for a renewal.

It is possible for a firm to request, at the time of application, for the permit to be granted at some later date.[15] However, this might not be clear to firms unfamiliar with the process of applying for a permit. It might also be possible for firms to apply for permits back-to-back, but this means that both exporters and the relevant authorities will be caught in a cycle of renewing and processing the same permit every few months.

The effort arising from the application process can discourage firms from exporting recoverable resources. SITA Environmental Solutions noted:

> SITA could recycle batteries and electronics more easily if it did not have to comply with the administrative burden of Basel. (sub. DR143, p. 22)

SITA Environmental Solutions (trans., p. 846) also noted that they can avoid the administrative burden by exporting their product via a third party that has already obtained an authorisation from the DEH.

Though the current exemption processes can be improved, many of the constraints faced by Australian exporters are beyond the Australian Government's immediate control, such as the time it takes foreign authorities to respond to Australian requests. There is limited scope to change the duration of permits as these are set out in the Basel Convention. There appears to be, however, scope to make sure that export and other permits are issued from the date the Minister grants approval not from the date of application.

RECOMMENDATION 12.6

The Australian Government should ensure that export, import and transit permits granted under the Hazardous Waste Act 1989 (Cwlth) are issued expeditiously and commence from the day the Minister grants approval, rather than from the date of application, unless the applicant requests otherwise.

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14 rr. 17(1)(a) and (2)(b), HWR 1996.

15 r. 17(1)(b), HWR 1996.

International trade agreements

Australia is a signatory to a number of international multilateral and bilateral trade agreements. The most notable is the General Agreement on Tariffs and Trade (GATT). Australia is also a signatory to four bilateral trade agreements:

- the Australia New Zealand Closer Economic Relations Trade Agreement and the associated Australian and New Zealand Government Procurement Agreement;
- the Australia–United States Free Trade Agreement;
- the Singapore–Australia Free Trade Agreement; and
- the Thailand–Australia Free Trade Agreement.

International trade agreements have the potential to influence Australian waste management policies in two ways: by placing limits on how Australia can implement an extended producer responsibility scheme; and by limiting how Australian governments can exercise their procurement policies.

Implications for extended producer responsibility schemes

The GATT is one of the World Trade Organisation (WTO) agreements that lay out the international rules for the use of trade restrictions. When a country accedes to the WTO, it agrees to trade with other countries on terms set out in the GATT. Generally, this means that parties are not permitted to restrict trade, except in accordance with the principles in the agreement (Oxley 1997).

The GATT is relevant for the management of extended producer responsibility schemes. Australia is not permitted to restrict imports from another country that is a signatory to the GATT, on the grounds that its environmental policies do not accord with Australia’s policies. However, under Article XX of the GATT, Australia is only permitted to restrict imports from another country to protect the public health or environment of Australia. Australia can impose trade restrictions on the basis of the technical specifications of imported goods provided:

- like products are treated as like products
- they are not unduly trade restricting.

International trade agreements do not appear to impede the adoption of extended producer responsibility schemes provided that the same restrictions (such as taxes and levies) apply to imports and their equivalent domestic goods, and the least trade restricting measures are used.

Implications for government procurement

Australia's international bilateral trade agreements with New Zealand, the United States, Singapore and Thailand contain provisions regarding government procurement (DOFA 2005). Australia is not a signatory to the WTO Agreement on Government Procurement, though it is an observer.

These bilateral trade agreements limit the use of government procurement to discriminate against importers — since government procurement policies can be used to protect domestic producers against foreign competition. (In the case of the Thailand–Australia Free Trade Agreement, there has yet to be resolution of the provisions regarding government procurement.)

A concern is whether bilateral trade agreements can limit the ability of Australian governments to use purchasing policies for environmental purposes. A review of the bilateral agreements reveals that Australian governments can use preferential purchasing — provided they do not discriminate against firms of the bilateral trading partner. Australia's trade agreements do not prevent Australian governments from using government procurement to promote environmental objectives. However, government procurement policies are not recommended as a means of promoting markets for recovered resources, due to their lack of cost-effectiveness (chapter 11).

13 Performance measurement

Key points

- Performance indicators can be effective ways of determining whether objectives are being met, but are not an end in themselves. They are only as good as the policies or practices they are evaluating and the data used to enumerate them.
- Indicators of amounts of waste provide no information on the costs and benefits of various waste management options and are, therefore, not good measures of whether a policy achieves net benefits for the community.
- Indicators that focus on downstream issues, such as the externalities of waste disposal, are likely to provide the most useful information.
- Indicators of cost effectiveness may assist policy makers in assessing waste management options and managing community expectations.
- Simply collecting more waste data is likely to be costly, for doubtful benefit. Collecting data for use in developing policy that focuses on particular demonstrated or potential problems may, however, be warranted.
- There may be benefit in State and Territory Governments developing a set of uniform definitions of waste that would result in improved national data with low additional cost. This could improve performance measurement of future waste policies.

The terms of reference ask the Commission to examine the 'effectiveness of performance indicators to measure efficiency of resource recovery practices'. Most inquiry participants interpreted this as being about performance against the targets of reducing waste to landfill and/or increasing resource recovery. This chapter outlines what performance indicators are and how they are currently being used in waste management policy. It goes on to describe some measures that might be useful for waste management policy and the issues surrounding data collection.

13.1 What are performance indicators?

Performance indicators are a device used in performance measurement. They are used to help measure how well organisations meet their objectives, given the external constraints and resource limitations placed on them, and whether they are operating efficiently and effectively. Their uses can include: governments measuring their performance in delivering services and undertaking regulatory activities; companies measuring their performance in creating value for owners; and contracting parties measuring whether outcomes are being achieved. Performance indicators are also used for establishing baseline levels of performance and monitoring changes over time.

Performance indicators are often used in policy review, including for demonstrating compliance. For example, the Australian Government's regulation impact statement process includes the requirement to outline 'how the preferred [regulatory] option will be monitored to assess its progress in achieving its objectives' (ORR 1998, p. D17). Good policy making also requires clear lines of accountability for achieving objectives and setting out consequences for non-compliance.

In order to be a useful evaluation tool, performance indicators need to reflect properly justified objectives and outcomes, and be comprehensive, transparent, meaningful and cost-effective (box 13.1). They can be used as evidence of the need to improve performance.

Performance indicators are not the same as benchmarks or targets, although they can be useful in determining whether benchmarks or targets are being met, and can, in some cases, be used to set these benchmarks or targets. Performance indicators can also be used in measuring comparative performance between organisations or jurisdictions. This can provide useful information on the outcomes being achieved by others, and having regard to relevant differences, what alternative approaches might improve performance. This process can be especially useful where there is no competitive market pressure on an organisation and there is limited information available to those deciding what services to supply. This often occurs in the waste industry, particularly at the collection stage, which tends to be a natural monopoly at the local level (chapter 5).

Box 13.1 Features of good performance indicators

Performance indicators are most useful when they provide a concise, measurable indication of whether properly justified objectives have been met. Indicators that provide a quantifiable measure are preferable, although there is sometimes a place for qualitative indicators. In the absence of reliable data on direct measures, proxies may be useful.

Good performance indicators are generally:

- **Objectives/outcomes focused** — given external constraints, performance indicators should reflect whether suitable, measurable, clearly defined and achievable outcomes are being met.
- **Comprehensive but concise** — a set of performance indicators should reflect all important objectives to demonstrate different aspects of overall performance, while not overwhelming users with information.
- **Transparent** — performance indicators should be accompanied by explanatory material with the limitations and qualifications outlined, including those of the data. Where possible, comparable data should be used to illustrate performance based on consistent definitions, both over time and across jurisdictions. However, there may be a tradeoff between the comparability of the data and its cost.
- **Meaningful to stakeholders** — there are a number of groups that use information provided in performance indicators in waste management. Governments use them in evidence based policy making and resource allocation, waste management firms and other firms use them in business decision making and to demonstrate compliance, and environmental groups and the community use them for monitoring outcomes and performance. Indicators should provide sufficient information for the target audience to make assessments about performance (and take into account the special needs of particular target audiences). It is also useful if data used for performance indicators can be disaggregated, so stakeholders can examine levels of detail relevant to them. The results should also be unambiguous in their interpretation.
- **Timely and cost effective** — there are practical considerations when developing performance indicators. Data used for performance indicators should be relevant for decision making and, therefore, need to be promptly available. There may be a tradeoff between timeliness and accuracy of data. The cost of data collection should not exceed the benefit.

13.2 Performance indicators for waste management policy

Current performance indicator exercises

There are a number of recent or current exercises being undertaken that involve using performance indicators for waste management.

- In 2004, the OECD Working Group on Waste Prevention and Recycling and the Working Group on Environmental Information and Outlooks finalised a set of performance indicators based on the Pressure-State-Response[1] framework (box 13.2).
- The Australian Government, and most State and Territory Governments publish regular 'State of the Environment' reports that include indicators such as solid waste disposed to landfill, participation in recycling and amounts of waste recycled. There are gaps in the data used to report against these indicators.
- The revised National Packaging Covenant (NPC) incorporates 29 performance indicators that signatories are required to report against. Each performance indicator relates to one of five Covenant Environmental Performance Goals. The indicators range from measures of volume of material sold and recovered to qualitative information on systems and practices.
- Performance indicators are often incorporated into contracts between local governments and agents contracting for waste management services such as collection and materials recovery. Performance indicators, such as waste contamination rates, can assist in determining whether contractual requirements are being met.
- Local governments use performance indicators to monitor their performance over time. To the extent that these are comparable, these can be used to compare performance between local governments in a state or territory. For example, the NSW Department of Local Government produces annual comparative information against four performance indicators for waste management relating to charges for, and costs of, domestic services, and amounts of domestic waste and recyclables collected.

1 The Pressure-State-Response model is a framework for environmental indicators and indicators of sustainable development. It was developed by the OECD to 'differentiate indicators which respectively relate to human pressures on the environment, actual states of the environment, and the response which may be undertaken to alleviate environmental damage.' (Newton et al. 1998, p. 19)

Some of the performance indicators used in the schemes outlined above do not meet all the criteria for good performance indicators. Some examples include:

- the OECD scheme contains three ‘indexes’ that appear fairly complex in their generation and may not be particularly transparent or meaningful to stakeholders (box 13.2);
- the NPC scheme contains a large number of indicators that will be costly for firms to collect data against, may overburden municipal staff (particularly in regional councils) and may overwhelm stakeholders with information. The scheme also includes a number of qualitative indicators that do not appear to be particularly meaningful (appendix C); and
- ‘State of the Environment’ indicators of amounts of waste disposed to landfill measure progress against a stated objective of diverting waste from landfill, but does not provide any information on the impact of waste in landfills on the environment, which is the policy issue that the Commission considers to be of primary importance.

Indicators of amounts of waste

Many performance indicators focus on amounts of waste going to, or being diverted from, landfill and amounts of materials being recycled. This reflects:

- policies based on the waste hierarchy, or particular targets of waste landfilled or recovered; and
- the relative ease of collecting data on quantities of waste.

As noted in chapter 7, the Commission considers that policies based on the waste hierarchy are likely to have resulted in net costs to the community. Performance indicators are only as good as the policies they are being used to evaluate. If a landfill diversion target has been set without rigorous analysis of the costs and benefits, its achievement is likely to impose net costs on the community. The amount of waste going to landfill, or being recovered, may be a suitable performance indicator for policies based on the waste hierarchy, but it does not provide information on the financial and environmental costs of achieving the objectives of such policies. Depending on the circumstances, such as the size and location of a landfill, the costs of diverting some types of waste may be greater than the benefits.

Box 13.2 **OECD waste prevention performance indicators**

The OECD indicators for waste prevention include:

- **Municipal waste generation** (tonnes per year) — municipal waste generation per person, and municipal waste generation per unit of private final consumption expenditure for municipal waste and its components.
- **Generation of construction and demolition waste** (tonnes per year) — generation of construction and demolition waste per unit of gross domestic product.
- **Generation of non-hazardous industrial waste** (tonnes per year) — generation of non-hazardous industrial waste per unit of gross domestic product.
- **Number of companies with a certified environmental management system** — total number, per person, or per unit of GDP.
- **Consumption of virgin material and (collection for) recycling of the material** — for selected materials only, for example, glass, paper and metals.
- **'No thanks' stickers for unsolicited mail handed out** — in percentage of total households or by type of household (single-family, multi-family, other).
- **Existence of a national waste prevention plan or strategy** (yes/no) — a qualitative indicator that shows the extent to which extended producer responsibility (EPR) schemes are implemented. In this case, a relevant indicator could be a list of products and/or product groups targeted by EPR nationally or regionally.
- **Households with variable-rate pricing for waste collection** — in total or as a share of the total number of households.
- **Hidden flow index** — domestic hidden flows/total material input describes the changes in material effectiveness especially in the branches of primary production and construction.
- **Waste disposal index** — waste disposed of/net additions to stock reflects the efficiency of the use of materials in, and recovery of, the waste from the production and consumption processes.
- **Manure utilisation index** — Dissipative use of manure/total generation of manure describes the magnitude and development of waste utilisation in agriculture leading to productive use of high amounts of waste.

Source: OECD (2004c).

A number of participants noted the limitations of measures that focused on the amount of waste diverted. For example, Collex noted:

> KPIs [key performance indicators] should take into account the value of resource recovery including energy and the toxicity avoided. This involves a recognition that tonnage is a very limited KPI. A tonne of paper contaminated by food scraps and glass has nowhere near the recycling value of good quality sorted paper. (sub. 80, p. 8)

Performance indicators can be useful for comparing the performance of different jurisdictions or countries. But such comparisons of volumes of waste generated and diverted from landfill need to be made with caution (discussed in more detail in chapter 2). This is because:

- there are significant data comparability issues in domestic and international waste data; and
- there are also geographic, social and economic differences between countries and jurisdictions that would be expected to result in different optimal waste management outcomes.

These issues were raised by the Australian Electrical and Electronic Manufacturers' Association (AEEMA):

> AEEMA is wary of direct comparisons with other countries without a full understanding of the comparability of data sets. Unfortunately, this can only be assessed on a case-by-case basis. For example, even in Europe, where EU Directives are intended to promote harmonisation, legislation and implementation of the Directives in EU member states can vary significantly due to different geography, demographics, economic circumstances, enforcement priorities and technical difficulties as well as lack of clear product definitions to distinguish product groups. (sub. 59, p. 11)

Moreover, the PCA noted:

> A number of jurisdictions prefer to report quantities early in the recycling process as the reported yields are higher. For example Germany reports a recycling rate of 82 per cent, but in Europe 'recycling' only means delivery to a recycler. There may be a difference of 30 per cent between what is collected and what is recovered. While the German DSD [Duales System Deutschland] … means a wide range of materials are collected, there is a high level of missorting and limited markets for a number of materials. Consequently about a quarter of the material delivered is rejected by the recycler and sent for disposal by other means. (sub. 67, p. 30)

Using amounts of waste as a performance indicator to set targets or benchmarks can result in policies that result in net costs to the community. Measures of amounts of waste may be useful information for the policy debate — in this regard, more accurate data may be warranted (discussed in section 13.3) — but their usefulness as performance indicators of the levels of community wellbeing achieved is questionable. They provide no information on the net benefits to the community of the various options for waste management.

FINDING 13.1

Performance indicators of the amounts of waste being disposed to landfill or recovered have limited value because they do not provide any information on the costs and benefits of these options.

Indicators of externalities

The Commission considers that waste management policy should focus primarily on waste disposal externalities. To the extent that these are internalised, for example, through the costs of compliance with regulation, markets will tend to achieve the right balance between disposal and recycling. To this end, performance indicators relating to the externalities arising from waste management and resource recovery may be useful. The most important externalities associated with landfilling are groundwater and surface water contamination, greenhouse gas emissions and loss of amenity.

Performance indicators could be used to determine whether the objectives of landfill policy were being met. For example, landfill operators could be required to publicly report measures such as contamination levels in groundwater due to leachate, greenhouse gas emissions, complaints about loss of amenity from nearby residents, and strategies for site rehabilitation as part of licensing requirements. This information could then be used by regulatory authorities, local residents or environmental groups to require landfill operators to bring sites to an acceptable standard, or to close sites, through enforcement of licensing conditions or application of political pressure.

Licensing of landfills has for some years been the responsibility of state and territory environmental protection agencies (EPAs), although the approach varies across jurisdictions. EPAs are also accountable for ensuring that landfills comply with licensing requirements. In an environment where regulation appears to offer the best policy response to externalities, non-compliance not only imposes significant risks to the environment, but also bestows a competitive advantage on non-compliers, distorting price signals and leading to sub-optimal outcomes. For example, non-complying landfill operators may be able to operate at a lower cost. This would provide a competitive disadvantage not only to compliant landfills, but also to operators of compliant alternative waste technology, energy-from-waste and recycling facilities.

While EPA licensing requirements for landfills appear to be largely adequate for addressing policy-relevant externalities, their effectiveness depends on the degree to which they are complied with (section 8.5). In this regard, performance indicators, such as the proportion of landfills that meet their EPA's licensing requirements, could be used to evaluate the effectiveness of EPA programs.

This approach was supported by SITA Environmental Solutions, which noted:

> The EPAs do not report systematically on compliance with licence conditions and only some undertake *ad hoc* landfill audits to assess compliance. This situation is clearly inadequate.
>
> Regulations and licence conditions should be rigorously enforced and reported upon publicly. A register of landfill compliance to … minimum operating standards should be developed and reported upon by each EPA. (sub. DR143, p. 23)

FINDING 13.2

Performance indicators relating to compliance with licence conditions at landfill sites may be useful in revealing the extent of externalities, and whether further policy intervention is needed.

Indicators of cost effectiveness

Community expectations have played an important part in shaping waste management policy. The Department of the Environment and Heritage (DEH) noted:

> States are under increasing pressure from the community to introduce zero waste policies and to make producers responsible for the waste impacts of their products. (trans., p. 605)

While recognising that it is important for policy makers to respond to community expectations, it is also important that the community is well informed about all costs and benefits of different waste policy options. Uninformed community expectations are not a good basis for policy development. Providing sound, relevant information to the community is crucial to informing the policy debate, especially as community perceptions of the problem sometimes drive the choice of solution. As the Business Roundtable on Sustainable Development (BRSD) noted:

> For sensible input to waste management policy, the BRSD believes that the aspirations of the community must be well informed. And those expectations must be determined properly, not just assumed and asserted, particularly by vested interests.
>
> Leadership and effective consultation by government and business is required to appropriately inform the community, to provide the lines of logic and to establish the evidence base that will inform the community and allow sensible aspirations to evolve. (sub. 70, p. 18)

One way in which the community can be given more information is through the use of soundly based cost-effectiveness indicators, such as the cost of achieving higher rates of recycling or lower rates of disposal to landfill. Improved information on cost-effectiveness would be beneficial to policy makers at all levels of government and to the community in assessing the costs of different waste management options. Moreover, cost-effectiveness indicators would assist in ensuring preferred waste management options are implemented at least cost. As Porter (2002, p. 262) noted:

> Cost-effectiveness avoids the tough issues [of how much waste the US should be generating each year] and tries to minimise costs with respect to the more readily controlled variables. Where life and fairness and justice are involved, as in many waste decisions, it may be impossible to decide what overall policy is optimal, but there are always parts of the problem that can be examined for cost-effectiveness. Whatever we do, we should always do it at least cost.

Chapter 4 noted that the total (private and external) net benefits of some recycling are likely to be small or even negative, and that alternative waste technologies are likely to result in greater net costs to the community than landfilling. Part of the task for policy makers is to inform the community of the costs involved in diverting waste from landfill, compared with other waste management options.

This suggests that information, such as that produced by the NSW Department of Local Government on the comparative performance of local governments in New South Wales, could be useful (NSW DLG 2005). For example, the indicator 'cost per service for domestic waste collection' across councils could indicate the variation in costs of different types of services used by different local governments (for example, hard waste collection, green waste collection and kerbside recycling).

Similarly, net cost per tonne of the kerbside collection system could indicate the variation across local governments in the net costs of different kerbside collection systems. Such indicators could be used by local governments to communicate to the community that there are costs involved with recycling and to identify councils with low costs. This may facilitate information sharing between local governments about strategies to reduce costs and undertake kerbside recycling at least net cost. Use of such indicators would need to have regard to the various factors affecting kerbside collection costs, such as population density and distance to resource recovery facilities.

FINDING 13.3

Performance indicators of cost effectiveness can have a role to play in measuring the cost of achieving social and environmental objectives in waste management, and in benchmarking performances of local governments in providing kerbside collection services.

13.3 Improved data collection

Good quality data are important for a number of reasons. As noted by the DEH:

> … good quality data assist sound policy development processes and enable industry to more effectively participate in markets for recoverables or otherwise manage waste. However, to justify the costs of its collection there must be a clear benefit from obtaining the data, whether it is at the national, state or local level, or related to market sectors or products. Moreover, the impact on individual businesses should be minimised.
>
> The nature of policy or business decisions varies across these levels/sectors, and data should be relevant to those levels. (sub. 103, p. 52)

Data on amounts of waste generated, recycled and disposed in Australia, and some of the issues relating to the quality of these data, are discussed in chapter 2. There is a range of other data that would be useful for waste policy and industry development, including environmental impacts, consumption, exports and imports, and recovery rates of recyclables. However, data collection is not costless, and depending on the policy objectives set, the cost of collecting waste data could be substantial.

The adequacy of data on waste

There are a range of difficulties in collecting data on waste. The Packaging Council of Australia (PCA) (sub. 67) observed:

- some jurisdictions do not have an annualised minimum data set and tend to only conduct one-off data collection exercises;
- some landfills do not have weighbridges;
- there is significant seasonal variation in waste and recycling rates, with events such as Christmas, Easter and long weekends having a significant impact on set out rates;
- reliably determining the composition of general waste can only be done by regular and detailed bin audits, which is a costly activity;
- reliable information on resource recovery is best obtained by audits of recycling facilities to measure quantities delivered, sorted and recovered; and
- audits need to be underpinned by comprehensive, independent and validated systems of reporting from landfills and recycling facilities.

There were numerous comments from participants about the inadequacy of data on waste and how this was limiting the policy debate. The Local Government Association of Tasmania noted:

> More reliable data on consumption, recycling and disposal and the environmental impacts of those things would greatly assist in establishing clear priorities and measuring policy outcomes and there is a need for intervention to facilitate improvements in this area. (sub. 60, p.5)

The PCA also noted:

> Forming effective and efficient policy in the absence of reliable and comprehensive data is at best risky and at worse irresponsible. Consistent, independent and accurate data is essential to forming good policy. (sub. 67, p. 29)

Resourceco noted:

> At the time of writing this document there was minimal reporting of waste streams in and out of all facilities with a majority of the documentation supplied being in support of the collection of the levies. This was done at the gate of the landfill so much of the data collection is anecdotal based on what companies want to report.
>
> Given the nature of the waste industry this information would be either exaggerated or understated dependant on what suited the company at the time. (sub. 46, p. 5)

Other participants claimed there was already sufficient data in the area of waste generation. For example, the Cement Industry Federation noted:

> While the cement industry believes that good data is important in making good management decisions, we do not believe that insufficient data exists in the area of waste generation and resource efficiency to make a case for delaying early action in this area. The cement industry collects data on all materials used by the industry as well as secondary materials utilised. (sub. 71, p. 4)

Good quality data can assist policy makers in managing community expectations. The DEH noted the role of the OECD data on waste generation in motivating policy responses:

> OECD data indicate that Australia's per capita waste generation is 690 kilograms per year. This figure is frequently used by governments and non-government organisations as a driver to motivate industry, governments and communities to take more action on waste, but it is based on 'estimated data referring to the late 1990s' (OECD 2005c).
>
> Accurate national data on waste and recycling would support more balanced, less reactive policy development. (sub. 103, p. 54)

The cost of data

Some participants commented on the costs of data collection, including the Building Products Innovation Council, which noted:

> … if the cost of collecting the data is too high compared to the application of the analytical results from the data then we should not proceed (on economic grounds). In our view it is preferable to estimate the costs involved in the data collection and then compare this to the benefits that might be achieved through redirection of the funds that would otherwise be spent on data collection to encouragement of research or practices that aim to reduce waste regardless of the finite amount actually disposed. (sub. 86, pp. 1–2)

AEEMA also questioned the cost effectiveness of more data:

> Although we would prefer to have more precise data, AEEMA has found that obtaining greater detail on domestic appliance recycling rates and material flows involves significant cost, yet would not result in significantly more accurate data, or increased recycling. (sub. 59, p. 9)

Some participants asserted that some data are not being made available, or are not collected on a consistent basis, limiting their usefulness. In this regard, it may be the case that much of the costs of data collection are already being borne, and standardising definitions or converting the data already collected into a format that is useful from a national perspective, not just from the perspective of the individual jurisdiction, would incur only small additional costs. For example, the Alex Fraser Group noted:

> Standardisation of audit protocols, the ability for comparisons to be made state-by-state and region-by-region is essential. Currently all levels of government enforce reporting systems and capture significant quantities of information, but because of its non-standardisation, much of it is unusable. (sub. 27, p. 16)

The Commission observes that while data are costly, there is also a cost in not having reliable data available for sound policy development, as noted by the DEH:

> There are uncertainties about applying and interpreting the quantitative results of cost–benefit analysis when a lack of reliable data makes it difficult to undertake quantitative assessment of all benefits and costs (especially those incurred due to environmental externalities), thus potentially skewing policy decisions away from environmentally sound outcomes. (sub. DR214, p. 14)

The Australian Waste Database

Experience with the Australian Waste Database (AWD), which was initiated by the Cooperative Research Centre for Waste Management and Pollution Control Ltd in the 1990s, serves to illustrate the difficulties in collecting uniform, national data.

Funding for this exercise was limited, and subsequent changes to the structure of the industry and lack of compulsion to report data has resulted in it now containing few data items of any currency or comparability across jurisdictions (or even within jurisdictions).

Some participants thought the AWD provided a useful model for improved data collection. For example, the Waste Management Association of Australia (WMAA), National Landfill Division noted:

> It's a fairly sophisticated and useful instrument for dealing with waste data because it looks at the sources that generate the waste as well as the actual material composition. This database has died through lack of support from state governments. It was maintained by the federal government for a while, and I think it might have gone to the CSIRO … but it's not being kept up to date and isn't really being used. But it is a systemised approach which is capable of giving you consistent data. … I think in the Waste Management Association there is some interest in reviving this database and possibly the Waste Management Association taking some role in maintaining it, because it's very much in our interests. We're very interested in that and we think that the collection of data on waste is an important issue. (trans., p. 1127)

Other participants believed that the AWD is not a model that would produce good results:

> … the Australian Waste Database was not successful and NSW would not support any similar efforts because of the degree of resources involved and the low probability of success. (NSW Government, sub. DR195, p. 1)

A way forward on data

The Commission considers that a nationally consistent set of data would be useful for comparing jurisdiction's performance against their particular waste management objectives and against each other. For example, it would appear that the use of a comparatively high landfill levy in New South Wales has not achieved as high levels of recycling (48 per cent of total waste generated was recycled in 2002-03, according to Hyder Consulting (DEH, sub. 103, attachment A)) as Victoria's approach that focuses more on education and industry support (51 per cent recycling rate).

Section 12.3 discusses the implications of standardising definitions of waste across jurisdictions, including how this would improve data comparability. Jurisdictions may argue that it is difficult to collect data on a nationally consistent basis because definitions of waste are determined by the legislative and regulatory frameworks, and these vary across jurisdictions. For example, the NSW Government noted:

> The waste data collected by NSW is of high quality, transparent and reported publicly on a regular basis … The data are also structured around the regulatory framework,

> which limits the flexibility to adjust the data or the reporting to be consistent with all states and territories. (sub. DR195, p. 1)

The Commission notes, however, that there are other policy areas where differing legislative frameworks have not prevented the collection of national data that is broadly consistent, and appropriately qualified as to any inconsistencies in supporting information. As such, there may be value in establishing nationally consistent definitions, such as those in the AWD, with jurisdictions collecting data against these definitions as they see a policy need. Such an approach would allow each jurisdiction to assess the costs of the additional administrative burden against the benefits for their jurisdiction. The Commission would encourage a lead role by industry, as suggested by the WMAA, National Landfill Division above, in such an exercise, supported by State and Territory Governments.

The Commission also considers that data could be used to understand the size and scope of particular waste-related problems. For example, since:

- landfilling tyres is perceived to be causing problems, data could be collected on the externalities associated with the disposal of tyres, and used to develop appropriate policy responses; and
- plastic-bag litter and its impact on the environment is a key concern, collection of data on these impacts could be undertaken.

The NSW Government also noted that data collections needed to be focused on particular policy issues and be cost effective:

> Data collection efforts should instead be focussed on those areas where meaningful data can be extracted quickly and at relatively low cost. It is recognised that work is underway in a number of product sectors, for example packaging, to develop cost effective data sets that will inform an analysis of products and their environmental benefits and costs, particularly with regard to product stewardship work. These initiatives should be encouraged. (sub. DR195, p. 1)

The Treated Timber Product Stewardship Group noted its particular data needs:

> We need good quality national data to be collected on disposal of waste timber, which includes the level of contamination (chemical and physical) as well as how the waste is presented (for example, size, shape, condition). This data is necessary for performing informed cost–benefit analysis as well as assessing the environmental impacts of alternatives to current practices. (sub. DR262, p. 4)

Data collection need not always be ongoing, which tends to be costly. One-off specific collections of data for identified policy problems is a suitable approach in some circumstances. The DEH suggested that 'governments … can commission work to seek additional information to better understand the problem' (trans., p. 980).

To justify a case for government intervention in the collection of data, market failures in information, or compelling environmental or social issues, need to be demonstrated. Moreover, the benefits of government intervention should outweigh the costs. Ongoing data collections will need to demonstrate significant benefits for their relatively high cost compared with more targeted collections. An appropriate balance will need to be found between avoiding the burdens on industry and local government of too much data collection and the risk of poor policy making resulting from too little. While a number of participants noted that a lack of data was hindering their efforts at developing markets for recovered resources, it is not clear why governments should be responsible for providing or funding such market research.

The ABS may be well placed to assist governments at all levels to improve waste data collections in a cost-effective manner, subject to resources being made available:

> At the inaugural ABS Centre of Environment and Energy Statistics Advisory Board meeting in August 2005, members highlighted that waste and waste management would be a topic of emerging and increasing interest. (ABS, sub. 47, p. 8)

The ABS noted that its potential role could include:

> Assisting others in collection and collation of waste data, particularly in the area of defining agreed statistical concepts, frameworks, standards and data requirements. (sub. 47, p. 8)

Good data are an important component of good policy practice based on rigorous cost–benefit analysis and poor data can result in policy that addresses little more than perceived problems and ill-informed aspirations. Governments can guide the development of relevant data sets.

RECOMMENDATION 13.1

The Australian Government should work with the State and Territory Governments to coordinate the development and implementation of a concise, nationally consistent data set for waste management that:

- ***facilitates evaluation and comparison of waste management policies across jurisdictions;***
- ***assists governments in undertaking cost–benefit analysis;***
- ***focuses on the data needed to address priority policy issues;***
- ***has regard to data collection practices already in use, including the framework provided by the Australian Waste Database; and***
- ***recognises the importance of government-funded data when there is a market failure in information.***

14 The main issues and the way forward

Key points

- Waste management policy needs to be refocused on the environmental and social externalities that can be associated with waste collection and disposal, and supported by more rigorous policy development processes, if it is to best serve the community.
- The reforms the Commission is proposing would produce a marked departure from the recent trends in waste management policy. The common ground is a reliance on regulation to address the externalities that can arise from waste disposal. However, from that point major divergences arise, with the Commission proposing the abolition of landfill levies and other interventions designed to achieve selected waste diversion targets.
- Some reforms could be introduced immediately. Others might need to be phased in to lessen adjustment costs, or because they will take time to be designed and implemented.
- The Australian Government could play an even more prominent role than it has in the past. It should use its powers and responsibilities to encourage and otherwise help State and Territory Governments develop sound and, where appropriate, nationally-coordinated approaches to waste management policy.

In many ways, this report challenges the conventional wisdom about waste management policy. Instead of focusing on achieving ever higher levels of diversion of waste from landfill or increasing the resources recovered, it asks policy makers to clarify objectives and consider all of the costs and benefits of the policy options facing the community, whether financial, environmental or social in nature. The options that maximise net community benefits will depend on location and circumstances, and will not be achieved through simple adherence to the waste hierarchy.

14.1 The objectives and focus of waste management policy

At the heart of any policy review, the objectives of government intervention need to be clarified. The Commission considers that waste management policy should be guided primarily by an objective of reducing the risks of harm from waste to human health, the environment and social amenity (environmental harm), to give the best returns to the community generally.

Waste management policy does not currently focus on this objective alone. It has tended to also include the pursuit of objectives such as reducing waste, increasing resource recovery, conserving resources and improving sustainability. These objectives are often explicitly or implicitly linked to the waste hierarchy, and are not necessarily consistent with reducing the risks of environmental harm. Indeed, waste minimisation and resource recovery have tended to become ends in themselves, rather than means for achieving better environmental and social outcomes. This has resulted in policy approaches being adopted with little regard to location, or circumstances, or the overall costs and benefits to the community

Left to themselves, markets will not reduce the risks of harm to human health and the environment from waste to acceptable levels. The two main market failures that government intervention should address concern waste collection and disposal (including illegal dumping and littering).

- The market failures in collection occur mainly with respect to household waste. These involve the likelihood that, in the absence of government intervention, waste collection services would not be universally supplied, and that private disposal of waste by householders would lead to unacceptable health and pollution impacts.
- The market failures in the collective disposal of waste in common facilities concern the externalities of landfills, and other large-scale waste disposal options, such as energy-from-waste and other alternative waste technologies. Similarly, illegal dumping and littering create externalities.

Waste management policy needs to be refocused on these issues, not upstream environmental matters or broad issues such as greenhouse gas abatement. To the extent that there is a case for intervention, such upstream issues should be addressed as directly as possible, not through waste management policy. Using waste management policy to address these issues is likely to be inefficient and ineffective.

Taking indirect action through waste management policy also presumes that direct actions are not being taken, or that the upstream externalities that have not been addressed are substantial. Yet with the exception of a comprehensive response to greenhouse gas abatement, a host of existing policies already address directly many upstream externalities occurring within Australia. If governments want to address climate change effectively and efficiently, it would be best done at a national and international level, not through piecemeal measures such as landfill regulation.

The Commission is not recommending that market failures further upstream in the product life cycle should be ignored. Quite the contrary — direct intervention at various points throughout the product life cycle should be continued, and where necessary, supplemented by additional measures. This would help ensure that product prices reflect all relevant costs.

14.2 The Commission's preferred policy framework

The Commission's preferred approach is different to current approaches but starts with some common principles (table 14.1 at end of chapter). One of those principles is a conviction that market failures associated with waste collection and disposal should be primarily addressed through regulation. Regulation has tightened over recent decades, but could be improved through greater use of performance-based approaches, and tighter compliance. Other areas of commonality include recognising the importance of community support for resource recovery; that local governments are struggling with the responsibilities of waste disposal and resource recovery; and that sound data are needed to develop sound policy. And a reasonable degree of commonality extends to other issues, such as recognising that some products might cause problems if disposed of through inappropriate channels.

But from that point some important divergences emerge. For example, the Commission does not support the use of landfill levies, or subsidies that are not based on downstream externalities. The Commission considers that the waste hierarchy should not be used as a formal basis for developing policy, nor should broad waste-diversion or recycling targets be used. And as noted, waste management policy should not be used to address upstream problems. The Commission is also sceptical about the case for establishing many extended producer responsibility and product stewardship (EPR and PS) schemes, and is calling for much tighter assessment of such schemes.

This is not an exhaustive account of the differences between the Commission's approach and current policy. To understand the Commission's approach the reader is encouraged to carefully consider all of the Commission's findings and recommendations, and the summary contained in table 14.1. But at its core, it is fair to say that the Commission's approach is based on getting the regulation right and then letting markets (which rely on a well-informed community) play a greater role than they are permitted at the moment. The suite of recommendations contained in this report are aimed at eliminating market failure, and government-imposed distortions in waste management, so that markets can operate efficiently. This would allocate all resources — including natural resources, labour and capital — in ways that achieve the best result for the community, and achieve a superior result compared to resource recovery targets developed by governments, almost regardless of the sophistication and effort that goes into their derivation. It might mean that the mix between landfill disposal and resource recovery will change, but provided all relevant externalities are addressed, this should not be regarded as a negative outcome.

Other features of the Commission's approach concern policy development processes and helping the community make informed choices about waste management policy. Unfortunately, much waste policy in Australia has been initiated with insufficient assessment of the overall costs and benefits. Waste disposal problems, and community support for the remedies proffered, are too often simply asserted, rather than demonstrated.

14.3 Adjustment issues

Some of the changes the Commission is recommending could be introduced immediately. Others might be disruptive for the waste industry, and hence could warrant a phased introduction to ease the adjustment process, or will take time to properly design and implement (box 14.1). But they should be introduced as soon as practicable to maximise the net benefits to the community generally.

Thus improving compliance with landfill regulations and full cost recovery could be introduced more or less immediately, whereas removing landfill levies or subsidies not based on soundly-identified market failures might need to be phased out. Landfill levies and financial subsidies have been the main ways in which jurisdictions have been pursuing the achievement of selected targets and waste hierarchy related objectives. Financial subsidies are used to directly support resource recovery facilities, such as alternative waste technology plants and materials recovery facilities. Landfill levies also subsidise these activities indirectly by making disposal a relatively more costly option for waste disposers. Removing these subsidies abruptly could create some adjustment problems for the waste management industry.

However, this would depend on the net effect of all of the Commission's recommendations on the waste industry. For example, tightening compliance will help ensure that the full costs of regulation (and hence the internalised cost of the externalities) are passed on to users, and in some cases, would raise gate fees. And in those jurisdictions where landfill levies are relatively low (or nonexistent) adjustment issues caused by the removal of levies would be commensurately lower (or nonexistent).

Box 14.1 Staging the reforms

The Commission's proposed reforms would need to be introduced over time.

Immediate or short-term reforms would include:

- dropping use of waste diversion targets;
- tightening compliance with landfill regulations;
- ensuring appropriate cost-recovery practices are in place for all landfills;
- not introducing any new subsidies unless warranted by downstream externalities;
- beginning to phase out landfill levies (and shelving plans to increase or introduce levies);
- beginning to phase out existing subsidies not based on externalities;
- establishing expert scientific panels as needed to assess evidence of the risks and environmental impacts of waste of concern; and
- giving broader consideration to the use of basic forms of pay-as-you-throw charging arrangements at the household level.

Medium-term reforms would include:

- refining the use of performance-based regulation for landfilling;
- undertaking research into the residual externalities from compliant landfills;
- considering regional responsibilities for waste disposal and resource recovery;
- referring upstream issues identified to appropriate ministries for consideration,
- reviewing the effectiveness and efficiency of existing extended producer responsibility and product stewardship schemes, including the National Packaging Covenant; and
- developing consistent classifications and definitions, and systems for exempting recyclables from waste regulation.

Longer-term reforms would include:

- revising waste strategies (and supporting legislation) to focus on reducing the risk of harm to human health, the environment and social amenity to acceptable levels, *not* on reducing waste or conserving resources per se;
- completing phase out of levies and subsidies;
- removing regulatory impediments to use of recovered materials;
- adopting regional approaches to waste disposal; and
- amending planning legislation to make large-scale facilities matters of regional or state significance.

Some initiatives will take time to roll out. For example, developing a more performance-based approach to landfill regulation, adopting uniform classification systems (and definitions), removing inappropriate objectives from waste legislation, and removing unnecessary regulatory barriers to the use of recovered resources, cannot happen overnight. But even in these cases, there are some sound basic foundations on which the states and territories can build, and lessons they can learn from each other. Assessing the merits of existing EPR and PS schemes will also take time. But more rigorous assessment processes for new or currently proposed schemes should be introduced as soon as possible so that only soundly-based schemes addressing real environmental issues are implemented.

The Commission's recommended approach will not see the abandonment of much useful work which has already been done to improve waste disposal facilities and to improve resource recovery activities. It will, however, remove government distortions and provide an environment which is more likely to result in the best results for the community as a whole.

14.4 Role of the Australian Government

While the State and Territory governments hold most of the policy levers in waste management, the Australian Government has significant coordinating and leadership roles to play. It also has the crucial power to levy indirect taxes — a virtual necessity in implementing most EPR and PS schemes. The Commission considers that the Australian Government could play a more significant role than it has in the past by:

- *working with the State and Territory Governments to develop and implement consistent waste classification systems and databases.* At a minimum, this would help ensure that more consistent data was collected (which in turn would assist with monitoring and benchmarking performance), and that similar processes would apply for exempting products from regulation. This work would lay the ground for exploring opportunities to achieve further consistency in regulatory standards applying to wastes.
- *facilitating research into the significant externalities caused by waste disposal.* The Australian Government could provide a central coordinating role in ensuring more robust analysis of environmental issues is undertaken. There may be scope for this to be done on a collaborative basis, involving the State and Territory Governments, and research institutions, such as the CSIRO and the universities.
- *refining information, education and awareness programs to help ensure the community is well informed about waste management issues.* In particular, effort should be directed at identifying and addressing areas of community concern.

- *playing a leadership role in the development of EPR and PS schemes*. The Australian Government should insist on clear objectives and that thorough, up-front identification of the problem precedes the development of such schemes.
- *ensuring that upstream market failures that concern waste policy makers are reviewed by other relevant ministries.* Where appropriate these should then be addressed directly.
- *ensuring rigorous adherence to regulatory impact assessment guidelines.* In turn the Australian Government could encourage the State and Territory Governments to do likewise.

14.5 Concluding remarks

Waste management policy should assist markets to find the balance between waste avoidance, resource recovery and disposal that maximises net benefits to the community. The Commission considers that, in many ways, Australian policy makers have yet to establish the right mix of policies to allow this to happen. Too much faith has been put in simplistic policy frameworks — such as the waste hierarchy — and waste minimisation and resource recovery have tended to be regarded as ends in themselves.

The reforms the Commission is proposing will help achieve the appropriate balance by, among other things: requiring a more rigorous approach to identifying environmental problems; tightening regulatory compliance; and reinforcing the roles of prices and awareness raising in assisting the community to make more informed choices. Addressing relevant market failures throughout the product life cycle, and removing government-imposed distortions, will facilitate the ability of markets to achieve the most appropriate balance between waste avoidance, resource recovery and disposal.

As in other areas of environmental policy, the way forward is not always intuitively obvious. But what is clear is that simple rules such as ‘recycling is good, more is better’, are no substitute for sound policy-making procedures. Waste management policy should be refocused on the environmental and social problems created directly by waste collection and disposal (including litter), not upstream problems. And policy makers and community attitudes need to be guided by open and rigorous analysis of costs, benefits and risks if waste management measures are to best serve the community.

Table 14.1 **Summary of main issues and the way forward**

The current situation	*The Commission's preferred approach*	*Main benefits of change*
Landfills can damage the environment (chapters 4, 9 and 12 and appendix B)		
• Regulation has tightened considerably, but tends to be prescriptive. Where regulations are complied with, environmental damage is reduced to low levels.	• Make regulation as performance based as possible and tailored to the circumstances of each landfill.	• Desired level of pollution control achieved at lower cost. • Allow operators maximum flexibility in meeting environmental standards.
• Enforcement of regulations appears variable and lax and some (local-government owned) landfills do not recover their full costs.	• Tighten enforcement of the regulations, thus internalising environmental costs. • Ensure full cost recovery of government-run landfills.	• Less risk of environmental damage. • Full cost pricing (including environmental costs) will promote the right level of recovery.
• Landfilling is discouraged through landfill levies. Levy revenue is often earmarked for environmental projects.	• Remove the levies as regulations are a better way of addressing externalities. • Raise funding for projects through general revenue.	• Inappropriate cost impost on the community removed. • Better assessment of the merits of projects funded.
Waste avoidance and resource recovery can be good for the environment (chapter 4)		
• The upstream benefits of resource recovery vary according to circumstances. Downstream external benefits are small.	• Address upstream sources of externalities directly (for example, require mining operations to meet specified standards) and greenhouse gas abatement nationally.	• Far more effective and efficient responses to upstream environmental issues. • Lower risk of perverse outcomes.
• Maximising resource efficiency (the return to one or more natural resources) is a major determinant of policy. • But, as a partial indicator, resource efficiency fails to consider the returns from using all inputs.	• Policy should be guided by consideration of all inputs and all costs and benefits, whether financial, environmental or social in nature.	• Policies are more likely to maximise the returns to the community generally.
• Resource recovery is promoted through landfill levies, subsidies, state strategies etc.	• Make support for resource recovery as transparent as possible using direct policy instruments.	• Transparent subsidies and charges help householders and others make better choices.
• The waste hierarchy is used to help guide policy and set waste diversion targets.	• Waste policy should be guided by assessments of all costs, benefits and risks.	• Avoids costly measures that do not deliver commensurate environmental benefits.
• Targets have been set for recycling and waste diversion in various jurisdictions.	• Discontinue use of targets as they are difficult to set at an optimal level.	• Full cost pricing will give the right balance between disposal and recovery.
• In line with the hierarchy, waste avoidance is seen as highly desirable.	• Greater adoption of pay-as-you-throw methods for both recycling and disposal.	• Reduction in waste generation commensurate with full costs of collection and disposal.

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Table 14.1 (continued)

The current situation	*The Commission's preferred approach*	*Main benefits of change*
Community support for recycling should count (chapters 6 and 11)		
• Surveys show high levels of community support for recycling, but less is known about the strength of this support. • Support for recycling does not always extend to a willingness to purchase products with recycled content.	• More direct testing of people's preferences and willingness to pay for recycling. • Governments should provide better information on, and promote debate about, the costs and benefits of recycling and other waste management options.	• Community and policy makers able to make better informed waste management choices.
Waste legislation should reduce risks to acceptable levels (chapters 3, 6 and 7)		
• Some of the objects of existing State and Territory legislation are inappropriate and inconsistent. They include reducing harm to the environment, but also include adherence to the waste hierarchy, using less resources, and avoiding waste.	• Overriding objective should be to reduce risks to human health, the environment and social amenity to acceptable levels. • Waste avoidance and resource recovery are not objects justifying government intervention in their own right.	• Help avoid perverse outcomes, for example, that recycling is maximised irrespective of net environmental benefits. • Reduce net costs to the community.
Extended producer responsibility or product stewardship schemes may be warranted in some circumstances (chapter 10)		
• Governments have urged industries to adopt extended producer responsibility (EPR) or product stewardship (PS) schemes for many products. • There is rarely a thoroughly-researched and clearly-justified case for government intervention.	• Use much clearer, earlier and more rigorous processes for identifying where government intervention is warranted. • Ensure focus is on potential harm to human health, the environment and social amenity. • Give closer consideration to other approaches, including doing nothing.	• EPR and PS schemes are only adopted when there is likely to be a net benefit to the community.
Plastic-bag litter can cause problems (chapter 8)		
• Plastic-bag litter is unsightly and may harm marine wildlife. • Governments plan to phase out plastic shopping bags by the end of 2008.	• Identify the nature, extent and underlying causes of plastic-bag litter. • Evaluate recent plastic-bag reduction efforts. • Examine whether other options — such as tougher anti-litter laws and targeting away-from-home sources of plastic-bag litter — would be more effective.	• Adoption of the most effective and efficient response to the problem of plastic-bag litter.

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Table 14.1 (continued)

The current situation	The Commission's preferred approach	Main benefits of change
Institutional and regulatory factors can impede resource recovery (chapter 12)		
• Classifying materials as waste sometimes impedes opportunities for them to be recovered for recycling. • Some product specifications favour use of virgin materials.	• Improve exemption processes to help ensure recovery opportunities are not unduly constrained. • Make product specifications performance based wherever possible.	• Better recovery of materials, particularly from industrial waste streams. • Better recovery, as materials judged on performance, not origin.
Local governments face considerable challenges in providing waste services (chapter 12)		
• Local governments deliver kerbside collection services. Many also own, or contract for the supply of, resource recovery and disposal services. • Planning, scale and technology issues are requiring regional solutions to waste disposal and resource recovery. In response, different models for regional groupings of councils have emerged.	• In large urban centres, State Governments should investigate moving waste disposal and resource recovery services to appropriately-constituted regional bodies. Collection could still be managed through local government. • Retain existing arrangements in rural areas with technical and other advisory help from State and Territory Governments.	• Better matching of tasks with responsibilities and capabilities. Regional approach to planning commensurate with regional impacts. • Potential for waste services to be delivered at lower cost, due to scale efficiencies in contract management.
Using waste to generate energy can be a useful form of resource recovery (chapters 4 and 8)		
• Energy-from-waste plants (for disposal of municipal solid waste) are not strictly prohibited in Australia, but are out of favour with many policy makers and the community. • Technological developments have provided the potential for flue emissions to be safely controlled. • Such plants are used in many developed countries.	• Modern, well-regulated energy-from-waste facilities, while financially costly, would have minimal net negative environmental externalities where they displaced fossil fuels used in electricity generation. • Cement kilns meeting all relevant environmental standards should not be prevented from using waste as an energy source.	• Better utilisation of wastes that might otherwise be sent to landfill. For example, packaging that is not readily recyclable would provide useful energy recovery with no adverse environmental implications.
Waste data are needed for developing sound policy (chapters 2 and 13)		
• Waste data are inconsistent and incomplete. • The data are influenced by the requirements and regulatory structures of the different jurisdictions. • Past attempts at establishing a national waste database foundered because it was costly and lacked support.	• EPHC should coordinate the development of a nationally-consistent data set for waste management. • Adopting common definitions would be an important first step. • Data should only be collected where there is a clear policy need.	• Enable comparisons of waste management performance across jurisdictions. • Enable each jurisdiction's waste management performance to be compared against their policy objectives.

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Table 14.1 (continued)

The current situation	*The Commission's preferred approach*	*Main benefits of change*
Life cycle assessment can be used in estimating costs and benefits (chapter 4 and appendix B)		
• Life cycle assessment (LCA) can be used to identify some of the environmental impacts of production processes, from raw material extraction to final disposal. • Some researchers have used LCA in estimating the costs and benefits of waste management policies. • The costs and benefits thus derived are not adjusted for the risks of environmental damage occurring. Nor do they take into account some upstream policies that address externalities.	• Deficiencies relating to risk adjustment and failure to take upstream policies into account mean LCA must be used cautiously in estimating the costs and benefits of waste policies. • Some of these deficiencies might be able to be overcome (at some cost), but given that waste policy should focus on downstream externalities, this should not be given a high priority. • Where LCA is used, consideration should be given to referring any upstream issues identified to relevant upstream policy makers.	• Prevent highly unreliable estimates of costs and benefits from influencing policy development. • Help to refocus waste policy on the main policy-relevant market failure — downstream externalities.

A Conduct of the Inquiry

This appendix outlines the inquiry process and lists the organisations and individuals that have participated.

Following receipt of the terms of reference on 20 October 2005, the Commission placed a notice in the press inviting public participation in the inquiry and released an issues paper to assist inquiry participants in preparing their submissions. The Commission received 123 submissions before releasing the draft report. A further 150 submissions were received following the release of the draft report (a total of 273). Those who made submissions are listed in table A.1.

The Commission also held informal discussions with organisations and government departments and agencies. This visit program assisted the Commission in obtaining a wide understanding of the issues and the views of inquiry participants. Organisations visited by the Commission are listed in table A.2.

In February and March 2006, the Commission held public hearings in Adelaide, Brisbane, Canberra, Melbourne, Perth and Sydney. In addition, public hearings were held via telephone conference with participants from regional Victoria and Western Australia. Following the release of the draft report a second round of public hearings were held in Brisbane, Canberra, Melbourne, Perth and Sydney in July and August 2006. Draft report public hearings were also held via telephone conference with participants from the Northern Territory and Tasmania. A total of 56 individuals and organisations participated in both rounds of public hearings (table A.3 and A.4).

Table A.1 **Submissions received**

Participant	*Submission no.*
ACT NOWaste - ACT Department of Urban Services	36, DR139
AGL	62
Agsafe Ltd	DR168
Alex Fraser Group	27
Amcor Australasia	DR167
Animal Health Alliance (Australia) Ltd	12
Aquaponics Network Australia	78
Ash Development Association of Australia	DR149
Ausasia Link Pty Ltd	72, 74
Australasian Bioplastics Association	69
Australasian Contaniner Reconditioners' Association	DR245
Australasian (Iron and Steel) Slag Association	DR171
Australasian Paper Industry Association Ltd	DR199
Australian Bureau of Statistics	47
Australian Chamber of Commerce and Industry	85, DR268
Australian Council of Recyclers	40, 109, DR197
Australian Electrical and Electronic Manufacturers' Association	59, DR182, DR258
Australian Environment Business Network	DR138
Australian Food and Grocery Council	93
Australian Local Government Association	77
Australian National Retailers Association	DR207
Australian Paper	DR144
Australian Retailers Association	DR211, DR271
Australian Services Union	DR157
Australian Tyre Importers' Group	DR270
Australian Tyre Recyclers Association	51, DR169
Ms Martha Ban	DR246
Mr Phil Barresi MP	64
Prof Sharon Beder	17
Mr Ben Blackburn	DR127
Mr Peter Boddis	DR132

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Table A.1 (continued)

Participant	Submission no.
Boomerang Alliance	54, DR183
Brisbane City Council	DR154
Ms Kathryn Brown	DR230
M. Brown	DR251
Building Products Innovation Council	86, DR220
Business Roundtable on Sustainable Development	70, DR209
Mr Greg Butler	DR131
C & D Recycling	44
Mr Gary Callanan	DR236
Canmakers Institute of Australia	115
Carbon Partners Pty Ltd	68
Mr R.L. Carr	DR142
Mr Peter Carroll	DR162, DR216
Cement Industry Federation	71, DR174
Central Queensland Local Government Association	121
Ms Carolyn Chalkley	DR238
Chamber of Commerce and Industry Western Australia	97, DR128
Ms Debra Chant	DR130
City of Ryde	DR176
City of Whitehorse	26
Ms Rita Clark	DR227
Clean Up Australia	DR185
Mr Ron Coleman	DR221
Ms Susan Coleman	DR233
Collex Pty Ltd	80
Compost Australia	DR148
Compost New South Wales	110
Compost Queensland	111
Compost South Australia	94
Consumer Electronics Suppliers Association	66

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Table A.1 (continued)

Participant	Submission no.
Ms Jennifer Crawford	DR210
CropLife Australia Limited	12, DR156
Mr Bruce Crunkhorn	34
CSIRO	24
Custom Composts	96
Darwin City Council	DR205
Department of Agriculture and Food (Western Australia)	81, DR184
Department of Environment (Western Australia)	101
Department of Health (Western Australia)	63
Department of Premier and Cabinet (Tasmania)	114
Department of the Environment and Heritage	103, DR214
Mr David Dettrick	DR180
Mr Romi Dhanji	DR237
Mrs Jill Dumsday	39, DR152
Earth Carers	DR173
Eastern Metropolitan Regional Council	DR155
Eco Waste Pty Ltd	83, 112, DR193
Ecohouse Pty Ltd	100
ELV Recyclers	105
Energetics	9
Energy Developments Ltd	37
Energy Networks Association	DR213
Engineers Australia	13
Environment Business Australia	DR202
Mr Rudy Ericson	DR134
Mrs Judith Evans	39, DR152
Evergreen Energy Corporation Pty Ltd	25
Federal Chamber of Automotive Industries	DR141
Ms Lynne Forster	DR186
Mr Laurie French	DR129
Friends of the Earth Melbourne	22

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Table A.1 (continued)

Participant	Submission no.
Ms Sylvia Giulieri	DR226
Global Olivine Western Australia	118, DR172
Mr Warren Godson	45
Golder Associates	31
GRD Limited	41, 116, DR181
Green Planet Environmentals Pty Ltd	89
Green Roofs for Healthy Australian Cities	78
Councillor Dick Gross, City of Port Phillip	16
Hanson Landfill Services	43, DR125
Ms Denise Harding	DR229
Healthy Soils Australia Ltd	32, 88
Heatherdale Community Action Group Inc.	DR244
Ms D. Hinton	DR241
C. Ho	DR235
Housing Industry Association	87
Mr Lawrence Huang	DR145
Hyder Consulting	56, 122, DR147, DR264
Ipswich City Council	DR198
Joint Working Group Tyres	75
Ms Jan Kassulke	DR135
Keep Australian Beautiful NSW	DR212
Kennedy's Classic Aged Timbers	14, 107
KESAB Environmental Solutions	20
Kimberly-Clark Australia	DR263
Kogarah Council	DR265
Mr Frank Krstic	DR228
Kwinana Industries Council	DR166
Landfill Management Services Pty Ltd	50, DR188
Chin-an Lee	DR247
Leeuwin Lions Club	DR146
Local Government and Shires Associations of New South Wales	98

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Table A.1 (continued)

Participant	*Submission no.*
Local Government Association of South Australia	102
Local Government Association of Tasmania	60
Local Government Association of the Northern Territory	19
Mr Norman Longworth	DR124
Ms Jennifer Loy	48
V. Mall	DR252
Marrickville Council	DR151
Maunsell Australia Pty Ltd	DR175
M.E.T.T.S. Pty Ltd	3, 106, DR153
M2W2 Professional Services	49
Ms Lisa Mach	DR254
Martin	DR133
T. Marwick	DR255
Ms Ruth Mary	99
Master Builders Association of Victoria	DR200
Ms Lyndall McCormack	8, 65, DR165
Dr Jo McCubbin	79
Mr Graham McDonagh	7
Ms Hayley McHugh	DR234
Melbourne PC User Group	DR163
Motor Trades Association of Australia	33
Municipal Association of Victoria	113, DR179
Municipal Waste Advisory Council	52, 119, DR190
National Association of Retail Grocers of Australia	DR194, DR266, DR269, DR272, DR273
National Centre for Sustainability	11
National Packaging Covenant Industry Association	92
Mr Patrick Navin	23
Ms Amanda Neill	DR224
Ms Valerie Neill	DR223

(Continued on next page)

Table A.1 (continued)

Participant	*Submission no.*
NSW Government	95, DR195
Ms Christine O'Neill	DR243
OPS Asia Pacific	18
M. Ottewill	DR222
Packaging Council of Australia	67
Paper Round	DR178
Ms Tina Pearce	DR242
Penrith City Council	DR261
Plantations North East Inc	DR215
Plastics and Chemicals Industry Association	120, DR203
Ms Anna Pleadin	DR248
Powerlink Queensland	DR218
Product Stewardship Australia	66
Product Stewardship Council	DR161, DR219
Publishers National Environment Bureau	2, DR137
Queensland Government	DR267
Resourceco	46
Ms Cristina Romero	DR225
Ms Mary Scott	21
Shoalhaven City Council	DR189
SITA Environmental Solutions	42, DR143
A. Slik	DR239
Ms Mercedes Slik	DR240
Solo Resource Recovery	6
Mr James G. Somerville	DR126
South Australian Government	DR217
South East Queensland Construction and Demolition Waste Working Group	61
Southern Oil Refining Ltd	DR192
Southern Sydney Regional Organisation of Councils	84
Southern Waste Strategy Authority	10, 123

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Table A.1 (continued)

Participant	*Submission no.*
Spartel Pty Ltd	73, DR196
Steel Can Recycling Council	115
Strategic Initiatives	58
Mrs Gith Strid-Nwulaekwe	DR250
Sustainable Futures Group Pty Ltd	57
Sustainable Living Tasmania	DR158
Mr Gordon Sutcliffe	DR201
Tasmanian Government	DR164
Tech Partners Australia	35
G. Thomas	DR253
Timber Queensland	90
Treated Timber Product Stewardship Group	DR262
Ms Wendy Trethewy	DR249
Ms Trina Tune	DR232
Urban Agriculture Network-Western Pacific	78
Victorian Automobile Chamber of Commerce	38
Victorian Government	DR187
Victorian Waste Management Association	DR170
Mr Gerard van Rijswijk	DR191
Visy Industries Pty Ltd	53, DR177
Mr Adrian Vlok	DR259
Waste Contractors and Recyclers Association of New South Wales	15, DR160
Waste Management Association of Australia	DR136
Waste Management Association of Australia, Compost Australia Division	55
Waste Management Association of Australia, Energy from Waste Division	82
Waste Management Association of Australia, National Landfill Division	28, DR159
Waste Management Association of Australia, New South Wales, Alternative Waste Treatment Working Group	30

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Table A.1 (continued)

Participant	*Submission no.*
Waste Management Association of Australia, New South Wales Branch	1, DR150
Waste Management Association of Australia, Queensland Division	91
Waste Management Association of Australia, Strategic Planning and Implementation Working Group	76
Waste Management Association of Australia, Tasmanian Branch	29
Waste Management Association of Australia, Western Australia Branch	DR260
Waste Reduction Group	DR206
Wentworth Shire Council	5
Western Australia Waste Management Board	DR208
WM Waste Management Services Pty Ltd	DR140
WSN Environmental Solutions	104, 117, DR204
Ms Jennifer Yu	DR257
Mr Peter Yu	DR231
Mr Vincent Yu	DR256
Zero Waste Action Group	108
Zero Waste Australia	4

Table A.2 **Visits**

Organisation
Amcor Australasia
Australian Chamber of Commerce and Industry
Australian Conservation Foundation
Australian Council of Recyclers
Australian Industry Group
Australian Local Government Association
BDA Group
Business Roundtable on Sustainable Development
City Waste Services (Brisbane City Council)
Collex
Department of Environment (Western Australia)
Department of Environment and Conservation (New South Wales)
Department of Industry, Tourism and Resources
Department of Premier and Cabinet (Queensland)
Department of State Development (Queensland)
Department of the Environment and Heritage
Environment Protection Authority (Victoria)
Global Renewables Ltd
Housing Industry Association
Kwinana Industries Council
Minerals Council of Australia
Packaging Council of Australia
Planet Ark
Plastics and Chemicals Industries Association
Publishers National Environment Bureau
Queensland Environmental Protection Agency
Queensland Recycling
SIMS
Sustainability Victoria
The Treasury (Australian Government)

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Table A.2 (continued)

Organisation
Thiess Services
Victorian Waste Management Association
Visy (Visy Recycling and Visy Industries)
Waste Management Association of Australia
Waste Management Board (Western Australia)
WSN Environmental Solutions
WWF Australia

Table A.3 Initial public hearings – participants

Canberra 20 February
ACT NOWaste - ACT Department of Urban Services
Australian Local Government Association
Zero Waste Australia
Healthy Soils Australia
Cement Industry Federation
Melbourne 22 February
Business Roundtable on Sustainable Development
Councillor Dick Gross, City of Port Phillip
Carbon Partners Pty Ltd
Waste Management Association of Australia, Tasmanian Branch
Melbourne 23 February
Dr Jo McCubbin
National Landfill Division, Waste Management Association of Australia
Alex Fraser Group
Green Planet Environmentals Pty Ltd
Victorian Automobile Chamber of Commerce (Auto Parts Recyclers Association of Australia/Motor Trades Association of Australia)

(Continued on next page)

Table A.3 (continued)

Adelaide 24 February
Resourceco
Graham McDonagh
KESAB Environmental Solutions
Warren Godson
Compost South Australia
City of Burnside
Brisbane 27 February
Kennedy’s Classic Aged Timbers
M.E.T.T.S. Pty Ltd
CSIRO
Compost Queensland
Waste Management Association of Australia, Queensland Division
Sydney 28 February
Collex Pty Ltd
Evergreen Energy Corporation Pty Ltd
Southern Sydney Regional Organisation of Councils
Eco Waste Pty Ltd
Waste Management Association of Australia, Joint Working Group Tyres
Waste Management Association of Australia, Strategic Planning and Implementation Group
Waste Management Association of Australia, New South Wales, Alternative Waste Treatment Working Group
Waste Contractors and Recyclers Association of New South Wales
Australian Council of Recyclers
Zero Waste Action Group

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Table A.3 (continued)

Sydney 1 March
Department of Environment and Conservation (New South Wales)
Ausasia Link Pty Ltd
Australian Electrical and Electronic Manufacturers Association
Waste Management Association of Australia, New South Wales Branch (Commpost NSW)
SITA Environmental Solutions
Australian Food and Grocery Council
Local Government and Shires Association of New South Wales
Perth 2 March
Western Australian Local Government Association and Municipal Water Advisory Council
GRD Ltd
Department of Agriculture (Western Australia)
Custom Compost
Department of Health (Western Australia)
Melbourne 6 March
Department of the Environment and Heritage
Consumer Electronics Suppliers Association and Product Stewardship Australia
Building Products Innovation Council
Housing Industry Association
Harrie Hofstede
Packaging Council of Australia
Environment Victoria

Table A.4 Draft report public hearings – participants

Perth 17 July
Municipal Waste Advisory Council
Department of Agriculture and Food, Western Australia
Global Olivine Western Australia
Waste Management Association of Australia, Western Australia Branch
Eastern Metropolitan Regional Council
Harrie Hofstede
Earth Carers

(Continued on next page)

Table A.4 (continued)

Sydney 25 July
Australian Council of Recyclers
GRD Limited
Clean Up Australia
Australian National Retailers Association
Environment Business Australia
Sydney 26 July
SITA Environmental Solutions
Waste Management Association of Australia, New South Wales Branch
City of Ryde
National Association of Retail Grocers of Australia
Department of Environment and Conservation (New South Wales)
Product Stewardship Council
Waste Contractors and Recyclers Association of New South Wales
Brisbane 27 July
Ipswich Waste Services, Ipswich City Council
Brisbane City Council
Adrian Smith
M.E.T.T.S. Pty Ltd
Energy Networks Association and Powerlink Queensland
Canberra 31 July
Department of the Environment and Heritage
Australian Services Union
Australian Electrical and Electronic Manufacturers Association
Cement Industry Federation
Federal Chamber of Automotive Industries
Melbourne 1 August
Australian Paper Industry Association
Paper Round

(Continued on next page)

Table A.4 (continued)

Melbourne 2 August
Darwin City Council
Plantations North-East Inc
Peter Carroll
Plastics and Chemicals Industries Association
Melbourne 3 August
Waste Management Association of Australia, National Landfill Division
Sustainable Living Tasmania
Australian Paper
Master Builders Association of Victoria

B Environmental and other externalities associated with waste

Externalities are unintended costs and benefits of an activity that are experienced by people other than those involved in the activity. If the impacts of externalities are not reflected in the costs incurred by the parties involved in the activity, markets may tend to over-provide negative externalities (such as pollution), or under-provide positive externalities (such as the public health benefits of immunisation).

This appendix describes some of the externalities that can arise from waste management, and examines some published estimates of their magnitude. A distinction is drawn between downstream and upstream externalities (figure 1.1). Downstream externalities can arise directly from waste management practices. They include the pollution emitted from landfills, incinerators and recycling plants. Upstream externalities can arise at a point in a product's life cycle before it becomes waste. An example of an upstream externality is the damage caused by pollution emitted during manufacturing.

The existence and magnitude of externalities depend in part on where they occur. For example, the damage done to human health by pollution is generally lower if the pollution is emitted in remote areas, than if it is emitted in metropolitan areas. Policies that directly target externalities can reduce their magnitude. If a policy requires a firm to adopt practices to avoid environmental damage, to repair any damage caused, or to pay compensation to the community for causing the damage, the cost of the damage should be reflected in the firm's costs. Where the damage is reflected in the costs of production, it is said to have been 'internalised' and no net external cost remains.

Some studies of waste management have included estimates of the costs imposed by externalities. Expressing the external costs and benefits in dollar terms makes it possible to compare them with the financial costs and benefits of waste management using a common unit. Estimates of the costs and benefits of externalities are, however, always subject to a degree of uncertainty.

B.1 Estimating external costs and benefits

Typically, the externalities associated with waste management — such as pollution, traffic noise and damage to mining land — are not traded in a market, so it is not possible to observe what people would be prepared to pay to prevent the pollution or noise, or to conserve the mining land. Instead, researchers rely on a number of techniques to estimate the value that people place on nontraded goods, including:

- stated preferences
- revealed preferences
- estimates of the value of life and health

This section briefly describes some of these techniques.

Stated preferences

The simplest approach to estimating the costs and benefits of externalities is to ask people how they value them. This can involve asking people what they would be willing to pay to avoid damage, or what they would be willing to accept in compensation if damage does occur. For example, researchers could ask people 'what would you be prepared to pay to preserve an area of native forest?' Or they could ask 'what is the minimum you would accept as compensation for the loss of an area of native forest?'.

This approach — known as contingent valuation — has been widely used to estimate the value of ecosystems and animal species, and survey techniques have become increasingly sophisticated as researchers have tried to increase the accuracy of their results. Nevertheless, there are a range of concerns with using contingent valuation analysis to estimate the costs and benefits of externalities.

The main concern is that most people do not think about the environment in dollar terms. Because they are seldom asked to pay to protect the environment, people tend not to have any point of reference when asked how much they value one particular component of it. This may lead them to give responses that do not reflect their true preferences for environmental protection. Sometimes they may refuse to respond because they disagree with any monetary value being placed on the environment. In other cases, people may overstate their preferences for environmental protection because they know they will not actually have to pay. Given these concerns, it is likely that estimates of the value of externalities that are based on contingent valuation analysis represent the upper bound of the true costs of environmental damage.

Revealed-preference techniques

An alternative to asking people how they value the environment is to observe their behaviour. Based on the choices people make in their consumption of goods and services that are traded, it may be possible to estimate how people value nontraded goods such as the environment. For revealed preference techniques to produce reliable estimates, researchers must have access to large samples of accurate data.

One commonly-used technique for estimating the value of externalities is hedonic pricing. This technique is based on the assumption that the price paid for a good reflects the value the buyer places on its attributes. For example, house purchasers with children may be prepared to pay more for houses located close to schools. Similarly, a house that is close to a landfill may have a lower price than an otherwise identical house that is not near a landfill. The difference in prices would reflect any disamenity of living near a landfill, among other things. Hedonic pricing uses statistical techniques to disaggregate the price of a good into its component elements including, in this example, the value that people place on not living near landfills.

Another approach to revealed preferences is to estimate the value of the work that people undertake to prevent or repair damage to the environment. This approach was used by the Allen Consulting Group (2006a) to estimate the external costs of plastic-bag litter. The Allen Consulting Group noted that, in 2005, volunteers donated approximately 1.5 million hours to Clean Up Australia Day. It assumed that their labour was worth $16 per hour (after tax), and that plastic bags accounted for 2 per cent of the litter collected. As a result, the value of removing plastic bags from the litter stream was estimated to be approximately 2 cents per bag.

Estimating the value of life and health

Some externalities can cause damage to human health. In such cases, researchers may base estimates of the costs of externalities on estimates of the value of human life and health. One technique that has been used by economists is to estimate the value of a statistical life — what the community would be prepared to pay to prevent one death. Such estimates are based on the value of saving one life on average, not of saving one particular life. For example, if people are prepared to pay $1000 to avoid a one in 2000 risk that they will die, the value of a statistical life would be estimated to be $2 million ($1000 multiplied by 2000).

Estimates of the value of a statistical life can be based on stated preferences, revealed preferences, or other methods. For example, researchers could ask people how much they would be prepared to pay to reduce the probability that they would contract a fatal illness. Alternatively, they could observe how much higher wages are in jobs that are associated with a high risk of death and use that as a basis for their estimate. Other techniques estimate the value of life based on people's expected earnings over their lifetimes. This approach tends to produce lower estimates of the value of a statistical life than stated or revealed preference techniques.

Similar techniques can be used to estimate the value that people place on good health. Stated and revealed preference techniques can be used to estimate how much people would be prepared to pay to avoid an episode of illness, or estimates could be based on the loss of income that people experience when they are unwell.

Abelson (2003) attempted to estimate a value of a statistical life for the purposes of public policy and cost–benefit analysis in Australia. He reported a range of overseas estimates of the value of a statistical life and health, but found there were few Australian estimates. Based on published estimates, he recommended that public agencies adopt:

- $2.5 million as the value of 'avoiding an immediate death in a healthy individual in middle age'; and
- $108 000 as the value of one year of a person's life in average health (Abelson 2003, p. 58).

The reliability of such estimates depends on how well the assumptions made by researchers reflect community preferences. For example, overestimating the discount rate that people apply to health could significantly underestimate the value of a statistical life.

Having estimated the value of a statistical life or good health, it may be possible to estimate the external costs of reduced health arising from damages such as pollution. For example, if it is assumed that the value of one year of a person's life is $108 000, and that emitting one tonne of a pollutant would, on average, reduce a person's life expectancy by six months, the external cost of the pollutant would be estimated to be $54 000 per tonne of emissions ($108 000 divided by two), or $54 per kilogram.

B.2 Downstream externalities

The externalities that can arise after a material has become waste are referred to as downstream externalities. This section addresses the external costs and benefits of waste transport, landfill, and thermal treatment.

Transport

Most waste collection is done by heavy trucks, which cause noise, traffic congestion and air pollution and increase the risk of accidents. The magnitude of these impacts depends on factors such as the size of the trucks, the distances they travel, the fuel they use, the population density along their routes, and the number of stops made. Whether they should be considered externalities depends on the existence and effectiveness of any direct measures to internalise the externalities. For example, drivers take out insurance against traffic accidents. This increases the costs of transport, and internalises a significant part of the costs of property damage caused by road accidents. Similarly, regulations to reduce some vehicle emissions have increased the costs of transport and reduced the damage done by pollution (PC 2006a).

The NSW Environment Protection Authority (EPA NSW) estimated in 1996 that a heavy truck imposed external costs of between $0.26 and $0.28 for each kilometre travelled (EPA NSW 1996c). It applied this estimate to information on the mass of waste collected by trucks and the average distances it was transported. Based on these data, it estimated that, in 1996, the external cost of transporting waste to a landfill was between $1.20 and $2.90 per tonne of waste (EPA NSW 1996c).

The EPA NSW estimates were based on the external costs of traffic noise, vehicle emissions, accidents and congestion estimated by the Bureau of Transport and Communications Economics (BTCE) in 1994. The BTCE (1994) estimate of the external costs of accidents allowed for the internalisation of some of the costs of property damage through insurance, however it is not clear that all of the direct measures that can internalise the external costs of pollution, noise and congestion were taken into account. This suggests that the BTCE may have overestimated the external costs of transport (PC 2006a).

Although the Commission considers that the BTCE (1994) — and therefore the EPA NSW — may have overstated the external costs of waste transport, other researchers have agreed that these figures are probably of the correct order of magnitude. BDA Group and EconSearch (2004) agreed with the EPA NSW (1996c) estimate for waste collected in metropolitan areas. Because population density and traffic volumes are lower outside of metropolitan areas, it proposed a lower estimate of between $1.20 and $1.50 per tonne of waste collected in rural areas.

Landfill

Waste disposed to landfills can be the source of a number of downstream externalities, including emissions of greenhouse and other gases, pollution of soils and water through leachate, and the loss of amenity experienced by nearby residents and firms. This section sets out estimates of the external costs imposed by properly-located, engineered and managed landfills, and by landfills with lower standards of environmental performance.

Estimates of the total external costs of landfills

There have been a number of estimates of the total external costs of disposing waste to landfills in Australia and overseas. EPA NSW (1996c) estimated that, in 1996, the external costs of landfills in New South Wales were between $10.50 and $33.20 per tonne of waste disposed to landfill. This included waste transport externalities of between $1.20 and $2.90 per tonne of waste, which are not a direct external cost of landfills themselves. Landfills in metropolitan areas were estimated to impose larger external costs than those in rural and regional areas, mainly due to the impacts of traffic and lost amenity. The ACT Government (2002) estimated that, in 2002, the environmental costs of landfill were $34 per tonne of waste. BDA Group and EconSearch (2004) estimated that, in 2004, the external costs of metropolitan landfills were between zero and $14.30 per tonne of waste, and that in rural areas the costs were between zero and $16.10 per tonne of waste. The externalities associated with rural landfills were estimated to impose higher external costs than the externalities associated with metropolitan landfills because it was assumed that rural landfills do not incorporate the landfill gas controls that are found in metropolitan landfills, and therefore emit more greenhouse gases. Davies and Doble (2004) estimated that, in 1999, the external costs of landfills in the United Kingdom were up to £6 per tonne of waste, depending on the location of the landfill and whether it has systems to recover energy from the waste.

Consultancy firm Nolan-ITU (now incorporated into Hyder Consulting) has published a number of estimates of the external costs and benefits of waste management systems that include landfill. These represent the extreme high end of the existing estimates. Hyder Consulting stated that its:

> … best estimate of the environmental externalities of a landfill in Australia compliant with legislation (and including gas extraction systems with conversion to electricity), in the face of all the existing data gaps and inadequacies, without further research to substantiate it, is between $100 and $280 per tonne, with the most significant impacts arising from air and water pollution. (sub. DR264, pp. 2-3)

The estimates of landfill externalities published by Nolan-ITU have been widely quoted in Australia. Because of their prominence, the Commission has gone to considerable lengths to understand these estimates. The Commission's analysis of one of the estimates published by Nolan-ITU (2004b) is set out below. This analysis suggests that Nolan-ITU's estimates of the downstream externalities of landfill are implausibly high.

Nolan-ITU estimate of the downstream external costs of landfill

Nolan-ITU (2004b) was commissioned by Global Renewables (a wholly owned subsidiary of GRD Limited) to compare the financial and external costs and benefits of sending mixed waste either to landfill or to an Urban Resource – Reduction, Recovery and Recycling (UR-3R) facility. The UR-3R process is an alternative waste technology (AWT) that applies mechanical and biological treatment to mixed municipal waste. The Nolan-ITU report included estimates of the net environmental benefits of the UR-3R option compared to the landfill option. The net benefits are comprised of benefits that arise directly from the UR-3R process, and avoided costs associated with reduced landfill disposal. Nolan-ITU (2004b) estimated that processing waste at a UR-3R facility rather than disposing the waste to landfill delivers environmental benefits valued at $230 per tonne of waste.

It is not clear from Nolan-ITU (2004b) how much of the $230 is related to avoided downstream externalities. The Commission has made a number of requests to Hyder Consulting for further information on the derivation of the $230 figure, and the allocation between upstream and downstream externalities. Hyder Consulting's responses to these requests (sub. 116; sub. 122; sub. DR147; sub. DR264) did not provide the detail requested, and therefore the Commission has attempted to impute from the Nolan-ITU report its estimates of the downstream externalities of landfills. This has necessitated the adoption of a number of inferences and assumptions (as detailed below).

The figure of $230 per tonne includes:

- upstream benefits, such as the benefits of recycling;
- avoided downstream costs, such as the costs of leachate and landfill gas; and
- benefits of the UR-3R process, such as the benefits of applying soil conditioner or 'organic growth media' generated from organic waste.

Referring to the estimated benefits of the UR-3R process, Hyder Consulting stated:

> Most of the benefits of using the GRL [Global Renewables Limited] technology arise from avoided landfill impacts. (sub. 116, p. 4)

GRD Limited stated that Nolan-ITU (2004b):

> … estimate the long-term environmental costs of leachate and landfill gas emissions at significantly more than $150 per tonne of municipal solid waste disposed of to best-practice landfill. (sub. 41, p. 13)

The Commission has not been able to obtain a more definitive allocation between upstream and downstream benefits, and so has made some inferences based on information given in Nolan-ITU (2004b) (table B.1). Nolan-ITU disaggregated the $230 figure into a number of categories that give an indication of the sources of the benefits. The Commission has assumed that ‘recycling credits’ and ‘organic growth media application’ are not downstream benefits, and that ‘avoided landfill’ associated with dry recyclables recovery and organic growth media production is a downstream benefit. How much of the benefits of ‘stabilisation and energy recovery’ should be counted as upstream and downstream is not clear from the report. Hyder Consulting stated:

> The nature of the environmental benefit from stabilisation of waste is a significantly reduced leachate and landfill gas generation. (sub. 116, p. 8)

This suggests that the benefits of stabilisation arise downstream. However, it is not possible to determine how much of the benefits of ‘stabilisation and energy recovery’ arise from stabilisation, and how much from energy recovery. Nor is it possible to determine whether any or all of the benefits of energy recovery should be counted as downstream or upstream benefits. Therefore, it is not clear how much of the estimated benefit from ‘stabilisation and energy recovery’ occurs upstream and downstream.

Table B.1 **Nolan-ITU estimates of the environmental benefits of the UR-3R process over landfill waste disposal, by impact category**

Source of environmental benefit	*Total benefit*[a]	*Downstream benefit*[b]	*Upstream benefit*[b]	*Unclear allocation*[b]
	$/tonne of waste	$/tonne of waste	$/tonne of waste	$/tonne of waste
Dry recyclable materials recovery				
Avoided landfill	12	12	–	–
Recycling credits	17	–	17	–
Organic growth media production				
Avoided landfill	87	87	–	–
Organic growth media application	12	–	12	–
Stabilisation and energy recovery	103	–	–	103
Total	**230**	**99**	**29**	**103**

[a] Nolan-ITU data. Total may not equal the sum of the benefits due to rounding. [b] Productivity Commission estimates. – Nil or rounded to zero

Sources: Nolan-ITU (2004b); Productivity Commission estimates.

Because no definitive allocation of the benefits of stabilisation and energy recovery is available, the Commission has estimated the upper and lower bounds of the downstream external costs of landfill that are implied in Nolan-ITU (2004b). The lower bound is estimated assuming that none of the benefits of stabilisation and energy recovery arise downstream. The lower bound estimate of the downstream external costs of landfill is $99 per tonne of waste (43 per cent of the $230 per tonne benefit of the UR-3R process over landfill). The upper bound estimate is $202 per tonne of waste (88 per cent of the total) — assuming that all of the benefits of stabilisation and energy recovery arise downstream.

The Commission has used these proportions to infer how much of the benefits of the UR-3R process are related to avoided leachate and landfill gas production. For example, Nolan-ITU (2004b) estimated that sending waste to a UR-3R plant rather than landfill delivers external benefits of $106 per tonne of waste arising from avoided air emissions. The Commission has assumed that this includes a downstream component arising from landfill gas of between $46 and $93 per tonne of waste. Likewise, the Commission has assumed that the $101 external benefit for avoided water emissions includes a downstream component of between $43 and $89 per tonne of waste. These figures are consistent with the previously-cited statements of Hyder Consulting (sub. DR264) and GRD Limited (sub. 41) regarding the magnitude of Nolan-ITU's estimates of the external costs of landfill.

Landfill gas

In most estimates, the largest single contribution to the external costs of landfills arises from emissions of landfill gas. Landfill gases are generated when organic waste decomposes, and typically comprise methane (approximately 55 per cent of total volume) and carbon dioxide (approximately 45 per cent) (DEH 2002). Other trace gases can produce unpleasant odours or be toxic to humans, plants and animals. This appendix draws a distinction between greenhouse gases — such as carbon dioxide and methane — and 'pollutants', which are the other gases emitted from a landfill.

Greenhouse gas emissions

Although some greenhouse gases and the greenhouse effect are a natural part of the climate system, evidence that human activity has increased the greenhouse effect has mounted rapidly in recent years (CSIRO 2005). Human-induced climate change is likely to have a range of impacts, including on human settlements, agriculture and ecosystems. Overall, these impacts are generally considered likely to be adverse, particularly for vulnerable communities and the environment. Estimating the external costs of greenhouse gas emissions from landfills involves estimating the quantities of gases emitted and the unit cost of these emissions.

Methane and carbon dioxide both contribute to the greenhouse effect. Methane has a 100-year global warming potential that is 21 times greater than carbon dioxide, meaning that over 100 years the effect of one tonne of methane is equivalent to the effect of 21 tonnes of carbon dioxide. For the purposes of this appendix, carbon dioxide and methane are aggregated into tonnes of 'carbon-dioxide equivalent' (CO_2-e) emissions.

The quantity of greenhouse gases generated in a landfill depends on the composition of the waste, the local climate and the design and management of the landfill. The Australian Greenhouse Office estimated 'the weighted average emission factors for the municipal, commercial and industrial, and construction and demolition waste categories' (AGO 2005, p. 21). It concluded that, on average, each tonne of municipal waste in a landfill generates 0.74 tonnes of CO_2-e gases; each tonne of commercial and industrial waste generates 1.04 tonnes; and each tonne of construction and demolition waste generates 0.20 tonnes (AGO 2005).

Once the gas has been generated, the amount that escapes from the landfill depends on whether any gas-management system is in place, and how effective it is. If there are no gas-management systems incorporated into the landfill, it can be assumed that almost all of the gases will eventually escape into the atmosphere. Some landfills incorporate networks of pipes that run through the waste and capture some of the gas. The captured methane can then be burned, which yields heat, carbon dioxide and water. Because carbon dioxide has a much lower global warming potential than methane, simply flaring landfill gas significantly reduces its environmental impact.

Captured methane can also be burned for electricity production, and this reduces the demand for fossil-fuel derived electricity. The combined effects of preventing methane from escaping and reducing the demand for fossil fuels can significantly reduce the net greenhouse gas emissions of landfills. The US Environmental Protection Agency estimated that if a landfill gas-management system captures 75 per cent of the landfill gas, and this gas replaces fossil fuels in electricity generation, the net greenhouse gas emissions of the landfill are reduced by 92 per cent (US EPA 1998).

This appendix compares the net greenhouse gas emissions of two alternative landfill-management scenarios. The base case assumes that the landfill has no gas-management system, and that all the gas escapes. The alternative assumes the landfill has an efficient gas-management system, and that the captured gas replaces fossil fuels as an energy source, reducing the net greenhouse impact by 92 per cent. This can be regarded as a maximum, as 75 per cent gas capture seems to be at the upper end of performance estimates for Australian landfills.

While it is possible to estimate the quantities of greenhouse gases that are emitted from landfills, there is still uncertainty regarding the effects of these gases on climate and the environment, the likely impacts and their related costs, especially in the long term. The task of estimating these costs is an extremely complex one. Tol (2005) reviewed 28 studies that contained estimates of the marginal damage costs of greenhouse gas emissions. The estimates ranged from a benefit of US$1.80 per tonne of CO_2-e emissions to a cost of US$455 per tonne. After reviewing the methodology of each of the studies, Tol (2005) concluded that the costs were unlikely to exceed US$13.64 per tonne of CO_2-e emissions.

The estimates reported by Tol (2005) are of the costs that would be incurred across all countries. Even leaving aside the uncertainty of these estimates, the extent to which estimates of global damage costs can be used to estimate the costs to Australia of greenhouse gas emissions — or the benefits of greenhouse gas abatement — is open to debate. What is clear, however, is that the benefits to any individual country of unilateral efforts to reduce greenhouse gas emissions are likely to be extremely small. Indeed, unilateral abatement efforts in Australia could cause some production to be transferred to other countries leading to global environmental outcomes being unchanged or even worsened.

Because of the difficulties involved in estimating the external costs of greenhouse gas emissions — or the benefits of abatement — a better approach for the purposes of cost–benefit analysis may be to use the costs of abatement under government programs as a proxy for the external costs of emissions. Governments have decided that these costs are worth incurring, presumably because they believe that the benefits to the community (from avoided damage and any other factors) are at least as large.

The Department of the Environment and Heritage (DEH 2005g) reported that the average cost of abatement for Australian Government programs was $4 per tonne of carbon dioxide (based on Australian Government expenditure to the end of 2003 and abatement projections). Some of these programs might impose costs on the private sector and so the total cost could be somewhat higher than $4 per tonne. The lowest cost abatement was reported as being $0.20 per tonne for the Greenhouse Challenge program (which targets energy efficiency improvements) (AGO 2004). In contrast, a review of the Australian Government's Mandatory Renewable Energy Target found that the cost of abatement to the economy arising from this scheme was expected to be about $32 per tonne (AGO 2003). This scheme has industry development as well as greenhouse gas abatement objectives and so the $32 per tonne figure is likely to exceed what the Australian Government would regard as an acceptable cost for achieving abatement alone.

The NSW Government has introduced the NSW Greenhouse Gas Abatement scheme. This is an emissions trading scheme that aims to reduce greenhouse gas emissions associated with the production and use of electricity and to encourage activities that offset emissions. The trading price in April 2006 was approximately \$15 per tonne of CO_2-e emissions (NSW Government 2006). A greenhouse gas emissions trading scheme has been operating in the European Union since January 2005. Since the scheme began, the price of permits for emitting greenhouse gases has fluctuated between €10 and €30 per tonne of carbon dioxide (Energy Information Administration 2006), and in October 2006 was around €12 per tonne of carbon dioxide (Point Carbon 2006).

A number of assessments of waste policy have included estimates of the external costs of greenhouse gas emissions. EPA NSW estimated that the 'environmental damage costs' (1996c, p. 60) of landfill greenhouse gases were between \$7.80 and \$14.60 per tonne of CO_2-e . BDA Group and EconSearch (2004) estimated that the external costs of carbon dioxide emissions were \$15 per tonne. Nolan-ITU and SKM Economics (2001) used a value of \$20.60 per tonne of CO_2-e . Nolan-ITU (2004b) used a slightly lower value of \$20 per tonne of CO_2-e .

This report assumes that the external cost of greenhouse gas emissions is between \$5 and \$20 per tonne of CO_2-e emissions (table B.2). This range is chosen to reflect the uncertainty associated with estimates of the external costs of greenhouse gas emissions, and is consistent with most of the previous Australian estimates of the external costs of greenhouse gas emissions that have been used for waste policy assessment. The range is also broadly consistent with the current costs of greenhouse gas abatement in Australia.

Because the greenhouse effect is a global phenomenon, the effect of greenhouse gases does not depend on where they are emitted. One tonne of methane emitted from a metropolitan landfill has the same effect as one tonne emitted from a rural landfill (or from any other source in any location).

Other gas emissions

Landfills emit traces of non-greenhouse gases, some of which can have adverse effects on human health and the environment. There have been few attempts to estimate the external costs of non-greenhouse landfill gas emissions in Australia. This may be because non-greenhouse landfill gas is not regarded as posing a serious risk to human health or the environment. For example, in its estimate of the external costs of landfills, EPA NSW (1996c) considered that if landfill operators comply with environmental management guidelines, non-greenhouse gases may not cause any damage to human health or the environment.

Table B.2 **Estimated external costs of greenhouse gas emissions from waste sent to landfill, dollars per tonne of waste[a]**

	Municipal waste		*Commercial and industrial waste*		*Construction and demolition waste*	
	Low	High	Low	High	Low	High
Landfill with no gas management	4	15	5	21	1	4
Landfill incorporating gas capture and electricity generation **b**	0	1	0	2	0	1

a Based on estimates from AGO (2005) that one tonne of municipal waste generates 0.74 tonnes of CO_2-e; one tonne of commercial and industrial waste generates 1.04 tonnes of CO_2-e; and one tonne of construction and demolition waste generates 0.20 tonnes of CO_2-e. **b** Landfill gas capture and electricity generation is assumed to reduce the net greenhouse gas impact of landfills by 92 per cent, taking into account the effects of displacing fossil fuels used in electricity generation (US EPA 1998).

Sources: AGO (2005); US EPA (1998); Productivity Commission estimates.

Eunomia Research and Consulting (2002) estimated that non-greenhouse gas emissions from ‘high quality’ landfills in Italy impose costs of between €0.03 and €0.10 per tonne of waste; and that gas emissions from ‘lower quality’ landfills impose costs of between €0.08 and €0.20 per tonne of waste. In Australia, BDA Group and EconSearch (2004) estimated that the external cost of non-greenhouse gases was less than $0.01 per tonne of waste in 2004.[1] In its estimate of the benefits of the UR-3R process over landfill, Nolan-ITU (2004b) estimated the benefits of avoided air emissions, including landfill gas. The Commission’s interpretation is that Nolan-ITU estimated that non-greenhouse gas emissions from ‘best-practice’ landfills impose costs of between $46 and $93 per tonne of mixed waste. The huge difference between the estimate of Nolan-ITU (2004b) imputed by the Commission and the estimate published by BDA Group and EconSearch (2004) is examined below.

BDA Group and EconSearch (2004) used data from the National Pollutant Inventory to estimate the average emissions from landfills of seven air pollutants.[2] They then estimated the external costs of the emissions by multiplying the quantity of each pollutant by the EPA NSW load-based licensing fee for that pollutant. Under the load-based licensing system, fees are charged for emitting pollutants into the environment.

BDA Group and EconSearch (2004) acknowledged that the load-based licensing fees they used as proxies for the external costs of emissions have been set well

1 This estimate refers to the combined external costs of leachate and gas. It could not be disaggregated to determine the costs of landfill gas alone.

2 Volatile organic compounds, nitrogen dioxide, sulphur dioxide, benzene, hydrogen sulphide, mercury and fine particles.

below the estimated external costs of the pollutants. For example, EPA NSW (1998) proposed a fee of $310 per tonne of emissions of fine particulates. The estimated external cost of emissions of fine particulates was $18 500 per tonne (EPA NSW 1998), almost sixty times more than the proposed fee. Acknowledging the discrepancy, BDA Group and EconSearch (2004) calculated that even if the external costs were 100 times greater than the fees charged, the actual external costs of landfill gas would be less than $0.40 per tonne of waste.

Nolan-ITU (2004b) applied life cycle assessment techniques to estimate the emissions of 32 pollutants from landfills. To estimate the external costs of these emissions, Nolan-ITU multiplied the estimated pollutant volumes by valuations derived from a number of sources from Australia and overseas, not all of which could be located by the Commission. The difference between the estimates of Nolan-ITU (2004b) and BDA Group and EconSearch (2004) may be explained in part by the fact that Nolan-ITU included a larger number of pollutants in its analysis. However, the Commission's assessment is that the inclusion of more pollutants explains only a small part of the large difference between the two estimates. Much more significant is the treatment by Nolan-ITU (2004b) of the risk that landfill gas will damage human health or the environment.

The Commission's interpretation of Nolan-ITU (2004b) is that its estimates of the external costs of landfill gases relate to the gases' 'potential to affect human health or the environment' (Nolan-ITU 2004b, p. 31), rather than expected outcomes. The potential external cost is likely to be much larger than the expected cost, as illustrated below for emissions of benzene and methyl chloroform. These examples are used because these gases account for around 70 per cent and 15 per cent respectively of Nolan-ITU's (2004b) estimate of the external costs of air emissions avoided through the UR-3R process.

Benzene emissions from landfills

Benzene is an aromatic hydrocarbon that can also be described as a volatile organic compound. It is a colourless liquid that evaporates quickly to air. Once in the air, it reacts with other chemicals and breaks down within a few days (DEH 2005c). Benzene occurs naturally in crude oil and in emissions from volcanoes and forest fires. It is present in petrol because of its natural occurrence in crude oil, but it is also sometimes added to petrol (US DHHS nd). It is used in the chemical industry, and glues, adhesives, cleaning products and paint strippers may contain benzene.

Benzene is known to be a human carcinogen (US DHHS nd). It also has a high acute toxic effect on aquatic life and can kill or damage plants. However, concentration levels do not build up in plant or animal tissue. Benzene is a precursor hydrocarbon leading to the formation of photochemical smog. On a scale of zero to three, benzene is rated at 2.3 as a health hazard and 1.0 as an environmental hazard for the National Pollutant Inventory (DEH 2005c).

The main way that people are exposed to benzene is by breathing air that contains it. In Australia, the main sources of air emissions of benzene are motor vehicles, domestic solid fuel burning, oil and gas extraction, lawn mowing and service stations. Between them, these sources account for about 87 per cent of total air emissions of benzene (DEH 2004). Cigarettes are responsible for much more of the human exposure to benzene than is suggested by the proportion of emissions they contribute (in Australia, they contribute 0.4 per cent). This is because of the deliberate and passive inhalation of relatively undispersed cigarette smoke. In the United States, approximately half of the total human exposure to benzene comes from cigarette smoke (US DHHS nd).

In relation to landfills in the United States, Tchobanoglous and Kreith noted:

> … the occurrence of significant concentrations of volatile organic compounds [VOCs] [including benzene] in landfill gas is associated with older landfills, which accepted industrial and commercial wastes that contained VOCs. In newer landfills in which the disposal of hazardous waste has been banned, the concentrations of VOCs in the landfill gas have been extremely low. (Tchobanoglous and Kreith 2002, p. 14.18)

They also noted that landfill gas recovery systems can reduce these emissions further. This finding of very low emissions is borne out in Australian data, that show landfills as contributing 11 tonnes, or 0.06 per cent of total benzene emissions to air (DEH 2004). Even this low figure is likely to greatly overstate the significance of benzene air emissions from landfills. This is because benzene is generally present in small quantities dispersed through the waste in landfills. Also, when benzene in the waste evaporates, it is released into the open air where it would be expected to react, disperse and be diluted to extremely low concentrations. For example, in one case where benzene was detected near a landfill, the concentration was found to be several thousand times lower than in the air at petrol stations (County of San Diego DEH nd).

The strongest evidence that benzene causes cancer comes from studies of occupational exposure (US DHHS nd). In light of this, there have been significant efforts to reduce and document the exposure of workers to benzene in the petroleum, chemical and other industries where high concentrations may be encountered. In the United States, a national survey of occupational exposure done in the 1980s estimated that over 272 000 employees in 31 industries and 117 occupations were potentially exposed to benzene (NIOSH nd). Landfill workers, and indeed workers in the nonhazardous waste management industry generally, are not represented among them. This suggests that US authorities did not consider landfills to be a significant cause of occupational exposure to benzene.

The Commission's interpretation is that Nolan-ITU (2004b) estimated that benzene emissions to air from landfills result in external costs of at least $31 per tonne of waste. This is based on two assumptions:

- the Commission's lower bound estimate that at least 43 per cent of the benefits of the UR-3R process identified in Nolan-ITU (2004b) arise from reduced downstream impacts; and
- the Commission's inference from Nolan-ITU (2004b) that each tonne of municipal waste causes emissions of at least 36 grams of benzene gas from landfills over 30 years.

Nolan-ITU (2004b) estimated that the cost of benzene gas emissions from landfills is $871 730 per tonne of benzene. In the Commission's view this estimate is not credible, mainly because it does not consider the concentration of benzene that people will be exposed to, and whether this concentration represents a risk to human health or the environment. The failure to discount future costs is an additional shortcoming. From the evidence examined, it is the Commission's conclusion that exposure to benzene from modern landfills does not pose a significant risk to human health or the environment. There may be some effect related to benzene's role as a precursor of photochemical smog. However, given the quantities of benzene emitted from landfills, this is likely to be very small. Totally eliminating benzene gas emissions from all landfills in Australia would be equivalent to reducing benzene emissions from motor vehicles by 0.1 per cent, according to National Pollutant Inventory data (DEH 2004).

Methyl chloroform emissions from landfills

The second most significant contributor to the external costs of landfill-gas pollution, as estimated by Nolan-ITU (2004b), is methyl chloroform, also known as 1,1,1 trichloroethane. The Commission's interpretation of Nolan-ITU (2004b) is that it implies that sending one tonne of municipal waste to landfill leads to emissions of at least 84 grams of methyl chloroform, and that this results in an external cost of at least $6 per tonne of waste.

Methyl chloroform is used as a solvent and is found in household cleaning products, glues and aerosol sprays. The US EPA (2006a) reported that acute inhalation of methyl chloroform can have effects including dizziness, nausea, vomiting, diarrhoea, loss of consciousness, and decreased blood pressure. Most studies have not reported adverse health effects in humans from chronic exposure to low levels of methyl chloroform (US EPA 2006a). Given the small amount of methyl chloroform that is emitted from landfills, the likelihood that it will be dispersed and diluted in the atmosphere, and the fact that no adverse effects on human health have been identified from long-term low-level exposure, it is unlikely that emissions of methyl chloroform from landfills will impose any significant external costs on the community.

When the estimated costs of benzene and methyl chloroform emissions are excluded, the Commission's estimate of the lower bound of the external costs of landfill gas derived from Nolan-ITU (2004b) falls from $46 per tonne of waste to $8 per tonne. It is likely that further analysis of the physical properties, human health effects, exposure pathways and risks associated with other air pollutants identified by Nolan-ITU (2004b) would reduce this estimate even further.

Leachate

Leachate is liquid that has passed through a landfill, and may have become contaminated with metals, organic and inorganic compounds, including toxins. Leachate can be contained within a landfill, it can be pumped out, treated and discharged to sewers, or it can escape into the soil and groundwater. If it remains within the landfill, or is treated and safely disposed of, leachate does not cause any damage to human health or the wider environment. However, if it escapes from the landfill and comes into contact with groundwater, surface water or soil, it may.

The concentration of pollutants in leachate depends on the composition of the waste in the landfill. Glass, plastics, aluminium, ferrous metals and concrete are largely inert in landfills, and, as such, compounds derived from them are not found in significant concentrations in leachate. Heavy metals (in most chemical forms) are also reasonably inert in landfills (Scott et al. 2005), but because they can be highly toxic, the small amounts that can be found in leachate could cause significant damage to human health and the environment if the leachate escapes.

There is very little information on how leachate is transmitted once it has left a landfill. This makes it difficult to estimate the average costs of leachate impacts. That leachate might escape from a landfill does not imply that the chemicals in the leachate will necessarily cause damage to the environment or human health. If the local environment has the capacity to assimilate the pollution, the damage done may be quite small. If it is sensitive to pollution, the damage could be significant. Likewise, if the pollutants enter the food chain, or come into contact with people by other means, they could have serious impacts on human health. If the pollutants do not come into contact with people, or if they are sufficiently diluted by the time they do, their impact on human health will be minimal.

Managing the risks of leachate

The volume of leachate that is produced within a landfill depends mainly on the amount of moisture that comes into contact with the waste, so landfills in areas that experience high rainfall would be expected to produce more leachate than landfills in areas with low rainfall, other things being equal. Modern landfills incorporate engineering features to control the amount of water that enters a landfill, while it is being filled, and after its closure. Some operators adopt a dry tomb approach to landfill management, aiming to minimise the amount of moisture that enters the landfill in order to slow decomposition and minimise gas and leachate generation. Other landfill operators have adopted the bioreactor approach to landfill management. This involves collecting and recirculating the leachate through the waste to accelerate the degradation process.

How much leachate escapes from a landfill depends on its design and management. Engineered landfills are lined with impermeable materials such as clay and plastic sheeting that can prevent or significantly impede the escape of leachate from the landfill (chapter 8). Some materials used in landfill liners have the capacity to retain many of the pollutants that are found in leachate (O'Leary and Tchobanoglous 2002). Some landfills have sumps where leachate is collected and pumped out of the landfill before being treated and discharged to sewers, or in the case of bioreactor landfills, recirculated through the waste. Such systems significantly reduce the potential for leachate in landfills to cause environmental damage.

Estimating the external costs of leachate emissions

The external cost of the damage done by leachate emissions also depends on a variety of local factors including the location of the landfill, the concentration of pollutants in the leachate, the height of the water table, the applications for which groundwater is used, and the capacity of the landfill liner and the surrounding environment to assimilate the pollutants.

BDA Group and EconSearch (2004) used the National Pollutant Inventory and the EPA NSW load-based licensing fees to estimate that the external costs of leachate were less than $0.01 per tonne of waste.[3] Miranda and Hale (1997) estimated that the external cost of leachate from landfills in the United States was between zero and US$0.98 per tonne of municipal waste.

3 This estimate refers to the combined external costs of leachate and landfill gas. It could not be disaggregated to determine the cost of leachate alone.

Nolan-ITU (2004b) applied life cycle assessment techniques to estimate the external cost of leachate. Its estimate included a larger number of pollutants than the estimates of BDA Group and EconSearch (2004) and Miranda and Hale (1997), which might be expected to increase the estimated external cost of leachate emissions. However, the Commission's assessment is again that the inclusion of a larger number of pollutants explains only a small part of the difference between the estimates. The Commission's interpretation of Nolan-ITU (2004b) is that the external cost of leachate was estimated to be between $43 and $89 per tonne of mixed waste sent to landfill. The Commission's assessment is that this represents the potential external cost of leachate if all the leachate that is generated escapes from the landfill and comes into contact with people and sensitive ecosystems.

Estimating the expected external cost of leachate damage requires some analysis of the risk that leachate will cause damage. Some government agencies have argued there is a low probability that leachate from landfills that comply with planning and environmental-management regulations will cause environmental damage. For example, EPA NSW (1996c) considered that compliance with environmental management guidelines can prevent leachate from causing. The Australian Government Department of the Environment and Heritage stated:

> … the majority of landfills currently servicing major population centres now meet stringent planning and regulatory requirements in relation to location, design, construction and operation. Consequently, such landfills generally do not present significant risks in terms of generating external environmental costs through air and water pollution, noise, dust and the generation and spread of disease. (sub. 103, p. 16)

Where landfill operators comply with regulations, they incur the cost of preventing leachate damage. This has the effect of internalising some or all of the external cost of leachate. Taking account of the assumptions made in the various estimates discussed above, and their applicability in estimating expected rather than potential costs, the Commission considers that the external cost of leachate from a properly-located, engineered and managed landfill in Australia is likely to be less than $1 per tonne of mixed waste.

Landfills that do not incorporate proper design and management practices may impose much higher external costs. However, some regulatory responses to leachate suggest that, even if some leachate does escape from landfills, the damage to the environment may not be large. For example, the Victorian EPA guidelines for 'best-practice' environmental management of landfills state that if a landfill accepts solid, inert waste, a landfill liner that allows seepage of no more than 1000 litres of leachate per hectare per day is sufficient to 'maintain groundwater quality as close as practicable to background levels' (EPA Victoria 2001c, p. 27).

Indirect estimates of the external costs of leachate

An alternative approach to directly estimating the external cost of leachate damage is to use the costs of avoiding the damage or cleaning it up as a proxy. The European Commission suggested:

> Cleanup costs and avoidance costs approaches might be more suitable and justified as long as all the effects of leachate in the short and long term are not known, although the valuations based on these techniques do not reflect individuals' willingness to pay [to avoid the damage done by leachate]. (European Commission 2000a, p. 47)

Estimating the costs of cleaning up leachate damage using this avoidance cost approach involves estimating the costs to landfill operators of managing their landfill in a way that minimises the potential for leachate damage. Current landfill regulations are designed to minimise the risks of leachate causing damage to human health and the environment, and appear to be very effective. However, for the sake of illustration, it may be useful to examine the costs of further reducing the potential for harmful emissions. The cost of a 'belt-and-braces' approach to landfill management can provide a reality check on estimates of the external costs of leachate, and serve as a point of reference for estimates of the cost effectiveness of policies to reduce leachate emissions.

The Commission understands that installing a liner that meets nonhazardous landfill management guidelines in Victoria costs between $60 and $70 per square metre. For a large landfill, this equates to between $3.00 and $3.50 per tonne of waste. Landfills that handle hazardous waste may be required to install double liners, costing up to $7 per tonne of waste. The WMAA National Landfill Division stated that incorporating a leachate treatment plant into an existing landfill adds to the costs of the landfill by between 50 cents and $1 per tonne of waste (trans., p. 152). This suggests that installing a liner and leachate-treatment system to minimise leachate externalities is likely to cost less than $5 per tonne of waste for a landfill that handles nonhazardous waste. Even installing a double liner capable of minimising the risks associated with landfilling hazardous waste would cost less than $8 per tonne of waste.

There are limited data available on the costs of cleaning up the damage done by leachate emissions. Eshet, Ayalon, and Shechter (2005) reported seven estimates of the costs of cleaning up leachate damage. They acknowledged that 'methods such as the clean-up cost do not provide the real value of the damage and are only a partial substitute for the actual damage cost' (Eshet, Ayalon, and Shechter 2005, p. 494). Most of the seven estimates reported by Eshet, Ayalon, and Shechter (2005) were secondary studies based on the same primary sources. For this reason, the estimates reported were all of a similar magnitude and ranged from zero to US$2.03 per tonne of waste.

Amenity

Landfills can reduce the amenity of nearby households and firms. The European Commission identified a number of disamenity effects associated with landfills, including:

> … odour, flies, seagulls, wind-blown litter, noise, visual intrusion, and traffic … [as well as deterioration in aesthetic attributes including] deteriorations in taste, odour, appearance, or visibility. (European Commission 2000a, p. 48)

Researchers overseas have used hedonic pricing techniques to estimate the external costs of lost amenity associated with landfills. The European Commission (2000a) reported the results of one study based on US data that showed house prices were 12.8 per cent lower if a house was located adjacent to a landfill, than if the same house was not close to a landfill. If the house was more than 5.5 kilometres from a landfill, there was no statistically significant effect on house prices. Porter (2002) reported estimates that the price of houses within 160 metres of a landfill may be as much as 15 per cent lower than houses not located near a landfill, and the price is a few per cent lower for houses within 1.6 kilometres of a landfill.

These results imply that if a landfill was located in a lightly-populated area, the external costs of lost amenity would be minimal. Where landfills are located in metropolitan areas, buffer zones would reduce the amenity impacts significantly, and for this reason they are required in some states and territories (chapter 8). The land required for buffer zones has an opportunity cost — the landfill operator forgoes earnings by deliberately leaving the land empty and unused. Therefore, where regulations require landfill operators to purchase land specifically for the purpose of maintaining buffer zones, some or all of the external costs of lost amenity are internalised.

Estimating the external costs of lost amenity that are imposed by each tonne of waste is difficult, and relies on a number of assumptions about the size of the landfill, its life span and the rate at which it is filled. In reality, once a landfill is established and accepting waste, the external cost of depositing one additional tonne of waste in the landfill (the marginal external cost) is likely to be close to zero. However, by using a number of assumptions, it may be possible to estimate the average external cost of lost amenity caused by landfill, which may be larger.

EPA NSW (1996c) reported estimates that property prices would be between zero and 1 per cent lower for dwellings located within two kilometres of a landfill. It assumed that there would be on average 6300 dwellings within two kilometres of a landfill, and the reduction in property prices would be spread over 50 years with a 7 per cent discount rate. Based on annual waste disposal volumes, it estimated the external cost of disamenity from sending waste to landfill is up to $3.70 per tonne of waste. If housing density were lower — as would be the case were the landfill to incorporate buffer zones — the external cost per tonne would be lower.

As well as the negative effects on amenity that occur during the life of a landfill, there can be some offsetting positive effects. Porter (2002) noted that neighbours of landfills may benefit from having their roads paved and widened. In many cases, after a landfill is closed, what was a disused quarry is rehabilitated as a public park, sports ground or golf course. This may increase the amenity of nearby residents, albeit in the post-closure phase, and, depending on the discount rates applied by the residents, the benefit could be substantial. The Commission is not aware of any estimates of the external benefits of site remediation, so those benefits are excluded from estimates of the external costs of landfill.

Estimated total external costs of landfill

The external costs of a landfill depend on its location, the type of waste it accepts, and the design and management systems in place to deal with leachate and landfill gas. Bringing together all of the estimates discussed above, the Commission estimates the total external costs of landfills vary from zero to $24 per tonne of waste, depending on the type of waste accepted and the presence of gas-capture systems with electricity generation (table B.3). If the landfill is properly located and incorporates a liner and an efficient landfill-gas management system with electricity generation, the external costs are probably less than $5 per tonne of waste. A poorly-located and managed landfill could impose much higher costs.

Thermal treatment of waste

Thermal treatment refers to technologies that involve burning waste, including incineration, gasification and pyrolysis, none of which are widely used in Australia for general-waste treatment. It can also refer to the use of waste as a fuel source in industrial processes such as cement kilns. There are a number of positive and negative externalities associated with thermal treatment. The negative externalities include emissions of greenhouse gases and pollutants to air, and any hazards that might arise from residues, such as ash, when they are disposed to landfill. The main positive externality associated with thermal treatment arises from reductions in greenhouse gas emissions that come from using waste instead of fossil fuels to generate energy. By reducing the volume of waste that is sent to landfill, and converting it to a largely inert ash, thermal treatment can reduce some of the externalities associated with landfill.

Table B.3 **Estimates of the external costs of properly-located, engineered and managed landfills, per tonne of waste**

	Municipal waste	*Commercial and industrial waste*	*Construction and demolition waste*
Properly-located, engineered and managed landfill			
Leachate	Less than $1	Less than $1	Less than $1
Greenhouse gas emissions	$4 to $15	$5 to $21	$1 to $4
Other gas emissions	Less than $1	Less than $1	Less than $1
Amenity	Less than $1	Less than $1	Less than $1
Total	**$4 to $18**	**$5 to $24**	**$1 to $7**
Properly-located, engineered and managed landfill with efficient methane capture and electricity generation			
Leachate	Less than $1	Less than $1	Less than $1
Greenhouse gas emissions	$0 to $1	$0 to $2	$0 to $1
Other gas emissions	Less than $1	Less than $1	Less than $1
Amenity	Less than $1	Less than $1	Less than $1
Total	**$0 to $4**	**$0 to $5**	**$0 to $4**

Sources: AGO (2005); BDA Group and EconSearch (2004); EPA NSW (1996c); European Commission (2000a); Nolan-ITU (2004b); Nolan-ITU and SKM Economics (2001); Porter (2002); Tol (2005); Productivity Commission estimates.

The estimates of external costs discussed below are for thermal treatment of municipal waste in modern facilities based on incineration. As this practice is not widely used in Australia for general-waste treatment, the estimates are based largely on overseas data.

Greenhouse gas emissions

The main greenhouse gas emitted from thermal treatment plants is carbon dioxide. The volume of carbon dioxide generated by combustion depends on the composition of the waste. Paper, plastics, and organic waste are the main sources of carbon dioxide emissions from thermal treatment of municipal waste. McDougall et al. (2001) reported estimates of the carbon dioxide emissions from combustion of these waste materials. Nolan-ITU (2004b) estimated the proportion of Australian municipal waste that is comprised of each of these materials (table B.4). By combining these estimates, it can be concluded that burning one tonne of municipal waste in a thermal-treatment plant in Australia would lead to emissions of approximately one tonne of carbon dioxide.

Table B.4 **Emissions of carbon dioxide from thermal treatment of municipal solid waste**

	Units	*Paper*	*Glass*	*Film plastic*	*Rigid plastic*	*Organic waste*	*Other waste*
CO_2 emissions arising from waste combustion	Tonnes of CO_2-e per tonne of material burned	1.28	0.06	2.74	2.65	0.59	1.28
Proportion of the Australian municipal waste stream comprised of waste material	per cent	9	3		10[a]	50	23
CO_2 emissions arising from combustion of waste materials	Tonnes of CO_2-e per tonne of municipal waste burned	0.11	–	As much as 0.274		0.30	0.29

[a] Figure is a total for all plastics. – Nil or rounded to zero.

Sources: McDougall et al. (2001); Nolan-ITU (2004b); Productivity Commission estimates.

Displacement of fossil fuels

Electricity generation is the largest single source of greenhouse gas emissions in Australia. Most of these emissions arise when coal and natural gas are burned in power plants. The greenhouse gas emissions associated with electricity generation depend on the fuel source. For example, generating 1kWh of electricity from brown coal combustion results in emissions of 1.23 kg of CO_2-e. By contrast, electricity generated using hydro power gives rise to negligible greenhouse gas emissions.

If municipal waste displaces fossil fuels as an energy source, emissions of greenhouse gases from burning fossil fuels are reduced. This would partly offset the negative effects of greenhouse gas emissions from thermal treatment. Enviros Consulting Limited et al. (2004) estimated the combustion of one tonne of municipal waste in a thermal-treatment plant can generate 581 kWh of electricity. Given the combustion of one tonne of municipal waste yields approximately one tonne of CO_2-e, this implies generating 1 kWh of electricity from waste combustion leads to the emission of 1.72 kilograms of CO_2-e (1000/581).

The external costs of thermal treatment, therefore, depend on whether the facility incorporates electricity generation. If it does not, the external costs of carbon dioxide emissions may be of the order of \$5 to \$20 per tonne of waste.[4] If the facility does incorporate electricity generation, the external cost would be lower.

4 Assuming the external cost of greenhouse gas emissions is between \$5 and \$20 per tonne of CO_2-e.

How much lower depends on the displaced energy source. For example, if energy-from-waste replaced a low-emission energy source such as hydroelectricity, the external cost of greenhouse gas emissions would be between \$5 and \$20 per tonne of waste. If energy-from-waste replaced brown coal, the net external cost of greenhouse gas emissions would be between \$1 and \$6 per tonne of waste (table B.5). If energy-from-waste replaced brown coal as an energy source, the net greenhouse gas emissions from municipal waste disposed to an efficient energy-from-waste facility would be lower than the emissions if the waste were disposed to a landfill with no gas-management system.

Table B.5 **Estimated net external costs of greenhouse gas emissions from sending municipal waste to an energy-from-waste facility**

			Displaced Fuel			
		Units	*Brown coal*	*Black coal*	*Natural gas*	*Hydro electricity*
Emissions of CO_2-e per kWh of electricity		Kilograms	1.23	0.93	0.49	–
Net emissions of CO_2-e from combustion of one tonne of municipal waste[a]		Tonnes	0.28	0.46	0.71	1.00
Net external cost of energy-from-waste greenhouse gas emissions[b]	**Low**	**\$/tonne of waste**	**1**	**2**	**4**	**5**
	High	**\$/tonne of waste**	**6**	**9**	**14**	**20**

[a] Based on the assumption that 1.72 kilograms of CO2-e are emitted per kWh of electricity generated from municipal waste combustion. [b] The low estimate assumes that the external cost of greenhouse gas emissions is \$5 per tonne of carbon dioxide. The high estimate assumes the cost is \$20 per tonne. – nil or rounded to zero.

Sources: ABS (2001); AGO (2005); Enviros Consulting Limited et al. (2004); Productivity Commission estimates.

Other emissions to air

Thermal-treatment facilities generate gases and particulate matter that can escape as flue gas and fly ash. McDougall et al. (2001) listed a number of pollutants that arise from the combustion of municipal waste, namely carbon monoxide, hydrochloric acid, hydrogen fluoride, sulphur oxides, nitrogen oxides, particulates, heavy metals, dioxins and furans. These pollutants can be harmful to human health and the environment.

There is particular concern over emissions of dioxins and furans. These compounds are highly toxic to humans and are suspected of being carcinogenic, although only one of the 210 compounds classed as dioxins and furans has been specifically linked to cancer in humans (McDougall et al. 2001). Dioxins are formed in combustion processes where carbon, oxygen and chlorine are present, which includes thermal waste treatment.

Modern thermal-treatment facilities incorporate technologies that significantly reduce emissions of dioxins, furans and other pollutants. In Europe, where thermal treatment is commonly used in waste management, regulations require facilities to incorporate these technologies. These regulations have been very effective in reducing emissions of dioxins and other pollutants. For example, the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (2005) stated that, since 1990, total emissions of dioxins from Germany's 63 thermal waste treatment plants have fallen from 400.0 to 0.5 grams per year. Between 1990 and 2001, emissions of lead from thermal treatment of household waste fell from almost 58.00 to 0.13 tonnes per year. Over the same period, emissions of mercury fell from 347.0 kg to 4.5 kg per year. These reductions mean that thermal treatment of domestic waste is responsible for less than one thousandth of Germany's total air emissions of lead and mercury:

> Requirements as to levels of heavy metals, dusts, and acid gases such as sulphur dioxide, hydrogen chloride, etc., have been similarly tightened, and these gases are consequently no longer relevant in terms of public health. (German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety 2005, p. 7)

This suggests that, other than the effects of greenhouse gases, the external costs of air pollution from thermal treatment facilities that incorporate modern pollution controls can be very small.

Solid-waste residues from thermal treatment

There are two main types of solid residues from municipal waste combustion: ash, and flue gas cleaning residues. Ash can accumulate under the burnt waste, or escape from the facility into the atmosphere, or be captured before it escapes. Flue-gas cleaning residues accumulate when the flue gases are treated to prevent pollutants from escaping to the atmosphere. Modern thermal waste-treatment facilities incorporate fabric filters to prevent fly ash from escaping. The ash residues are disposed to landfills, or used in construction applications such as road base, while the flue-gas cleaning residues are regarded as hazardous waste in most countries, and are disposed to controlled landfills (European Commission 2000a).

The residual ash from combustion is much more inert than municipal waste, and the thermal treatment destroys pathogens in the waste, so the volumes of leachate and gas generated when the ash is sent to landfill are significantly reduced (McDougall et al. 2001). However, because the ash residues may contain heavy metals at up to four times the concentration of the original municipal waste (Porter 2002), the leachate can be more toxic. The net effect depends on the landfill that accepts the ash residues and its capacity to prevent leachate emissions. If the ash is sent to a hazardous waste landfill, the impacts are likely to be controlled, and the external cost would be minimal. If the ash were disposed to a landfill that did not incorporate adequate pollution controls, the impact could be significant.

Loss of amenity

Thermal waste-treatment facilities can lead to losses of amenity similar to those caused by landfills. The European Commission (2000a) identified factors such as dust, noise, odour, traffic and visual intrusion as the sources of the disamenity. As is the case with landfills, there are only likely to be significant disamenities if the facility is located close to residential or commercial areas.

The Productivity Commission is not aware of any direct estimates of the external costs of the amenity loss caused by thermal waste treatment facilities. The European Commission noted:

> … although there are differences in the types of nuisances and disamenities associated with living close to an incinerator and close to a landfill, there are also obvious similarities. It would therefore not seem unreasonable to expect a somewhat similar profile of welfare losses associated with a landfill and an incineration plant. (European Commission 2000a, p. 102)

B.3 Upstream externalities

The extraction of minerals and forest products can cause damage to mining land and forests. Transporting and processing virgin materials can lead to greenhouse gas emissions, air and water pollution. If these damages are not reflected in the costs to firms of producing goods, they are externalities. Because they do not arise directly from the generation or disposal of waste, but rather at a point earlier in the product's life cycle, these damages are often referred to as upstream externalities. If waste management practices lead to reductions in the use of virgin materials, some upstream externalities may be avoided, although the processes involved in recycling could result in some externalities themselves.

This section sets out some of the issues that should be considered when attempting to estimate the upstream external costs and benefits of waste management. Life cycle assessment (LCA) — a materials accounting technique that has been used to estimate the environmental costs and benefits of recycling — is discussed. One prominent Australian study of kerbside recycling is considered.

Life cycle assessment

LCA is a material accounting technique that catalogues the inputs of materials and energy and the emissions of pollutants that are associated with a product or production process. The practice of LCA is guided by a series of International Standards Organisation (ISO) standards, which have been reproduced as Australian and New Zealand Standards. The standard that sets out the principles and framework for LCA states:

> LCA studies the environmental aspects and potential impacts throughout a product's life (that is cradle-to-grave) from raw material acquisition through production, use and disposal. (Standards Australia 1998, p. iii)

The standard (Standards Australia 1998) sets out four stages to be completed in an LCA:

1. The goals of the LCA and its scope are defined. The scope of the study includes the inputs and emissions that are to be measured and the boundaries of the product system. While the standard states that LCA studies the impact of a product from cradle-to-grave, it is conceivable that an LCA could begin at a point later in the product's life cycle than raw-materials acquisition, and could end at an earlier point than final disposal. For example, if a product is imported, it may not be possible to assess the impacts of raw-materials acquisition and manufacturing. If it is exported, it may not be possible to assess the impacts of consumption and disposal.

2. A 'life cycle inventory analysis' is undertaken. The life cycle inventory quantifies the material and energy inputs and outputs associated with the product or process at the various stages of its life cycle. The accuracy of the LCA depends on the reliability of the inventory data.

3. A 'life cycle impact assessment' is carried out. The impact assessment involves 'associating inventory data with specific environmental impacts and attempting to understand those impacts' (Standards Australia 1998, p. 7). This could include evaluating the contribution of certain emissions to impacts such as global warming potential, photochemical-smog formation and damage to human health. In some cases, emissions of different chemicals contribute to the same environmental impact. The ISO standard for LCA allows for emissions to be aggregated 'in very specific cases and only when meaningful' (Standards Australia 1998, p. 8). For example, carbon dioxide and methane can both contribute to global warming, and could be reported as emissions of CO_2-e. This is acceptable because there is broad agreement that the global warming potential of methane is 21 times that of carbon dioxide. Cases where there is agreement about the relative damage caused by two chemicals are uncommon, and therefore aggregation of chemicals would be expected to be uncommon.

4. ‘Life cycle interpretation’ is the stage at which ‘the findings from the inventory analysis and the impact assessment are combined together … consistent with the defined goal and scope in order to reach conclusions and recommendations’ (Standards Australia 1998, p. 8).

The ISO standard for LCA places some limitations on the way that the results of an LCA are reported. For example, the standard states:

> There is no scientific basis for reducing LCA results to a single overall score or number [such as dollars], since tradeoffs and complexities exist for the systems analysed at different stages of their life cycle. (Standards Australia 1998, p. 4)

The Commission agrees that ‘tradeoffs and complexities’ exist within and outside the scope of an LCA study, and they make it problematic to use LCA to estimate the external costs and benefits of processes such as landfill, energy-from-waste, recycling and AWTs. One obvious factor that affects the reliability of LCA is that there is a shortage of reliable life cycle inventory data in Australia. The Building Products Innovation Council (trans., p. 646) raised concerns that due to the lack of reliable local data, LCAs are being based on overseas data that do not accurately reflect Australian conditions. However, even when reliable data are available, using the results of an LCA to estimate the external costs and benefits of a process is likely to lead to inaccurate and unreliable estimates.

The results of an LCA are reported as a list of the physical inputs to, and outputs from, a production process. The physical characteristics of a pollutant are an important determinant of its potential to cause damage to human health and the environment, but the actual damage done by emissions depends on factors like the background concentration of pollutants in the environment, the pathways through which exposure occurs and any measures taken to reduce their impacts. These factors are not adequately accounted for in LCA.

The Commission has identified three characteristics of LCA that make it a poor tool for estimating external costs and benefits. Namely, LCA:

1. cannot differentiate between externalities and impacts that have already been internalised through direct policy intervention;
2. has no mechanism for accounting for the location of avoided pollution; and
3. does not take time into consideration.

These concerns are elaborated on below.

Some environmental impacts are internalised

Natural resource extraction, transport, processing and manufacturing can damage human health and the environment. Some of the potential for damage has been identified by governments, and in some cases policies have been adopted that have the effect of internalising the costs of the damages so they are reflected in the firm's costs of production. For example, governments may levy pollution taxes on firms, or require them to offset some or all of the damage they cause by undertaking environmental improvements elsewhere. Such policies are discussed further in chapter 5.

In an LCA, only the physical effects of production processes are identified. Measures to internalise environmental externalities are not taken into account, and therefore where such policies exist, LCA would tend to overstate the externalities associated with a production process.

The size of upstream benefits depends on location and time

As it is currently practiced, LCA is unable to account for the source of any avoided pollution or when it would have occurred. Both of these factors are significant in determining the external costs of pollution or benefits of avoided pollution.

Estimates of the external cost of fine particulate emissions made by EPA NSW (1998) illustrate the importance of location. Fine particulates can affect people who suffer from respiratory illnesses and can contribute to photochemical smog. EPA NSW (1998) estimated that, in 1998, the external cost of particulate emissions in the greater Sydney region was $18 500 per tonne. If the emissions occurred outside the greater Sydney region, where population density is lower, EPA NSW (1998) estimated that they impose no external costs. In the results of an LCA, no distinction would be drawn between avoided urban air pollution and avoided pollution in sparsely-populated areas, although in a properly conducted cost–benefit analysis, the external costs could be very different.

Imports and exports further complicate the analysis and strengthen the case against using LCA to estimate the external costs and benefits associated with particular products. Where goods are imported, reduced consumption in Australia may lead to reduced pollution in other countries. Most air and water pollutants — the notable exception being greenhouse gases — have localised effects on human health and the environment. In such cases, it is unlikely that there is any external benefit to Australia from avoiding consumption of the product. Likewise, reducing domestic consumption of a particular virgin material may not lead to any external benefit to Australia, if the reduced domestic demand is made up for by increased exports.

Similarly, LCA results do not include any consideration of the timing of avoided emissions. The life cycle impacts of a product or process may occur over a long period, and the cost to the community depends in part on when the impacts occur. In general, the community will place a greater value on avoiding an emission of pollution today than avoiding the same emission in the future. In cost–benefit analysis this is reflected by the use of discount rates that adjust the external cost of pollution (or benefit of avoided pollution) depending on when the emission would be expected to occur.

The location and timing of avoided pollution are key factors in determining the risk that the pollution will cause damage to human health and the environment, and therefore the size of any externalities. Failure to account for risk will tend to overstate the size of environmental externalities.

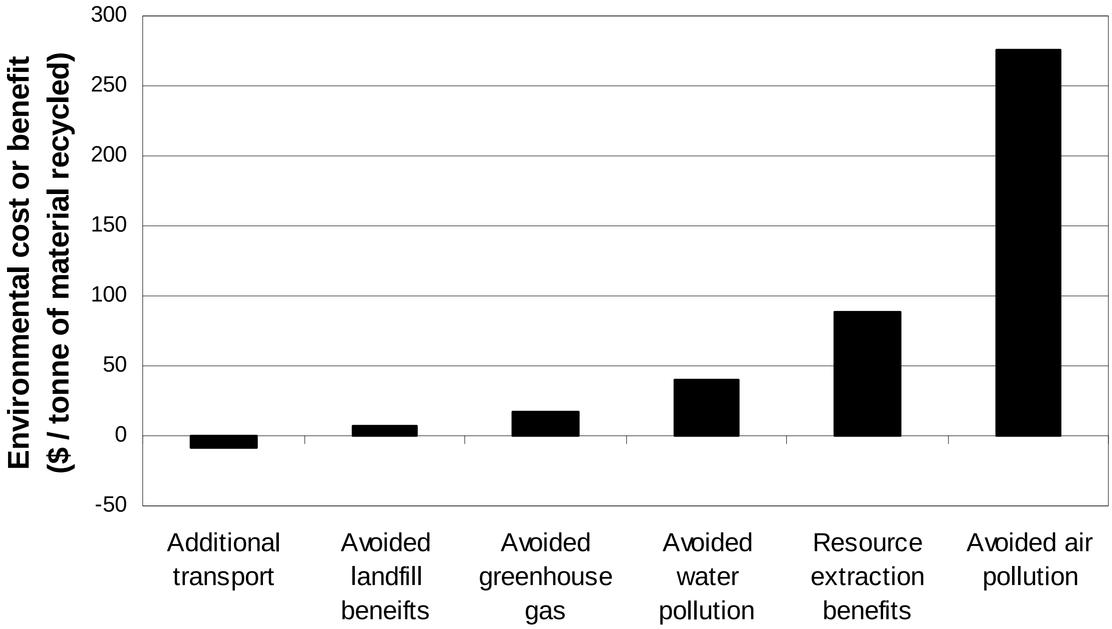
Estimates of upstream externalities

Nolan-ITU and SKM Economics (2001) used LCA to estimate the external costs and benefits of kerbside recycling in Australia. They concluded that kerbside recycling delivered environmental and other external benefits valued at $420 per tonne of recyclable material recovered, most of which was attributed to upstream benefits. The largest contribution to the environmental benefits of recycling was estimated to arise from reduced air and water pollution associated with avoided virgin materials processing (75 per cent, or $315 per tonne). The 'natural resource value' of recycling — associated with resource conservation and reduced environmental impacts of resource extraction — was estimated to contribute a further 21 per cent ($88 per tonne) of the benefits. Reduced greenhouse gas emissions were estimated to deliver 4 per cent ($17 per tonne) of the benefits of recycling. The downstream impacts of recycling were estimated to comprise a benefit of around $6.70 per tonne, arising from reduced landfill impacts, and a cost of around $8.40 per tonne, caused by the collection trucks required for kerbside recycling (figure B.1)

Nolan-ITU and SKM Economics (2001) based their analysis on the assumption that materials collected through the kerbside recycling system were recycled back into the same product — known as 'closed-loop' recycling. This not always the case, and would tend to bias upward the estimated benefits of recycling.

Since they were first published, the Nolan-ITU and SKM Economics (2001) estimates of the costs and benefits of recycling have been applied in a number of prominent studies of the costs and benefits of waste management in Australia. The estimates in Nolan-ITU and SKM Economics (2001) are discussed below.

Figure B.1 **Sources of environmental costs and benefits of kerbside recycling estimated by Nolan-ITU and SKM Economics**



Data source: Nolan ITU and SKM Economics (2001).

Avoided air and water pollution

Industrial processes, including virgin materials processing and recycling, can lead to air and water pollution. If that pollution constitutes a residual net externality (taking into account any direct measures to internalise the costs) and recycling reduces the total volume of pollution emitted, it would deliver an external benefit. Nolan-ITU and SKM Economics (2001) estimated that avoided air pollution delivers benefits of approximately $275 per tonne of material recovered (around 65 per cent of the total benefit of recycling), and avoided water pollution delivers benefits of approximately $40 per tonne of material recovered (around 10 per cent of the total benefit).

To estimate the benefits of avoided air and water pollution, Nolan-ITU and SKM Economics (2001) used LCA to estimate the volumes of air and water pollution that would be avoided if virgin materials were replaced by recycled materials. The LCA accounted for emissions of 22 air pollutants and 23 water pollutants. The volumes of avoided pollution were multiplied by existing estimates of the external costs of pollution, and this was reported as an external benefit of kerbside recycling. The estimates of the external costs of pollution came from Australian and overseas sources, not all of which could be located by the Commission.

The Commission's assessment of the benefits of avoided air and water pollution estimated by Nolan-ITU and SKM Economics (2001) is that they are overstated for three reasons:

1. The estimates did not take into account the effects of upstream policies such as pollution taxes and environmental offsets. While recycling may lead to reduced pollution, it may also lead to reduced environmental offsets, or reduced pollution-tax revenues. If this is the case, then recycling may not deliver the estimated net benefit to the community.
2. Hyder Consulting (sub. 116, p. 8) stated that in the valuation model used by Nolan-ITU and SKM Economics, 'the impacts [of avoided air and water pollution] have been valued as occurring in populated areas', where they would impose higher external costs. In fact, some of the emissions would have occurred in less densely-populated areas where their external costs would be much smaller.
3. Nolan-ITU and SKM Economics (2001) did not apply any discount factors to the benefits of avoided emissions that would arise in the future.

Not taking the location or timing of pollution into account are examples of the general problem of using potential rather than expected cost estimates. As has been discussed for downstream pollution from landfills, expected costs can be very much lower than potential costs. Although the Commission has not analysed the risks associated with upstream pollution, it would appear that similar differences exist, and hence the Nolan-ITU and SKM Economics (2001) estimates are likely to substantially overestimate the expected costs of pollution, and therefore the benefits of recycling.

Greenhouse gas emissions

Extracting and processing virgin materials can lead to emissions of greenhouse gases. Replacing virgin materials with recycled materials can lead to lower emissions of greenhouse gases. Nolan-ITU and SKM Economics (2001) estimated that reduced greenhouse gas emissions credited to kerbside recycling deliver benefits of $17 per tonne of materials recycled (approximately 4 per cent of the total benefit of recycling).

To derive this figure, Nolan-ITU and SKM Economics used LCA to estimate the volume of greenhouse gas emissions avoided through kerbside recycling, and assumed avoided greenhouse gas emissions deliver external benefits of $20.60 per tonne of CO_2-e.

Currently there is no comprehensive nationally-coordinated policy to address greenhouse gas emissions and internalise the external costs of emissions. Should such a policy be adopted in the future, estimates of the external costs of greenhouse gas emissions relating to recycling would need to be reconsidered in the light of the policy.

Resource extraction

Nolan-ITU and SKM Economics (2001) estimated that slower extraction of mineral and forest products delivers external benefits of approximately $88 per tonne of material recycled through the kerbside system (21 per cent of the estimated total benefit). The benefits of slower resource extraction are related to reduced impacts on the land used for mining and forestry, and the contribution of slower resource extraction to sustainability.

Land-use impacts of mining

Mining can cause losses of native vegetation and wildlife habitat, pollution of waterways and losses of recreational or aesthetic values. If these impacts are not reflected in the cost of extracting mineral resources, they are net externalities. It appears that Nolan-ITU and SKM Economics (2001) assumed that avoided impacts on mining land deliver external benefits of approximately $20 per tonne of material recycled through the kerbside system.

Nolan-ITU and SKM Economics (2001) used an estimate of the costs of mining-land rehabilitation as a proxy for the external cost of damage to mining land. This estimate was in turn drawn from ‘United States data adapted to Western Australia’ (DEST 1997, p. 38). The Commission has not researched estimates of the external costs of damage to mining land**,** but considers an estimate of the costs of mining-land rehabilitation based on overseas data to be an unreliable proxy for the true external costs of mining-land use in Australia.

There are a number of factors that would need to be taken into account in estimating the external costs of damage to mining land. The magnitude of the externality depends on the location of the mine, the practices of the mining company, and the existence and effectiveness of direct policies to address the externalities. For example, the external costs of a mine in a tropical rainforest or on the fringe of a city would be larger than the external costs of a mine in an uninhabited area in the remote outback. Likewise, an open cut mine will have different costs to an underground mine.

Regulations and license conditions placed on mining companies can serve to internalise the externalities associated with damage to mining land. Regulations that require mining companies to avoid environmental damage or repair any damage that is caused can reduce the net external costs of mining. Other regulations require mining companies to pay compensation for environmental damage, or to undertake environmental-improvement work away from their mine sites to offset the damage done by mining (chapter 5). Through such policies, mining companies must bear some or all of the costs of the damage caused by their operations, and the externality is partially or fully internalised.

Given the range of factors that influence the external costs of mining-land use, they are difficult to estimate, and it is unlikely that overseas estimates of the costs of mining-land rehabilitation are a reliable proxy for the external costs of mines in Australia.

Mineral-resource depletion

Extracting mineral resources today reduces, or at least disperses, the stock of resources that are available for extraction in the future. Nolan-ITU and SKM Economics (2001) identified resource depletion as an externality associated with mineral extraction. Their estimate appears to value the benefit of slower resource depletion at around $60 per tonne of materials recycled.

Nolan-ITU and SKM Economics (2001) based their estimates of the benefit of slower resource depletion on an estimate of the external cost of electricity in Western Australia, which, in turn, was 'based on a German study on the costs of substituting renewable energy for coal in the generation of electricity' (DEST 1997, p. 38). The estimates were described by DEST (1997, p. 39) as 'controversial', and they are not related to the rate of extraction of mineral resources.

Where a mineral does become increasingly scarce, the world price tends to rise. Rising prices encourage exploration for new supplies, make recycling more attractive and promote substitution to other materials. In this way, price operates to both limit demand and increase supply in the future. In addition, firms with rights over mineral reserves make decisions as to the quantities they will extract over time. In doing this, they recognise that minerals extracted now cannot be extracted in the future, that is, they have an opportunity cost. If firms predict future scarcity leading to price increases they may limit current production in order to be able to benefit from higher prices later. These dynamic market responses to scarcity mean the opportunity cost of using non-renewable resources does not specifically introduce a market failure (Kahn 1995). Of course, nobody can predict the future with certainty, but as Kahn (1995) noted, markets are the best mechanism available for taking into account anticipated future conditions. As there appears to be no market failure associated with extraction rates for nonrenewable resources, it is not appropriate to treat resource depletion as an externality.

Forest production

Forests provide a number of environmental benefits. They act as a sink for greenhouse gases, reducing the concentration of carbon dioxide in the atmosphere. They can prevent soil erosion and salinity. They provide habitat for wildlife, and have recreational and scenic values to people. When forests are harvested, some of these benefits may be lost. Some are regained if the forest regenerates, while others such as biodiversity may be lost forever. As well as the loss of the environmental benefits of forests, harvesting can lead to direct negative impacts such as runoff into local water courses. If the environmental impacts are not included in the costs of forest production, the impacts can be considered externalities.

Nolan-ITU and SKM Economics (2001) considered the environmental impacts associated with forest production to be externalities that could be reduced by recycling paper and cardboard. They assumed that every tonne of virgin native forest that was not harvested delivered external benefits of approximately $36 per tonne of wood, while regrowth and plantation forests delivered benefits of around $13 and $7 per tonne respectively.

The values chosen by Nolan-ITU and SKM Economics (2001, p. A-17) were based on ‘hypothetical non-wood charges’ sourced from an Industry Commission report on recycling. The Industry Commission (IC 1991) noted that forests have wood and non-wood values. The wood values are the market value of trees as a source of logs, while the non-wood values reflect the external benefits provided by forests. It made the point that forests might be managed differently where both types of values were considered. The Industry Commission illustrated this point by arbitrarily selecting a set of values to represent the non-wood values of forests. These values were not derived by any systematic means, rather they were simply chosen to demonstrate the effect of different valuations of the non-wood values of forests. Nolan-ITU and SKM Economics (2001) used these hypothetical charges as the basis of their estimates of the non-wood value of forests.

Nolan-ITU and SKM Economics (2001, p. A-17) acknowledged there were no published estimates of the external costs of forest production, and they had adopted the Industry Commission’s figure ‘in the hope that the adoption of a value would prompt further debate and research in the area’. However, it also described the Industry Commission’s hypothetical values as a ‘conservative estimate of the environmental value of timber' (Nolan-ITU and SKM Economics 2001, p. A-17). There appears to be no basis for the judgement that this value is conservative.

The external impact of forest production depends on the location and characteristics of the forest. Native forests may deliver larger external benefits than plantation forests because they contribute more to biodiversity, scenic and recreation values. Plantation forests can deliver many of the benefits associated with native forests, but can also impose costs through the use of water resources that could be used for other activities.

The extent of the externalities can be influenced by government policy. The Australian, State and Territory Governments have agreed on a National Forest Policy Statement (NFPS) that sets a number of requirements for the management of Australia's forests. The NFPS includes commitments to safeguard 'areas that have important biological, cultural, archaeological, geological, recreational and landscape values' (DAFF 2002). The NFPS also sets out guidelines for the pricing of forest products, including:

> Prices will be market based, at least cover the full cost of efficient management (including regeneration) attributable to wood production, include a fair return on capital, and provide an adequate return to the community from the use of a public resource. (DAFF 2002)

If the provisions in the NFPS are met, some of the external costs of forest production will be internalised. These factors suggest to the Commission that the benefits of avoided forest production are highly variable, and that because it does not account for direct policies like the NFPS, any analysis based on LCA may lead to overestimates of the benefits of recycling.

Total upstream benefits of kerbside recycling

The Commission accepts that recycling some materials can deliver some upstream environmental and human-health benefits. However, the estimate that kerbside recycling systems deliver upstream benefits of $420 per tonne of mixed recyclables recovered that was published by Nolan-ITU and SKM Economics (2001) is substantially biased upward. The Commission considers the estimate to be biased upward because:

- it does not take into account the internalisation of upstream externalities through direct mechanisms, such as requirements for environmental offsets;
- it values all pollution as if it occurred in a large metropolitan area when, in reality, some of it occurs in regions where the human-health costs of pollution are generally much lower;

- it relates to the potential impacts of pollution without any risk adjustment to estimate an expected impact. The potential impact is effectively a worst-case scenario that is unlikely to reflect the damage done by pollution in Australia;
- it includes an external benefit of approximately $60 per tonne for mineral resource conservation. The Commission considers there is no externality associated with mineral-resource depletion and therefore the appropriate value for the purposes of cost–benefit analysis is zero;
- it is based on the assumption that recycling occurs in a ‘closed-loop’ system; and
- the costs and benefits of avoided externalities that may occur in the future are not subject to any discount rate.

As well as being biased upward, there are a number of factors that cause the Commission to question the reliability of the estimate, including:

- the scarcity of reliable life cycle inventory data for Australia;
- the variability of the environmental impacts of resource extraction and processing facilities; and
- the use of mining-land rehabilitation costs and hypothetical non-wood charges as proxies for the external costs of mining and forestry activities.

C Case studies of three Australian product stewardship schemes

This appendix examines Australia's product stewardship schemes for:

- waste oil
- consumer packaging
- newsprint.

C.1 Waste oil

Since 2001, waste oil has been subject to the Product Stewardship for Oil (PSO) Program. The rationale for this scheme is that large quantities of used oil would otherwise be discharged into the environment, leading to adverse impacts on human health and the productive capacity of the economy (Allen Consulting Group 2004; DEH 2005d). Such impacts could occur because it is relatively easy for people to dispose of used oil inappropriately.

Policy instruments

The key policy instrument used in the PSO Program is an advance recycling fee. Oil producers and importers have to pay a fee of 5.449 cents per litre (or per kilogram for greases) on petroleum-based oils and their synthetic equivalents (excluding exports and single-use oils). The resulting revenue is used to offset the cost of subsidies paid to oil recyclers.[1]

Used oil can be cleaned of contaminants and then used as an industrial burner fuel, hydraulic oil, incorporated into other products, or re-refined back into new lubricating oil.

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1 Strictly speaking, the subsidies are not financed directly by the fee. Rather, the fee was set so that, over the life of the PSO Program, no government funding was required to finance the expected subsidies. However, in any given year, there may be a disparity between government revenue and payments. In 2004-05, revenue was $25.1 million, after accounting for drawbacks (for exports) and refunds, while $13.7 million was paid for oil recycling.

The recycling subsidies vary according to the volume and type of recycled product produced (table C.1). The rate structure provides a significant preference in favour of re-refined base oil, sometimes referred to as 'lube-to-lube'. As a result, a disproportionate share of subsidies go to this product (figure C.1).

Table C.1 **Subsidy rates under the Product Stewardship for Oil Program**

Category	*Amount (cents per litre or kilogram)*[a]
1. Re-refined base oil (for use as a lubricant or a hydraulic or transformer oil) that meets the criteria mentioned in Schedule 1 of the Product Stewardship (Oil) Regulations 2000 (Cwlth).	50
2. Other re-refined base oils.	10
3. Diesel fuels to which the *Excise Tariff Act 1921* (Cwlth) applies.	7
4. Diesel extenders (filtered, de-watered and de-mineralised).	5
5. High grade industrial burning oils (filtered, de-watered and de-mineralised).	5
6. Low grade industrial burning oils (filtered and de-watered).	3
7. Industrial process oils and lubricants, including hydraulic and transformer oils (re-processed or filtered, but not re-refined).	0
8. Gazetted oil consumed in Australia for a gazetted use.[b]	5.449
9. Recycled oil mentioned in item 5 or 6 that has been blended with a petroleum product that meets the criteria mentioned in Schedule 2 of the Product Stewardship (Oil) Regulations 2000 (Cwlth).	9.557

a Paid per litre on oils and per kilogram on greases. **b** This category was created so that the levy of 5.449 cents could be reimbursed for specific uses of oil that do not create recyclable waste and pose a low risk to the environment.

Source: Product Stewardship (Oil) Regulations 2000 (Cwlth).

The Department of the Environment and Heritage (DEH) claimed the different subsidy rates are set so they:

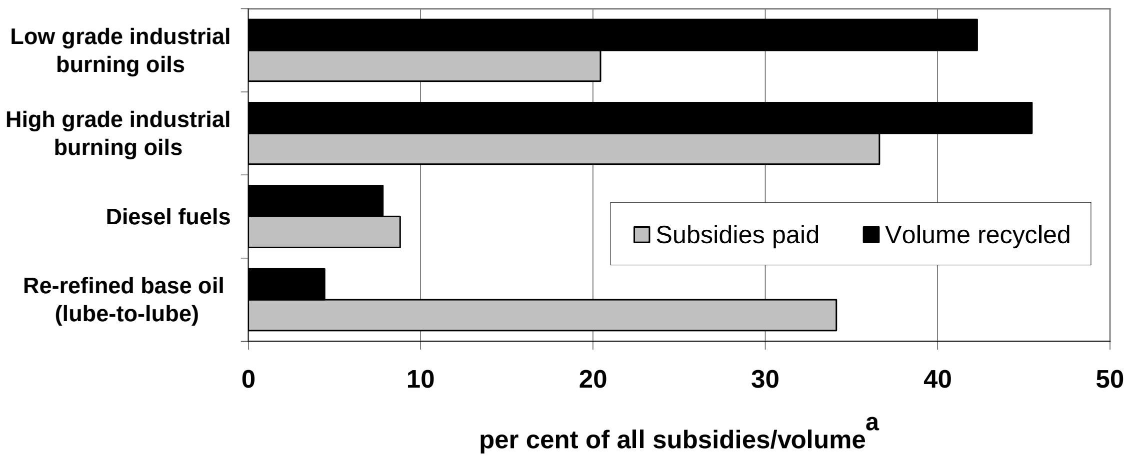
> … broadly reflect the recycling effort and investment required to produce recycled oil of better quality with improved environmental outcomes. The underlying principle is that benefits should only be paid where they might serve as an incentive for increased recycling activity. This has been given precedence over other factors. The hierarchy is thus designed to encourage the increased recycling of waste oil and not to simply reward current good practice or provide industry assistance. (DEH 2005e, p. 9)

However, a formal evaluation of the PSO Program (prepared for the Minister for the Environment and Heritage) questioned whether the subsidy rates reflect the costs and benefits of different treatment methods:

> … since the PSO Program's introduction a number of oil life cycle analyses have been undertaken … These studies challenge the perceived environmental supremacy of lube-to-lube recycling, and have confirmed that burning of high grade reprocessed used oil

or, in the case of cement kilns even lower grade used oil, has an environmental impact similar to re-refined base oil. (Allen Consulting Group 2004, p. 23)

Figure C.1 **Subsidy payments and volumes recycled under the Product Stewardship for Oil Program, 2004-05**



[a] Excluding payments for categories 8 and 9 (see table C.1 for definitions), which do not contribute to the total volume of oil recycled under the Product Stewardship for Oil Program. Transitional assistance funding is also excluded.

Data source: DEH (2005a).

As a result, the evaluation recommended the subsidy for high-grade burning oil be raised relative to that for lube-to-lube oil. However, the author of the evaluation (Allen Consulting Group) recently changed its view. Australia's only operator of a used oil refinery, with assistance from the Allen Consulting Group, noted:

> A recent life cycle analysis by a highly regarded German research institute (IFEU) has found that re-refining produces significantly better environmental and economic outcomes than burning, after considering a number of environmental and resource criteria.
>
> It is therefore argued that:
>
> - Lube-to-lube re-refining should be the preferred means of addressing the issue of used lubricating oils …
> - The $0.50 per litre benefit rate is appropriate and should retain continuing relevancy by being increased by the CPI index …
> - There are health hazards from burning used lubricating oil in anything other than cement kilns. Not only is burning a poor use of a valuable resource, but the release of harmful chemicals into the environment or into glasshouses is undesirable …
>
> Prior to the IFEU analysis, there had been a number of previous life cycle analysis studies, which influenced the ACG [Allen Consulting Group] review [evaluation of the PSO Program] to propose an increase in the burning oil benefit rate. (Southern Oil Refineries, sub. DR192, pp. iii–iv and 11)

Similarly, the DEH noted:

> … the Commission … refers to the independent review of the Product Stewardship (Oil) Act 2000 (Allen Consulting Group 2004) and questions whether the subsidy rates reflect the costs and benefits of different treatment methods. DEH considers that the Allen Consulting Group analysis of this matter was flawed. (sub. DR214, p. 24)

A past problem with the PSO Program was that the advance recycling fee was being levied on products and end uses that did not produce a recyclable waste and had minimal impact on the environment. This was subsequently addressed by amendments to the relevant legislation, although with a significant time lag (DEH, sub. 103).

The PSO Program also includes government-funded transitional assistance of $34.5 million over the period 2001–07. This is intended to be 'an interim measure to engender change that will ensure the long-term viability of Australia's oil recycling industry' (DEH 2005a, p. 124).

Administrative arrangements

The PSO Program is implemented as government regulation. It is administered by existing agencies, which would tend to reduce the administrative cost of the Program. However, the administrative arrangements are somewhat complex in practice. This complexity is reflected in the number of parties involved and the numerous legislative instruments used to implement the Program.[2]

The advance recycling fee on domestic oil production is collected as an excise by the Australian Taxation Office. For imports, it is collected as a customs duty by the Australian Customs Service. Subsidy payments are administered separately by the Tax Office. Further complexity arises due to the need to exempt exports and non-recyclable oils from the fee.

The advance recycling fee is set by the Treasurer. The DEH is responsible for ongoing monitoring and review of the Program, and for administering the transitional assistance funds. An Oil Stewardship Advisory Council — including

2 The legislation underpinning the Program is the *Product Stewardship (Oil) Act 2000* (Cwlth); *Product Stewardship (Oil) (Consequential Amendments) Act 2000* (Cwlth); *Excise Tariff Amendment (Product Stewardship for Waste Oil) Act 2000* (Cwlth); *Customs Tariff Amendment (Product Stewardship for Waste Oil) Act 2000* (Cwlth); *Product Grants and Benefits Administration Act 2000* (Cwlth); and *Appropriation (Supplementary Measures) Act (No. 2) 1999* (Cwlth). The Product Stewardship (Oil) Regulations 2000 (Cwlth) specify the benefits paid to encourage recycling.

government and industry representation — has also been created to provide advice to the Australian Government on the operation of the PSO Program.

However, the DEH defended the administrative arrangements:

> The Allen [Consulting Group] Review found that the administrative costs of the programme were reasonable and compliance costs were not unreasonable. The Allen Review noted that administrative costs had been constrained by using existing excise and customs arrangements. It also noted that the programme was reasonably flexible for business while identifying some concern about the paperwork burden (Allen Consulting Group 2004, p. x). (sub. DR214, p. 24)

A positive aspect of the Program is that the relevant legislation requires annual reporting on its operations and the conduct of evaluations at least every four years.[3] The DEH reports on the Program's operations each year as part of its annual report.

The first evaluation of the PSO Program was undertaken by Allen Consulting Group (2004). It concluded there was a sound basis for the Program, but found it difficult to reach definitive conclusions about effectiveness due to data limitations. It also found that relying on the customs and excise system would be a major problem over the longer term, given the system is complex and not designed for environmental regulation. It therefore recommended a tradeable certificate scheme be considered when the Program is next subject to an evaluation, which is due by 2008. As noted above, the evaluation also raised concerns about the distortionary effects of the subsidy rates.

Conclusion

The PSO Program addresses a clearly-identified and potentially significant problem. Namely, market failures leading to the disposal of a hazardous product in a way that could have adverse impacts on human health and the environment.

The use of an advance recycling fee seems appropriate, given the technical feasibility to readily process oil for reuse, the adverse consequences of otherwise disposing of waste oil, and that levying a fee at the time of disposal/recycling would encourage inappropriate disposal.

The choice of regulation also seems appropriate. There is not a strong case for a voluntary or co-regulatory approach. This is because existing industry bodies lack adequate coverage and resources, there is a high risk of harm, and there has been a long history of oil not being disposed of appropriately (Allen Consulting Group 2004).

3 *Product Stewardship (Oil) Act 2000* (Cwlth), ss.35–36.

The DEH (sub. 103) noted the Program had been effective in significantly increasing oil recycling. In 2004-05, over 220 million litres of used oil was recycled, representing about 80 per cent of potentially-recoverable used oil.

However, the administrative arrangements for the Program appear complex and the recycling subsidies introduce a distortion into the market for recycled oil. As noted above, an evaluation of the Program recommended a shift away from relying on the customs and excise system when the Program is next evaluated (Allen Consulting Group 2004). The evaluation also recommended the subsidy for high-grade burning oil be raised relative to that for lube-to-lube oil. The DEH (sub. DR214) rejected this recommendation because it considered the evidence used was not valid. The Commission has not formulated its own recommendation on this matter because it is beyond the terms of reference for this inquiry, but notes the subsidies should be based on the externalities avoided, not 'infant-industry' arguments or favouring particular industries in a manner suggested by the waste hierarchy (chapter 7).

C.2 Consumer packaging

In 1999, Australia adopted a stewardship scheme for consumer packaging based on co-regulation. The scheme has two elements:

- The National Packaging Covenant — an agreement between governments and firms — specifies the self-regulation component of the scheme.
- The National Environment Protection (Used Packaging Materials) Measure (NEPM) specifies the supporting government regulation, which is implemented by individual states and territories.

A common criticism of the arrangements introduced in 1999 was the lack of consistent performance measurement by affected parties (DEH, sub. 103; Local Government and Shires Associations of New South Wales, sub. 98; Municipal Association of Victoria, sub. 113; National Packaging Covenant Industry Association, sub. 92). Hence, little quantitative evidence exists about the scheme's overall effectiveness or net benefit to the community.

Various qualitative evaluations of the Covenant have been conducted (Boomerang Alliance 2004; ISF 2004; Lovell and Wilson 2004; Meinhardt Infrastructure and Environment 2004; Nolan-ITU 2004a; Perchard 2005). However, their usefulness was constrained by an inability to objectively weigh different pieces of information (DEH, sub. 103).

The most extensive evaluation was conducted by Nolan-ITU (2004a). It reviewed actions by 54 Covenant signatories and conducted interviews, surveys and workshops with a range of interested parties. It concluded the achievements of individual firms varied, ranging from 'very little' to 'substantive improvements'.

Another major criticism of the arrangements introduced in 1999 was that a large proportion of packaging waste — so-called away-from-home waste — was not covered. Some parties — particularly local governments — were also critical of the relatively small funding commitment firms made to collecting and processing packaging waste (for example, Boomerang Alliance 2004; ISF 2004; Meinhardt Infrastructure and Environment 2004).

The revised Covenant and NEPM

In 2005, the packaging stewardship scheme was revised to address some of the above criticisms. Key changes were the introduction of more consistent data-reporting requirements, and the inclusion of packaging waste occurring away from homes and workplaces. As a result, the Covenant now sets three 'overarching targets' (detailed in chapter 10).

The supporting NEPM requires parties that are not Covenant signatories to ensure the collection of their packaging and its reuse, recycling and/or energy recovery. The extent to which this is required is supposed to reflect the material-specific targets in the Covenant. Individual jurisdictions have the option of recovering collection costs from non-signatories, who have to keep detailed records on their activities. The NEPM also requires local governments to provide data on their recovery activities, including the weight of recyclable materials collected.

Action plans and annual reporting requirements

Covenant signatories have to produce action plans specifying what actions they will take, the key performance indicators used to measure their accomplishments, and the baseline data and targets they will use. All signatories have to report annually on their performance.

The annual reporting requirements are very detailed and are likely to be costly to comply with (table C.2). Individual firms are required to report on matters including the weight of packaging they have sold, the energy and water used to produce packaging, and the proportion of packaging manufactured from recycled material. Firms also have to implement the Environmental Code of Practice for Packaging, which is incorporated as a schedule to the Covenant.

Table C.2 **Annual reporting requirements of the National Packaging Covenant**

Performance indicator	Parties required to collect and report data			
	Firms	*State & Territory Govts*	*Local govts*	*Other*[a]
1. Total weight of consumer packaging (domestic and imported) sold per annum into the Australian market and the total weight of products packaged	✓			
2. Resources (energy and water) used to produce packaging	✓			
3. Improvements in design, manufacture, marketing and distribution to minimise the environmental impacts of packaging	✓			
4. Changes to protection, safety, hygiene, shelf-life or supply chain considerations affecting amount and type of packaging used	✓			
5. Average percentage per annum of post-consumer recycled content in packaging manufactured	✓			
6. Total weight, by type, of 'non-recyclable' packaging sold per annum into the Australian market	✓			
7. Total weight of consumer packaging disposed to landfill				NPCC
8. Consumer packaging as a percentage by weight of total waste and relative to other waste stream components		✓	✓	
9. Total weight of consumer packaging recycled through (a) domestic and (b) away-from-home recovery systems	✓		✓	
10. Total weight of recycled consumer packaging sold to end users	✓			
11. Number of Councils operating according to good practice collection principles and state-based benchmarks		✓	✓	
12. Percentage of households with access to kerbside collection systems			✓	
13. Percentage of households with access to other domestic collection systems			✓	
14. Number of commercial and industrial premises with packaging recycling collection systems	✓			NPCC

(Continued on next page)

Table C.2 (continued)

Performance indicator	Parties required to collect and report data			
	Firms	*State & Territory Govts*	*Local govts*	*Other*[a]
15. Percentage of councils and government agencies providing public-place recycling infrastructure		✓	✓	
16. Provision of recycling collection facilities for post-consumer packaging generated on-site	✓	✓	✓	
17. Amount and type of consumer packaging in the litter stream		✓		
18. Contamination rates in consumer packaging recovery systems (for example, kerbside, events, venues, public places and workplaces)	✓	✓	✓	
19. Improvements in consumer knowledge about the functional attributes of packaging, including recyclability/reuse	✓			NPG
20. Improvements in littering behaviour		✓	✓	NPCIA
21. Estimated tonnage of consumer packaging (a) recycled and (b) sent to landfill from on-site collection facilities	✓	✓	✓	
22. Formal adoption of the Environmental Code of Practice for Packaging (Schedule 5 of the National Packaging Covenant) and development of systems for its implementation	✓			NPCC
23. Application of Covenant compliance procedures by the NPCC to identify non-complying signatories				NPCC
24. Implementation of NEPM procedures by jurisdictions		✓		
25. Enforcement of the NEPM to 'free-riders' and non-complying Covenant signatories		✓		
26. Implementation of 'buy recycled' purchasing policy or practices	✓	✓	✓	
27. Establishment of baseline performance data	✓	✓	✓	
28. Annual reporting against action plan	✓	✓	✓	
29. Demonstrated improvement and achievements against individual targets and milestones	✓	✓	✓	

[a] NPCC refers to the National Packaging Covenant Council; NPCIA refers to the National Packaging Covenant Industry Association; and NPG refers to the National Projects Group.

Source: NPCC (2005).

As noted previously, the packaging NEPM requires local governments to provide detailed data on their recovery activities, including the weight of recyclable materials collected. The Municipal Association of Victoria (sub. 113) noted this can place a significant burden on the staff of some municipalities, particularly in rural areas.

Administrative and funding arrangements

The Covenant is managed by the National Packaging Covenant Council (NPCC), which includes representatives from government and industry. Signatories' action plans and annual reports are lodged with the NPCC, which can audit the action plans. The NPCC publishes its own annual report on progress toward reaching the overarching targets, using the 29 performance indicators listed in table C.2.

There is matched funding by government and industry for Covenant administration and projects. This cannot be used to subsidise waste collection costs, but can fund development of collection services.

Administration of the Covenant is budgeted at $750 000 per annum, funded by matched contributions from industry and government. Overall, firms have committed to providing a minimum of $3 million per annum for Covenant administration and projects. Their contributions are paid via the National Packaging Covenant Industry Association, with contributions from individual firms based on their turnover and sector.

Local governments remain very critical of the Covenant's funding arrangements, noting the relatively small contribution firms make to funding the collection and processing of packaging waste (ALGA 2006; Southern Sydney Regional Organisation of Councils, sub. 84).

Conclusion

As detailed in chapter 10, the Commission considers the case for the National Packaging Covenant and supporting NEPM has not been substantiated by policy makers. The Commission has, therefore, recommended that a review of the National Packaging Covenant scheduled for 2008 be expanded by the Australian Government beyond an assessment of effectiveness. In particular, the review should include an independent investigation of whether sufficient evidence exists to justify the scheme. Such a review should be independent, draw on objective and scientific evidence about the consequences of landfilling or creating energy from packaging waste, and consider all costs and benefits.

C.3 Newsprint

Since 1992, Australia has had a stewardship scheme for used newsprint. The scheme is based on a voluntary agreement that is essentially negotiated between firms without government involvement. However, governments do participate to a small degree via the Environment Protection and Heritage Council (EPHC).

Historical background

The origins of the scheme can be traced back to the early 1990s, when Australia's sole newsprint manufacturer — Australian Newsprint Mills (jointly owned by News Limited and Fletcher Challenge) — decided to invest in a plant at Albury to recycle old newspapers.

The manufacturer decided to negotiate an agreement with Australia's major publishers to ensure increased collection of used newspapers and magazines, and to provide a viable market for its recycled newsprint.

The publishers are represented by an industry body — the Publishers National Environment Bureau (PNEB) — whose members are:

- ACP Publishing
- APN Newspapers
- Independent Print Media Group
- John Fairfax Holdings
- Marinya Media (Rural Press Limited)
- News Limited
- Pacific Magazines
- PMP Limited
- West Australian Newspapers (PNEB, sub. 2).

In 1992, an Industry Waste Reduction Agreement was made under processes established by the then Australian and New Zealand Environment Conservation Council, an intergovernmental body. A key feature of the agreement was a newsprint recycling target of at least 40 per cent by 1995.

The agreement underpinning the newsprint stewardship scheme has subsequently been renegotiated three times. The second agreement operated from 1996 to 2000, the third agreement from 2001 to 2005, and the fourth (current) agreement applies from 2006 to 2010.

There has also been a change in ownership of the newsprint manufacturer, which is now owned by Norske Skog Australasia.

The current agreement

The current newsprint agreement — titled the National Environmental Sustainability Plan (Newspapers) 2006–2010 — is endorsed by the EPHC and sets three targets (box C.1). Norske Skog and PNEB have jointly committed to reporting annually on progress towards reaching these targets.

> Box C.1 **Targets in Australia's newsprint stewardship agreement**
>
> The stewardship agreement for newsprint sets three targets to be achieved by 2010:
>
> 1. Recover 76 per cent of newsprint consumed annually in Australia.
> 2. Remove 250 000 tonnes annually of publication grade paper from the waste stream (includes printing waste and unsold publications).
> 3. Meet other sustainability targets, subject to technical and financial constraints:
>   - (a) recycle aluminium printing plates;
>   - (b) reuse or recycle cardboard and paper packaging;
>   - (c) negotiate with computer manufacturers to dispose or recycle old computers at time of replacement;
>   - (d) purchase recycled office paper and recycle used office paper;
>   - (e) reuse or recycle waste oil;
>   - (f) recycle photographic film;
>   - (g) recycle plastic wrapping film;
>   - (h) reuse or recycle waste printing ink; and
>   - (i) recycle toner cartridges.
>
> *Source*: Newsprint Producer and Publisher Group (2005).

Norske Skog supports the collection of used newsprint by entering into long-term contracts that provide guaranteed prices and quantities to local governments and other collectors (Kelett 2002). Newsprint Producer and Publisher Group (2005) noted that Norske Skog planned to increase the capacity of its Albury plant and this would in turn raise the volume of used newsprint it would seek to obtain from collectors.

The major publishers have supported Norske Skog's recycling plant at Albury by specifying the use of recycled fibre in their newsprint contracts. These contracts have an unusually long duration (10 years) compared to those used in other countries (PNEB, sub. DR137). In addition, the major publishers created an Interim Support Fund that provided $6 million for projects that increased the collection and recycling of used newsprint. In the latest stewardship agreement, the publishers have committed to donating $1 million worth of free advertising annually to 2010 in their publications for the promotion of newsprint recycling. They also plan to encourage recycling by providing free educational materials to schools and local governments, running competitions, and maintaining a website (Newsprint Producer and Publisher Group 2005).

Potential benefits

If newsprint is collected in a clean and dry condition, it can be recycled repeatedly into new newsprint, provided that some virgin material is also used to maintain quality. Used newsprint can also be used in the manufacture of cardboard and other paperboard, coating on plaster sheeting for housing and construction, egg cartons, home insulation and cat litter (Newsprint Producer and Publisher Group 2005).

Using recycled newspapers and magazines to produce newsprint can increase its tensile strength and opacity. This enables the production of lighter and thinner paper without a reduction in quality. The reduced weight and thickness reduces transport, handling and printing costs, and leads to less wrapper and roll waste (Newsprint Producer and Publisher Group 2005).

The executive director of PNEB has noted, however, that newspaper recycling *does not* reduce the number of trees cut down for harvesting:

> … forget the old line about how many trees it takes to make a given newspaper or magazine or emotive offerings like how much rainforest is destroyed to produce a Saturday edition of your local paper.
>
> Let me set the record straight: The material used in newsprint manufacture in Australia is a byproduct from the production of timber. Plantation pine forests are thinned to allow the best trees to grow large enough to be turned into timber for housing and construction.
>
> These thinnings lie rotting in the forest unless the newsprint manufacturer — the scavenger of the forests — collects them. Sawmill waste can be used for newsprint too.
>
> No old growth eucalypt is used in newsprint manufacture. (Kelett 2002, p. 4)

Rather, he identified the environmental benefits from newsprint recycling as being less greenhouse gas emissions and reduced landfilling of waste:

> How does recycling newspapers and magazines help the environment?
>
> Producing pulp for paper making through de-inking creates less greenhouse gas because de-inking paper uses one-sixth of the energy of pulping wood.

> It reduces pressure on landfill. … at the start of 1990, 72 per cent of newsprint used in Australia went to landfill, now 72 per cent is collected for recycling. (Kelett 2002, pp. 3–4)

However, the Commission considers that reduced use of landfills is not an environmental benefit *per se*.

Conclusion

The newsprint scheme appears to have been very effective in achieving its goal of increased recycling. The rate of newspaper recycling increased from 28 per cent in 1989 to 75 per cent in 2004 (Newsprint Producer and Publisher Group 2005). PNEB (sub. 2) claimed Australia now recycles more newsprint than any other country.

There is little information available about the benefits and costs of the scheme. However, the scheme sets targets that appear to be arbitrary, rather than being based on robust evidence of a net benefit. The third (sustainability) target seems only remotely relevant to the primary purpose of the scheme — to support a market for recycled newsprint.

PNEB acknowledged key benefits from the newsprint scheme were those to the industry from increased product quality and lower ink use:

> Quality of Australian-made newsprint contained recycled fibre is superior to newsprint made from all virgin fibre in calliper (thickness), finish, opacity and show through. Price is the same, making Australian recycled content newsprint a clear choice for publishers regardless of the environmental benefits of landfill avoidance and energy conservation. Also, recycled content paper uses less ink because of the smoother finish; another economic benefit. (sub. DR137, p. 2)

It is doubtful the environmental benefits are very significant from a waste management perspective. Newsprint is not a hazardous waste, and so its disposal in landfills seems unlikely to have major adverse impacts. The other environmental benefit the PNEB has noted — reduced greenhouse gas emissions due to lower energy consumption — might eventually be more efficiently achieved by broader policy instruments operated at the national level.

Nevertheless, the Commission considers that the newsprint stewardship scheme has been worthwhile. The scheme has been effective in increasing recycling and, given it is essentially a private arrangement entered into by a handful of large firms, it appears to have delivered net benefits.

D EPHC National Waste Framework

The Environment Protection and Heritage Council (EPHC) ('the Council') National Waste Framework was included as an attachment to the Department of the Environment and Heritage's submission to this inquiry (sub. 103). It is reproduced here and discussed in chapter 6.[1]

1. Goal

To assist EPHC achieve its goal to protect and manage Australia's environment and its natural and cultural heritage by identifying and addressing waste management issues of national importance.

2. Objective

To establish a systematic framework to determine waste issues upon which national collaboration would be appropriate. The framework will be used by all jurisdictions in developing proposals for EPHC action.

3. Defining Waste Issues

A crucial first step in determining whether a waste issue requires national action is to clearly define and characterise the issue. Factors to consider in characterising the issue include:

- environmental, economic and social drivers
  - volume and toxicity of the waste
  - risks to human health
  - resource use efficiency
  - people affected
  - current costs, who is bearing them
  - potential cost of addressing the issue

[1] In the Department of the Environment and Heritage's submission, the framework was accompanied by a table of policy instruments. That table has not been reproduced here.

- actual and potential environmental impacts
  – quantified where possible
  – whether a precautionary approach is justified
- timeframe across which the issue operates, including recovery time
- geographical context, locations affected
- existing frameworks
  – applicability
  – barriers to resolving issue through these
- research needs
- identification of stakeholders.

In addition, variation in all these factors across jurisdictions should be identified and noted.

4. Filter Criteria

The standard filter criteria, tailored to waste issues, are set out below, and in diagrammatic form in box D.1.

What is the significance of the problem?

Consider:

- severity of environmental/health risks
- degree of risk of continuance or reoccurrence
- potential for resource recovery
- downstream consequences (benefits and costs)
  – of the issue
  – of unilateral action
  – of bilateral action
  – of multilateral action
  – of national action.

If the waste issue affects a limited area, risks are low and consequences are limited, it may be best resolved by individual jurisdictions or bilateral arrangements. If the issue affects a broad area, risks are high and consequences substantial, a national approach may be considered in light of the other criteria (see questions below).

What is the extent of the issue or market?

Consider:

- geographic range (which jurisdictions are affected? to what extent?)
- local (e.g. area or state/territory specific) issues or market
- statutory differences between jurisdictions (eg regional environment, land-use, industry)
- trans-boundary (including downstream) impacts
- international impacts
- priority of issue in different jurisdictions.

If on the basis of consideration of the above the issue is localised, varies greatly across jurisdictions, has limited trans-boundary impacts and is generally of low priority, it may be best resolved by individual jurisdictions or bilateral arrangements. If the issue is of international or national significance and generally of high priority, a national approach should be considered in light of the other criteria (see questions below).

Is there a role for Government intervention?

Consider:

- what is the need for government intervention?
  - protection of the environment
  - advancing public good
  - protecting public health and safety
  - market failure — identify and justify intervention
- are existing legal and policy settings adequate?
  - international treaties and agreements
  - national laws, policy framework
  - state and territory laws and policies
- consequences of government inaction.

If industry, community and market forces are unable to resolve the issue then government can play a beneficial role. If the issue is adequately addressed through existing arrangements, no further action may be required. If existing arrangements are inadequate, consequences of inaction are significant, and the scale and scope support national action, a national approach should be considered in light of the other criteria – see questions below.

Are there benefits from national action?

Consider:

- existing laws, policies and programs
  - scope
  - effectiveness
  - gaps
- would national action duplicate or undermine existing state / Commonwealth / national arrangements?
- what are the benefits to Government, industry and the community from national consistency?
- is a national approach cost effectiveness for all jurisdictions?
- what are the relative cost and benefits of other ways to get the same or better outcomes?

If national action would duplicate or undermine existing effective arrangements or if alternative approaches would generate greater benefits with fewer costs, the issue may be best resolved by individual jurisdictions. If existing arrangements are ineffective or could be strengthened through national consistency, and a national approach is cost effective, a national approach should be considered in light of the other criteria — see questions below.

Who has the powers, responsibilities and influence?

Consider:

- benefits of uni/bilateral vs. national approach
- role of the National Environment Protection Council (NEPC) in regulatory solutions
- Commonwealth powers in external affairs, trade and tax
- state and territory roles in implementation and enforcement of national and international agreements
- Commonwealth role as facilitator, including working with national industry bodies

- roles of different spheres of government
- level of enforcement required
- other ways the issue could be addressed
- potential tools (see section 6)
- issue should be led by the jurisdiction(s) with primary interest.

Different policy tools and approaches are available to address waste issues. Powers and responsibilities play an important role in determining which tool is most appropriate in a particular case — see Part 6 below.

5. Prioritisation

Only the most important issues, which will generate the highest environmental benefit from national cooperation, should be referred to the Environment Protection and Heritage Standing Committee (‘the Standing Committee’) and Council for consideration. The primary considerations in assessing priority are:

- significance of impact or harm
- analysis of the cost and associated benefits of any action
- the level of social and community concerns.

6. Potential Tools

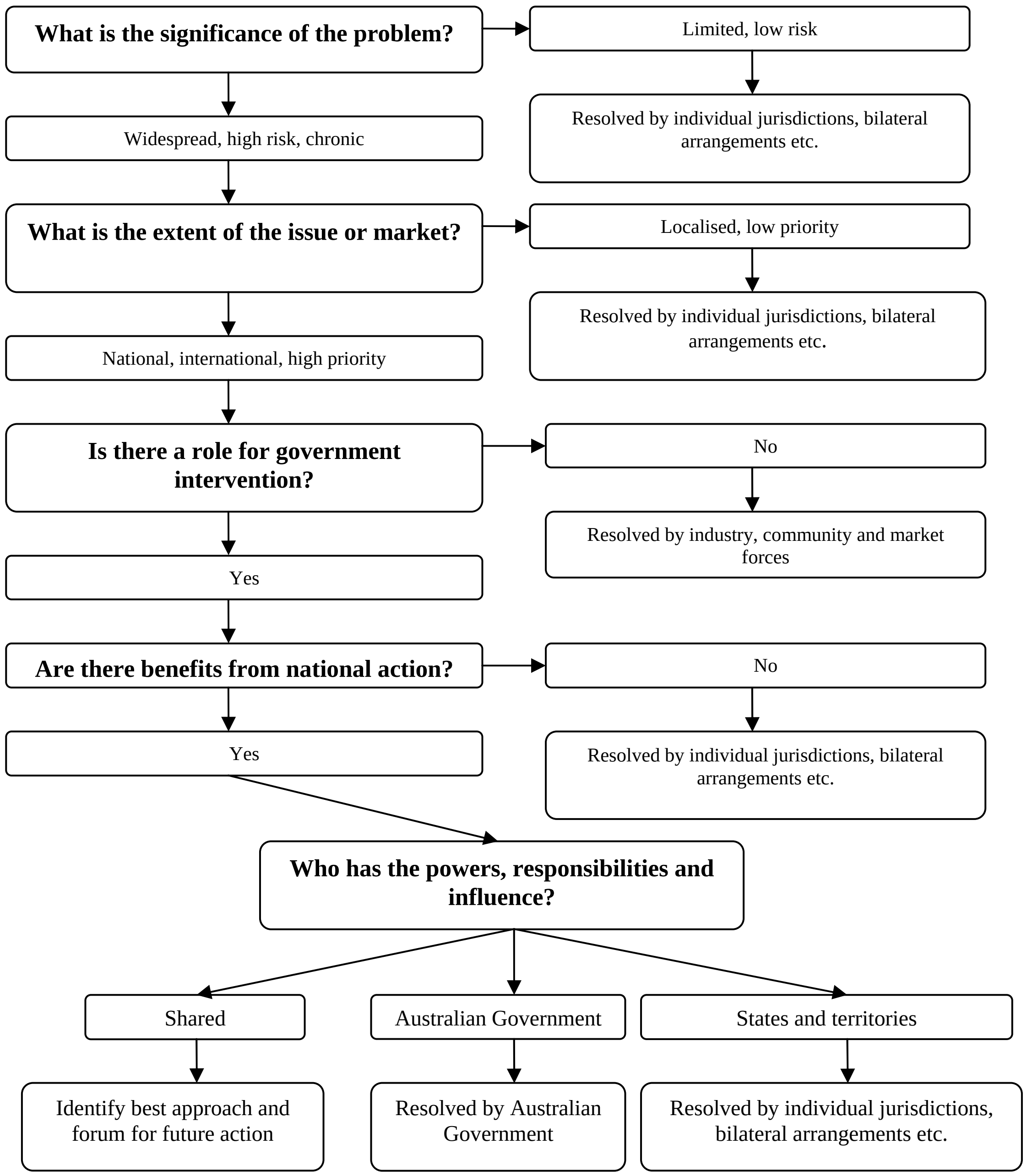
When developing proposals for EPHC action on national waste management issues, jurisdictions should consider and evaluate a range of different policy tools so the tool most suited to addressing the issue is identified and recommended. Options and approaches outside the EPHC/NEPC framework, including informal cooperation, should also be considered. In evaluating potential tools, jurisdictions should:

- recall the scope and scale of the issue
- recall the distribution of powers and responsibilities
- identify stakeholders
- identify capacity of government and industry
- identify (and quantify, where possible) the direct and indirect consequences of the different tools
- consider appropriate evaluation mechanisms.

7. Recommendation to Standing Committee / Council

The waste framework should be applied to all waste issues proposed for Standing Committee and Council consideration. All jurisdictions should be notified and endeavour to meet to discuss the application of the waste framework to a particular waste issue prior to it being put on the Standing Committee and/or Council agenda.

Box D.1 **EPHC waste filter criteria flowchart**



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