



Waste Avoidance and  
Resource Recovery  
Strategy

2003

RESOURCE<sup>NSW</sup>

# RESOURCE<sup>NSW</sup>

strategy@resource.nsw.gov.au  
www.resource.nsw.gov.au  
ISBN 0-9580364-4-6

## HEAD OFFICE

Level 2  
1 Fitzwilliam St  
Parramatta NSW 2150

PO Box 644  
Parramatta NSW 2124

Switchboard: 02 8837 6000

## CENTRAL COAST

Building 19  
Mount Penang Parklands  
Pacific Hwy  
Kariong NSW 2250

Phone: 02 4340 5822

## HUNTER

99 Broadmeadow Road  
Broadmeadow NSW 2292

Phone: 02 4940 0400

## ILLAWARRA

14/51 Baan Baan Street  
Dapto NSW 2530

Phone: 02 4262 2200

## SOUTH EAST

12 Rutledge St  
Queanbeyan ACT 2602

Ph: 02 6232 9930

## Disclaimer

Resource NSW has made all reasonable efforts to ensure that the contents of this draft NSW Waste Avoidance and Resource Recovery Strategy are factual and free of error. However, Resource NSW shall not be liable for any damage or loss which may occur in relation to any person taking action or not on the basis of this document.

## The NSW Waste Avoidance and Resource Recovery Strategy 2003

The *Waste Avoidance and Resource Recovery Act 2001* consolidates the best principles of the previous *Waste Minimisation and Management Act 1995* and clearly reflects the community's view that waste must be treated as a resource. It provides a clear sense of purpose to reduce the waste we generate, optimise the recovery of useable resources from waste and manage residual wastes in an environmentally responsible way.

The new Act reinforces the importance of waste avoidance as our primary goal. The choice of resource recovery options, which include re-use, reprocessing and energy production are all based on an assessment of environmental, economic, geographic and social factors. Disposal remains an unattractive final resort.

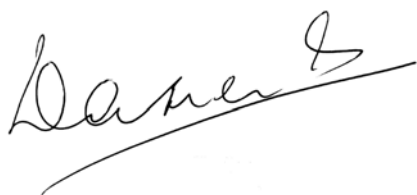
Resource NSW is a state government agency created under the Act. Its function is to develop a framework and support implementation of state-wide, regional and local programs to avoid waste and recover resources.

Under the legislation, an initial task for Resource NSW has been to develop a state-wide Strategy for Waste Avoidance and Resource Recovery, which is subject to bi-annual review

The Strategy has benefited from the input from industry, local government, individuals, environment and community groups and state government agencies. This has helped to establish a framework which will maintain NSW at the cutting edge of waste avoidance.

The Strategy sets out 'where we are now' and 'where we want to be in the future' and the challenges we face to get there. The targets and action agenda set out in the Strategy are both realistic and visionary. They reflect Australian and international best practices and performance.

Success through partnership is the cornerstone of this Strategy which builds on the existing efforts and successes that many in the community have worked hard to achieve. We can achieve much more and the actions in the Strategy provide guidance about where the greatest gains may be made.

A handwritten signature in black ink, appearing to read 'David Harley', with a long horizontal line extending from the end of the signature.

David Harley

Chairman, Resource NSW Board

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# 1 Executive Summary

## Background to the strategy

Resource NSW is a state government agency created in October 2001 under the *Waste Avoidance and Resource Recovery Act 2001*. Its purpose is to develop a framework and to support implementation of statewide, regional and local programs to avoid waste and recover resources. An initial task for Resource NSW has been to develop a statewide Strategy.

The Waste Avoidance and Resource Recovery Strategy is a first for Australia. NSW is the first state to develop targets for waste avoidance and resource recovery and a framework for action. The Strategy is broadly supported by industry, community groups, environment groups, individuals and state and local governments, all of whom have expressed a commitment to working together to achieve its goals.

The Strategy is designed to guide all sectors – to help them identify priorities for action and opportunities for partnerships. It will also enable policy and priority setting and delivery of a more coordinated approach across government and industry at all levels.

The Strategy is about products and materials that are commonly called “waste” by the community and which are often disposed of to landfill. Our challenge is to prevent waste and turn the wastes we can’t avoid into one of the most important and sought after raw materials of the 21st century in accordance with the principles of ecologically sustainable development.

Resource NSW received over 75 submissions on the draft Strategy released in September 2002. These provided valuable feedback, which has helped refine a number of areas in the Strategy and produce a more user-friendly document.

The targets and actions in this Strategy have been endorsed by the NSW Government.

The Strategy is, however, a living document and it is recognised that a great deal of work remains to be done to fill in the details about how we will implement specific actions and who will take key roles and responsibility to deliver these. Many of the suggestions received on the draft Strategy related to this next phase of developing a detailed implementation plan. These will be incorporated as we commence this process during 2003.

## 1.1 Vision and principles

The Strategy is based on some important principles, which must guide our actions.

- Sustainability
- Economic benefits for NSW
- No “one-fit” solutions
- Guided by outcomes
- Partnership based approaches
- Local solutions
- Whole of lifecycle information
- Improvement of existing systems
- Community involvement in decision making
- Integrated framework

The Strategy is written to reflect the current regulatory and legislative context within NSW and recent inquiries and reports which have contributed to our understanding of the challenges we face. It also acknowledges our national and international obligations and the potential for new national approaches, particularly product stewardship and Extended Producer Responsibility approaches given the increasing national operational focus of business.

The Strategy is also designed to help us see waste in the context of the life cycle of goods and materials. The life cycle includes extraction, manufacturing, distribution, consumption and recovery for reprocessing or disposal. At every step along this chain, we can take action to avoid and prevent waste.

## 1.2 Our challenge

Over 6 million tonnes of waste was disposed of to landfill in NSW in 2000 and even though we have reduced waste and increased our recycling in many areas, we continue to face an enormous challenge. This challenge is reflected worldwide where increased economic activity is almost always mirrored by increased waste generation.

The Strategy identifies four key areas where we must achieve outcomes.

These are:

- Avoiding and preventing waste.
- Increased use of renewable and recovered materials.
- Reducing toxicity in products and materials.
- Reducing litter and illegal dumping.

Broad targets are proposed for each outcome area. These are shown in the following table. They are global targets which no single sector or group can deliver on its own. They rely on each individual, organisation, region or sector identifying the specific contribution which they can make to help achieve them.

Outcome area	Target
<b>Preventing and avoiding waste</b>	To hold level the total waste generated for the next 5 years
<b>Increased recovery and use of secondary resources</b>	By 2014, to: Increase recovery and utilisation of materials from municipal sector from the current 26% to 66% Increase recovery and utilisation of materials from the commercial & industrial sector from the current 28% to 63% Increase recovery and utilisation of materials from the construction & demolition sector from the current 65% to 76%.
<b>Reducing toxic substances in products and materials</b>	By 2014 or earlier: To phase out priority substances in identified products as a first choice or if not possible to achieve maximum recovery for re-use and; where identified products containing these priority substances require disposal as a last resort, the permitted "leachability" of the substances will be reduced to the levels that are permitted for inert waste.
<b>Reducing litter and illegal dumping</b>	Reduce total volume and tonnages of litter reported annually. Reduction in total tonnages of illegally dumped material reported by regulatory agencies and Regional Illegal Dumping (RID) squads annually.

*Table 1: Broad targets for each outcome area*

The **prevention of waste** target aims to hold waste generation level for the next five years. This means that in five years time, we are aiming to be generating no more waste than we were in 2000, even taking into account a projected population growth of around 1% per year and economic growth of around 2.5% per year.

This target will be challenging but it will also provide us with the time we need to prepare and activate a detailed Waste Prevention Strategy that will aim to reduce future generation rates instead of simply holding them steady. Resource NSW will develop this Strategy in close consultation with councils, industry and the community during 2003.

The **resource recovery targets** adopted in this Strategy are the Aggressive Resource Recovery targets proposed by Tony Wright in the *Independent Public Assessment – Landfill Capacity and Demand*. Based on Wright Scenario 7, we will aim to achieve these targets over the next 12 years.<sup>1</sup> This means we need to increase our recovery levels according to the table on the following page:

<sup>1</sup> Wright 2000. Scheme 7 estimates 6-year intervals to move from our current situation to the improved scenario and then a further 6 years from improved to the aggressive scenario.

Stream	Current resource recovery	Aggressive scenario recovery (by 2014)
Municipal	26%	66%
C & I	28%	63%
C & D	65%	76%

*Table 2. Resource Recovery Targets*

**The reduction of potentially toxic substances target** is important as small amounts can cause serious and ongoing environmental damage. Specifically, we are aiming to phase out priority substances in identified products as a first choice. If this is not possible, we need to achieve maximum recovery for re-use, and where identified products containing these priority substances require disposal as a last resort, the permitted "leachability" of the substances will be reduced to the levels that are permitted<sup>2</sup> for inert waste.

Initially, we will be focussing on a small number of priority substances, particularly those which, if mixed in with other wastes, potentially block or limit the recovery and recycling of the whole stream. These will be established through robust research managed by a cross sectoral steering group.

**Less litter and illegal dumping** does not have a quantitative target since an accurate picture of the amounts of litter and illegal dumping is not yet available. The EPA will shortly be releasing a methodology for measuring and reporting on the amount of litter we create. This will be used to benchmark our current performance and establish targets. We also need to do further work on measuring illegal dumping and measuring the effectiveness of the various strategies to tackle litter and illegal dumping.

**Development of material or sector sub targets** relating to specific participants in the system are also proposed. These sub-targets will help to provide momentum and will provide shorter-term milestones for us to work to achieve as we head towards the big picture targets by 2014. The sub targets will also provide a focus for action for those working in particular sectors eg retailers, manufacturers, government agencies or producing or generating particular products or materials eg office paper, food wastes, asphalt.

Resource NSW will be working with key participants including industry sectors and associations, councils, government agencies and community groups to develop a range of sub targets during 2003.

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<sup>2</sup> As published by the EPA



### 1.3 A partnership approach

Those who will be working together to achieve the outcomes and targets identified in the Strategy include:

- State government agencies, particularly Resource NSW, the Environment Protection Authority and Planning NSW
- Local councils
- Business, including retail and manufacture
- Waste & recycling industry
- Householders
- Consumers
- Industry associations
- Community / non-government organizations
- Education providers.

### 1.4 Actions to achieve our targets

Whole of system actions

A number of key actions will impact on waste avoidance and resource recovery across the whole system and influence each of the four outcome areas. They will need support and input from every part of the system and will be coordinated by Resource NSW. Key groups will also be involved on an ongoing basis in implementation and delivery.

These actions are:

- Develop a Strategy Implementation Plan that details programs, budgets, milestones and responsibilities under each outcome area in the Strategy in collaboration with key participants.
- Develop a Waste Prevention Strategy over the next 12 months as a companion document to this Strategy. It will identify a methodology for measuring amounts of waste prevented, specific targets for key sectors and materials, where appropriate, and detailed actions needed to achieve these.
- Establish whole of supply chain monitoring and reporting.
- Initiate whole of system product stewardship initiatives to prevent waste, recover resources, phase out identified toxic substances and reduce litter and illegal dumping.
- Establish a cross-sectoral group to oversee research to establish the most potentially harmful contaminants in commercial and industrial, building and demolition and household hazardous waste. Use this research to identify priority substances.
- Establish a NSW Litter and Illegal Dumping Action Alliance.
- Establish a coordinated, statewide education strategy to support waste avoidance and resource recovery which involves and integrates the efforts of education

providers from formal education institutions with programs run through councils, other state government organisations, individual companies, industry associations, ethnic and other community organisations. This strategy will be consistent with the NSW Environmental Education Plan 2002-05, recently endorsed by the Government.

Action opportunities for materials and specific parts of the system

The Strategy also identifies many actions which can be taken by people in every part of the materials flow system and identifies sectors, products and materials where there are substantial opportunities for action to achieve positive change.

Achieving change in each of the system areas will not usually be able to be achieved solely by the key players in that area. Cooperation and partnerships will be needed across industry, state and local government and the community.

## 1.5 Monitoring and reporting progress

The Strategy will be reviewed every two years and an annual progress report will be released.

## 2 The Strategy in context

### Development of this strategy

The development of a NSW Strategy to avoid waste and recover resources is a requirement under the *Waste Avoidance and Resource Recovery Act 2001 (WARR Act)*. The Strategy was developed by Resource NSW in accordance with section (12) of the Act and has been based on broad consultation with the NSW community. A list of people who provided input into its development is provided in Appendix 2.

Resource NSW received over 75 submissions on the draft Strategy released in September 2002. These provided valuable feedback which has helped refine a number of areas in the Strategy and produce a more user-friendly document.

The targets and actions in this Strategy have been endorsed by the NSW Government.

The Strategy is, however, a living document and it is recognised that a great deal of work remains to be done to fill in the details about how we will implement specific actions and who will take key roles and responsibility to deliver these. Many of the suggestions received on the draft Strategy related to this next phase of developing a detailed implementation plan. These will be incorporated as we commence this process during 2003.

Resource NSW will have the responsibility for coordinating key initiatives identified in this Strategy in collaboration with all of those groups who have a role to play in driving waste avoidance and resource recovery in NSW. Resource NSW will also use the next 12 months to work in partnership with key sectors to develop an implementation plan with priority actions. This plan will include roles, responsibilities and milestones for delivery.

The Strategy will be reviewed every two years and an annual progress report will be released.

### 2.1 Our focus

This Strategy is about products and materials that are commonly called “waste” by the community but which we must see in a new light, as resources which we can re-use. It is a strategy that applies to everyone – as individuals, householders, employees, producers of goods and services, retailers, educators and government.

Our collective challenge is to prevent and avoid the creation of waste by “smarter” product and process design and by recovering used products and materials, re-using them for other purposes to keep them in the materials cycle.

The *Waste Avoidance and Resource Recovery Act 2001* does not restrict the range of products or materials that it deals with. This first Strategy takes advantage of the growing momentum over the past decade to avoid waste and recover materials that, if not recovered, would be disposed of to putrescible and inert waste landfills. These could be solid or liquid and are generated by households, commerce and industry, state and local governments and the building and demolition sector.

This momentum has been driven by the efforts and initiatives of the community, local councils, schools, individual industries and businesses, industry associations and state and national

governments. We can build on this work and realise the potential in these sectors to achieve substantial increases in waste avoidance activities, recovery and re-use.

As we make further progress in these sectors, and as our technology and experience continues to grow, there will be increasing opportunities for systems and practices to incorporate materials from other sources. Options and timing for extending the Strategy to address other materials and sectors will be reviewed as progress is made towards the goals and targets identified in this Strategy.

## 2.2 Why “waste” matters

We live in a world where expanding population puts increasing pressure on our natural environment and its finite resources. As standards of living improve in both developed and developing countries, we are encouraged to consume more goods and materials.

As a community, we are at a critical decision point where we need to make a conscious decision – to either keep on using our resources at an ever increasing rate and lock ourselves into the need for increasing numbers of landfills to dispose of the waste we create, or to change our attitudes, technologies, practices and actions to refocus on avoiding waste and using our resources better.

Waste per se is harmful for the economy, for the environment and for our health. It generates greenhouse gases, liquids (leachate) that pollute waterways and causes air pollution. Improper waste protocols lead to inefficient use of materials and processes and create unnecessary costs for business. This can cost jobs and affect our international competitiveness. We must take urgent action to restore our environment and ensure we don't continue to do wide scale damage.

Our challenge is to prevent waste and turn the wastes we can't avoid into one of the most important and sought after raw materials of the 21<sup>st</sup> century.

## 2.3 Vision and principles

We want to create a community in NSW which, between now and 2014, fundamentally changes its attitudes and actions that until now have created waste and unnecessarily squandered our precious natural resources.

To achieve this, we will be guided by the principles set out in the legislation and other general principles that are accepted nationally and internationally.

### Sustainability

The systems and practices implemented by all sectors of the community must contribute to ecologically sustainable development at local, state, national and global levels. They should deliver optimum outcomes that are sustainable in environmental, economic and social terms.

Our resource management decisions reflect the waste hierarchy. Prevention of waste is our primary resource management strategy. We must also reduce our impact on the environment from our use of virgin materials and from the potentially harmful substances found in some products. The same logic applies to our manufacturing, distribution and disposal systems.

### No single approach or "one fit" solutions

Preventing waste and using our resources better requires varied approaches. No single approach or "one fit" solutions can be applied universally across all sectors or waste streams. Geographic location, population numbers and density, existing infrastructure and socio-economic circumstances all affect program design and performance.

### Guided by vision and outcomes, not technology

The waste and resource management policies and strategies adopted by state and local government agencies must be driven by the vision, goals and outcomes identified in this Strategy. Short sighted or "quick fix" decisions about infrastructure or technology solutions taken without a clear understanding of broad scale outcomes, and the relationship to the system as a whole, will hamper our ability to achieve coordinated, integrated solutions.

We must apply a mix of strategies including education, economic tools and regulation to drive implementation of state waste policies and the adoption of environmentally superior systems and practices.

### Established criteria for decisions about new systems and practices

The number of new technologies and systems and practices are constantly changing and our choices are continually growing. We need consistent criteria and comparable data on all the available options to help us make the best and most sustainable choices. Guidance and new tools are also required for local and regional decision makers to ensure a consistent and world-class infrastructure.

### Whole of life cycle information

Replacing virgin materials with recycled or re-used materials generally creates less pollution and energy use than using waste to make energy. The impacts of our consumption and waste generation can also affect our environment and health over time.

We will only reduce these impacts and achieve better use of resources if we collect accurate information to enable us to understand the impacts and real costs of the “whole of life” path for goods and services.

#### Integrate and improve systems

All parts of the system are linked. We have choices about the amount and type of materials used to manufacture goods and services, distribution channels, consumption of goods and services and collection for re-use, recycling or disposal. We must develop a greater “whole-of-system” understanding and approach to ensure we get effective and sustainable outcomes.

Ultimately, no material should require disposal. This means an increased focus on avoidance and waste prevention strategies and proper streaming (as early as possible) to recover homogenous material for specific reprocessing. Material streams which are contaminated with materials, or substances that reduce the usability of the stream, must be avoided as a matter of priority, e.g. batteries in composted materials.

In many cases existing systems and practices need to be improved. There is currently too much inconsistency in approach. For example, there are too many different kerbside-recycling systems, public place recycling configurations and workplace recycling systems.

Industry and business processes and practices need to be reviewed to deliver increased producer responsibility. These must be based on full life cycle costing whilst ensuring that the product or material continues to perform its function as well as catering to product safety and performance standards.

Product stewardship initiatives must be initiated throughout entire supply chains. They must encompass improved product design, manufacturing processes, distribution, systems for collection, and recycling. Substantially increased markets for recovered materials are also required and must be driven by governments, business and individuals “closing the loop”, i.e. purchasing products containing recycled material.

The community places great importance on recycling, in particular, as a contribution to environmental protection. Practices such as household level separation of waste for recycling and re-use must continue to be supported and expanded into workplaces and public places.

#### Approaches based on partnerships, cooperation and simplicity

Achieving better use of resources and minimising environmental impacts can only be achieved if participants in different parts of the system work together and share responsibility for the outcomes. In an increasingly time-poor world, outcomes and actions must be clear and simple to understand. They must have practical benefits, particularly since waste and resource use issues are not core business or core concerns for many people in the community.

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.

#### Local solutions

In a country such as Australia with such large distances and a relatively small population dispersed primarily along the coast, local and regional approaches are preferred where possible. Systems need to balance the desirability of resource recovery and re-use against the environmental, economic and social disadvantages of transporting products and materials long distances for treatment, recovery or sale. Other key drivers for regional areas include

supporting the initiatives of local organisations and ensuring their decisions make the most effective use of limited Council rate revenue.

#### Growing our economy

Recovering and making ongoing use of our resources makes good sense for the NSW economy. Finding new uses for recovered materials creates jobs and income for NSW. It also reduces costs to rehabilitate our environment, reduces disposal and other costs of managing waste.

#### Public involvement and participation in decision making

People from all parts of the community must be encouraged to participate in decisions that affect our environment. This will ensure that we consider the full range of drivers and impacts on different communities, businesses and systems when we set priorities for action. Accurate and regular reporting of waste flows, costs and performance are an important aspect of the community's "right to know".

## 2.4 The Role of the NSW Strategy

The Waste Avoidance and Resource Recovery Strategy for NSW is the primary strategic document to guide the efforts of state and local government agencies, industry and the broader community in waste prevention and avoidance, re-use and recycling.

The Strategy identifies targets for achieving waste avoidance and resource recovery and sets a framework for delivering targets through the commitment of industry, government and other stakeholders to key programs and actions. The Strategy sets a reference point for government agencies with approval and regulatory controls. It will enable policy and priority setting and delivery of a more coordinated approach across government, as well as interactions between industry and government at all levels.

The Strategy reflects the current regulatory and legislative framework. Any changes which are made to this framework will be reflected in successive bi-annual reviews of the Strategy.

## 2.5 Key players in avoiding waste and recovering resources

The following diagram represents the framework for waste management and resource recovery in NSW.

## Principal Current Legislation &amp; Regulation



this provides the framework for:

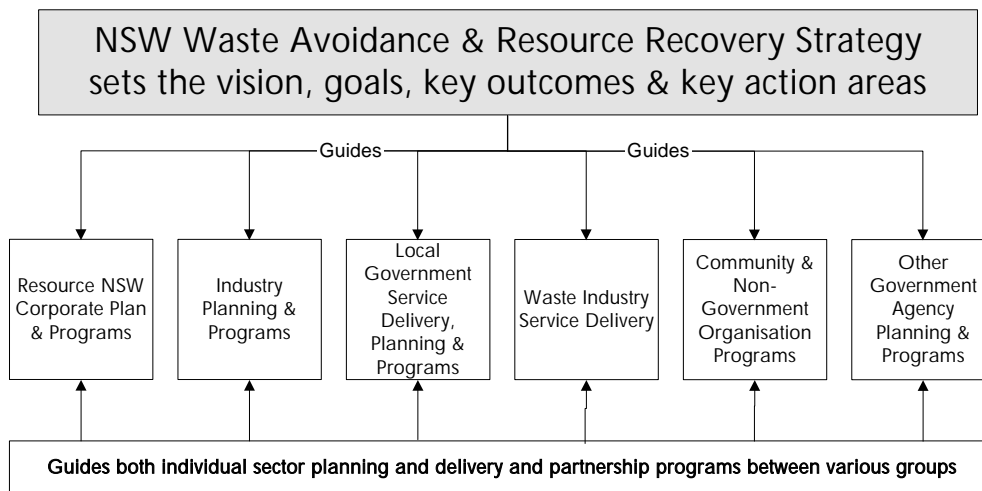


Figure 1. Framework for Waste Management in NSW

## Regulatory framework

In addition to the Waste Avoidance and Resource Recovery Act 2001, the following legislative frameworks can influence waste avoidance and resource recovery in NSW:

- The *Protection of the Environment Operations Act 1997 (POEO) Waste Regulations*, which set out regulatory requirements for specific wastes, waste facilities and activities and transporters, including those to be regulated by the EPA and those to be regulated by local government. The collection of the waste levy is also governed by this Act.
- The *Environmental Planning and Assessment Act 1979* that directs the overall planning and building system in New South Wales.
- The *Local Government Act 1993* that guides councils in developing policies affecting waste management activities.
- The *Waste Recycling and Processing Corporation Act 2001* that is concerned with the operation of the majority of waste facilities located in the Sydney region operated by the newly corporatised Waste Service NSW.
- The Used Packaging Material Industry Waste Reduction Plan that implements the NSW Government regulatory commitment under the National Packaging Covenant.

A list of other relevant legislation is included in Appendix 3.

## Government authorities

The key responsibilities of government organisations responsible for managing regulatory and policy frameworks affecting resource recovery and waste management are described briefly below.



## The Environment Protection Authority (EPA)

### *Regulatory role*

The NSW EPA administers environment protection legislation, licenses certain facilities and premises and undertakes regulatory action to protect the community and the environment. This includes compliance for landfills and resource recovery technologies, guidelines on waste classification, waste tracking of hazardous industrial wastes and facility licensing to prevent pollution and emissions. The EPA also enforces the provisions for the collection of the waste levy and prosecutes for illegal dumping or other waste related offences.

### *Policy role*

The EPA develops policy and guidelines and reviews legislation relating to waste and resource recovery. It is responsible for advising the Minister on the Extended Producer Responsibility (EPR) and product stewardship schemes and co-ordinates the implementation within NSW of nationally negotiated approaches such as National Environment Protection Measures, some of which relate to waste (e.g. waste tracking and packaging). The EPA also represents the NSW Government in negotiations for national approaches such as the National Packaging Covenant.

It develops policy frameworks on waste issues such as cleaner production, energy from waste and land application of waste. Other framework documents developed by the EPA include the NSW Government's Construction & Demolition Waste Action Plan, which provides a waste management framework for the building industry and relevant State agencies, the State Government's Waste Reduction and Purchasing Policy (WRAPP) and the Draft Guidelines for Composting and Related Facilities. The EPA also plays a major role in compiling and reporting waste trends and data, much of which is collected from section 88 waste levy reporting. It is currently preparing a Protection of the Environment Policy (PEP) that will guide the use of waste materials to produce energy.

### *Education and awareness and changed practice*

The EPA manages a number of education and public awareness campaigns to provide the NSW community with information on key environmental issues, some of which include cleaner production for businesses, broad community campaigns, e.g. litter and "It's a Living Thing" and more targeted campaigns to assist with regulatory compliance. It has produced education and information materials for schools and tertiary training, as well as general community and targeted information to sectors such as the building industry. It also jointly supports the Council for Environmental Education with the Department of Education and Training in facilitating the implementation of the NSW Environmental Education 3 year plan.<sup>3</sup>

The EPA also undertakes the triennial community attitudes survey, "Who Cares About the Environment?" This tracks the NSW community's knowledge, attitudes and behaviours relating to a range of environmental issues including waste, and is used by many organisations to guide education strategies and campaigns.

### *Economic instruments*

The EPA has been responsible for some leading initiatives to use economic instruments to drive improved environmental performance. The main economic instrument currently relating to waste is the waste levy that is administered by the EPA. The levy is collected on waste disposal

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<sup>3</sup> NSW Council on Environmental Education 2001.

at waste transfer stations and landfills in the Sydney Metropolitan, Hunter, Central Coast and Illawarra regions.

The waste levy provides a financial mechanism to ensure that users of waste facilities pay a contribution to the environmental costs of waste disposal. The levy also provides a disincentive to landfilling and encourages resource recovery.

### PlanningNSW

PlanningNSW is responsible for land use planning and environmental impact assessment in New South Wales. The policies, regulations and guidelines provided by the department are designed to ensure that developments occur within a framework that protects human health and the urban environment.

#### *Regulatory role*

Developments that are likely to have a large impact on the community or the environment are governed by state-wide planning controls. PlanningNSW is responsible for assessing developments of state significance and enforcing compliance of the conditions for approval. Proposals for major developments are subjected to rigorous risk assessment to ensure they will not pose a significant risk to people, property or the environment.

#### *Policy role*

Policies focus on ensuring that risks to people and the environment from any type of development are taken into account in the planning process. Many State Environmental Planning Policies (SEPPs) have been developed, some of which relate to waste, e.g. justifiable demand for increased putrescible landfill capacity, potentially hazardous or potentially offensive developments and consent approvals for major reprocessing facilities in NSW.

#### *Education, awareness and changed practice*

PlanningNSW undertakes community consultation and provides information to government agencies and industry to support integrated delivery of regional infrastructure and government activities.

### Resource NSW

The *Waste Avoidance and Resource Recovery Act 2001* established Resource NSW as a new government agency. Its role is to implement programs and strategies to avoid waste and use our resources better.

Resource NSW is also charged with developing a waste avoidance and resource recovery strategy for NSW. The Act also states that this must be based on continuous improvement and benchmarked against international best practice whilst setting targets for waste reduction, resource recovery and the diversion of waste from landfill disposal.

The Act establishes a framework for all waste avoidance, reduction and recovery programs implemented by the NSW community. These will be:

- Framed under the new waste hierarchy framework: avoidance, resource recovery (including re-use, reprocessing, recycling and energy recovery) with disposal as a final resort.
- Developed in accordance with the principles of Ecologically Sustainable Development (ESD) – having regard for the precautionary principle, intergenerational equity,

conservation of biological diversity and ecological integrity, improved valuation, pricing and incentive mechanisms.

#### *Regulatory role*

Resource NSW has no regulatory role under the *Waste Avoidance and Resource Recovery Act 2001*.

#### *Strategic role*

Resource NSW's main function is to implement strategies to assist and complement the Government's policies and regulations on waste management and resource recovery. Resource NSW and its Board can provide advice to the Minister for the Environment and the EPA on policy reform.

The areas in which Resource NSW will work to achieve significant results are:

- Developing support frameworks for education, market expansion for recovered resources and waste management systems.
- Influencing practices for improved waste management and resource recovery practices adopted by governments, the private sector and the community.
- Contributing to ecologically sustainable development through avoiding waste, conserving natural resources, increased use of renewable and recovered resources and reducing toxicity in the environment.

Resource NSW has a key role to play in facilitating producer responsibility initiatives to avoid and reduce waste. It will collaborate with key industry sectors on this. Resource NSW also has an obligation to work closely with the Environment Protection Authority to inform its deliberations and advice to the Minister relating to voluntary product stewardship initiatives and the need for mandated Extended Producer Responsibility (EPR) approaches for particular sectors. The process for introducing mandatory EPR Schemes as set out in the Waste Avoidance & Resource Recovery Act 2001 is contained in Appendix 4 (Sections 15-17).

The Department of Local Government

#### *Policy and regulatory role*

The Department of Local Government (L.Gov NSW) manages the legislative framework under which councils are established, given powers and levy their rates and charges. The domestic waste management charges for municipal collections including recycling are subject to specific restrictions.

Local councils

#### *Regulatory role*

Local councils play a major role in waste management in NSW. Councils are largely responsible for dealing with municipal waste through garbage, recycling and hard rubbish collections. Councils also have responsibility for a number of specific waste functions including domestic collection services and street cleaning. They regulate many of the activities such as housing developments, certain business activities, pollution control, littering and illegal dumping. Some councils operate landfills and recycling facilities.

### *Policy role*

Councils plan for the future of their areas, deciding what kinds of developments and activities are allowed. They often use Development Control Plans (DCPs) to guide and control these developments. For example, a Waste Management DCP encourages better building design and recovery of materials during construction and occupation.

### *Education, awareness and changed practice*

Local governments have an enviable record of leadership and innovation in educating their communities on managing their waste. This includes composting and waste avoidance activities, kerbside recycling, public event management, public place recycling and schools education.

### *Economic Instruments*

The cost of waste and recycling collection services is covered in the Domestic Waste Charge that is a part of the charge on rateable properties. Many local councils provide economic incentives to minimise waste such as offering differential pricing to residents. This could involve reducing the size of the waste container and offering a lower cost for the smaller containers. Those councils managing landfills can also offer different charges if wastes are separated into clean streams for recycling instead of mixed loads.

### Waste Service NSW

*The Waste Recycling and Processing Corporation Act 2001* converted The Waste Recycling and Processing Service (Waste Service NSW) to a corporation governed by the *State Owned Corporations Act 1989*. The main function of Waste Service NSW is to develop and operate waste and secondary resource facilities within a context of international best practice.

## 2.6 Other factors influencing waste management and resource recovery strategies

### A National Approach

A number of national product stewardship schemes are described below. It is recognised that national approaches have a potentially key role to play since they reflect the changing structure of business which is increasingly conducted on a national or international basis. Waste avoidance and resource recovery product stewardship and EPR programs need to be designed to reflect this operational reality, however, such an approach must not compromise the achievement of tangible outcomes within acceptable timeframes.

### National and international obligations

#### The National Packaging Covenant

The National Packaging Covenant (the Covenant) relates to packaging and paper waste (excluding newsprint) in Australia. It is a voluntary agreement that includes all spheres of government and the packaging supply chain. Signatories to the Covenant commit to product stewardship through:

- The continuous improvement in recovery and reprocessing of used packaging materials, set out in Annual Action Plans.
- Support for kerbside recycling collection.

Failure to meet commitments agreed under the Covenant may result in a signatory becoming subject to the National Environment Protection Measure (NEPM) for Used Packaging. This is a "regulatory safety net" established by each state to ensure a level playing field within the industry sector between signatories and non-signatories.

Both the Australian Local Government Association and LGov NSW remain opposed to the National Packaging Covenant in its current form on the basis that it is wholly focussed on kerbside collection and does not canvass other systems of packaging return (such as deposit/return schemes). Further, the Covenant is based on the principle of "product stewardship" or "shared responsibility", whereas Local Government believes it should be founded on the principle of extended producer responsibility or EPR. To date, there are no local government signatories to the Covenant in NSW.<sup>4</sup>

#### National Environment Protection Measure (NEPM)

The NEPM relates to used packaging materials. Its goal is to reduce environmental impacts resulting from the disposal of used packaging materials and conserve virgin resources by encouraging re-use and recycling and complementing the strategies in the National Packaging Covenant.

In NSW, the NEPM has been implemented through the Used Packaging Material Industry Waste Reduction Plan. This instrument ensures industries that fail to deliver under the Covenant will have mandatory targets and actions set for them.

There is also a NEPM governing interstate movement and tracking of controlled wastes.

#### Product Stewardship initiatives

There is currently a national product stewardship arrangement for used motor oil underpinned by the *Product Stewardship (Oil) Act 2000*. This was developed following negotiations between the Federal Government, state jurisdictions and industry. Oil producers and importers pay a levy on lubricants to support environmentally sustainable management and re-refining of waste oil.

A national Product Stewardship Agreement has been in place with the newsprint producers and publishers for many years. The current agreement, which runs from 2001-2005, sets a target of 74% recovery of all newsprint produced in Australia by the end of 2005.

There is also a national product stewardship program which is contributing to farm chemical waste management. *DrumMUSTER*, based on an agreement by national veterinary and farmers groups, involves the collection, recycling or disposal of rinsed farm chemical containers.

Product Stewardship negotiations are underway with representatives of the supply chain for various electronic products including computers, televisions and white goods. Discussions are addressing environmental issues arising during manufacture, use, disposal and recovery of products.

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<sup>4</sup> LGOV Nov 2002

### Hazardous Waste (Regulation of Exports and Imports) Act 1996

This Commonwealth Act was developed to comply with Australia's obligations under the *Basel Convention on the Control of the Transboundary Movements of Hazardous Wastes and their Disposal* by regulating the export and import of hazardous waste.

The Act regulates the export and import of hazardous waste to ensure that exported or imported hazardous waste is disposed of safely and regulates the movements of wastes destined for recycling and recovery of valuable components.

### The Basel Convention

Australia became a party to the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal* in 1992. The Convention is the response of the international community to the problems caused by the worldwide production of hundreds of millions of tonnes of waste. These wastes are hazardous to people or the environment because they are toxic, poisonous, explosive, corrosive, flammable, eco-toxic or infectious.

Each country that is a party to the Convention is required to report information on the generation and movement of hazardous wastes.

### Recent inquiries on waste management and resource recovery

A number of reports prepared for the NSW Government have been taken into consideration in preparing this Strategy.

### The Alternative Waste Management Technologies and Practices Inquiry

In August 1999 the NSW Minister for the Environment commissioned an Inquiry into alternative waste technologies and practices for NSW. The Inquiry report, released in June 2000, canvasses issues that need to be addressed to progress waste management and resource recovery in NSW. It contains a review of conventional and emerging waste technologies and the management practices that drive the logistics and transformation of discarded materials to beneficial resources.

Resource NSW has the task of facilitating and supporting waste reduction and resource efficiency through infrastructure, technologies and systems improvements. This report will serve as a reference guide for the development of programs in these areas.

### Independent Public Assessment – Landfill Capacity and Demand

This report was commissioned by the Minister for Planning and was published in 2001. It presents the outcomes of an independent assessment of landfill capacity and the need for the Sydney region to inform decision making on proposed waste management facilities.

In addition, Resource NSW commissioned Mr Tony Wright to prepare a background paper on "Shaping the Vision and Strategy for Sustainable Waste Management in NSW" (2002) which consolidates the key trends and strategies outlined in his previous papers. This document is a useful companion document to this Strategy.

### Independent Review of Container Deposit Legislation

Dr Stuart White of the Institute of Sustainable Futures prepared an independent report on waste management dealing with extended producer responsibility and Container Deposit Legislation (CDL). The report was prepared for the Minister for the Environment in 2001.

Deposit-refund systems can be voluntary or mandated through regulation. They involve the payment of a deposit by the consumer when the product is purchased. The deposit acts as an incentive for the consumer and the deposit is redeemed when the used product is returned to the producer or agent. Producers are then responsible for ensuring that the product is recycled or, depending on the product, disposed of safely.

To date, deposit-refund systems have been commonly applied to beverage containers, including in South Australia where a scheme has run for 24 years. Dr White's review found that a deposit system for beverage containers could be introduced in a manner that delivered economic, social and environmental benefits to the NSW community although more work was needed to test the ability of NSW to act unilaterally to introduce such a mandated system.

The Report recommended Extended Producer Responsibility provisions similar to those that are included in the Waste Avoidance and Resource Recovery Act. The report has been referred to two federal, state and territory ministerial councils, the National Environment and Heritage Ministerial Council and the Industry and Technology Ministers Council.

It is acknowledged that there is vigorous debate about container deposit systems and legislation. This was indicated in submissions on the draft Strategy from local government and community and environment organisations. The implementation and monitoring program for the Strategy will include a watching brief on CDL.

## 2.7 The picture so far

### Achievements to date

Since 1990, the focus of waste management in NSW has changed from providing facilities for waste disposal to actively planning for systems and facilities to recover resources and reduce the amount of waste generated.

The *Waste Minimisation and Management Act 1995* established a waste reduction target that served as a “wake-up call” to the community that we needed to do much more to tackle waste. It established a comprehensive regulatory system for the transport, treatment and disposal of waste and environmental regulation of waste across the state, not just Sydney.

Following the review of this Act in 2001, the Minister for the Environment, the Hon Bob Debus described the considerable progress and achievements that we have made in managing waste better and recovering resources.

Before 1995, waste regulation focussed on the storage, collection and disposal of waste and was confined to the Sydney region. It did nothing to discourage the proliferation of more and bigger landfills. While households had taken to recycling, there was little evidence of a consistent approach to avoiding or re-using waste, particularly in the commercial & industrial sectors. In addition, regulatory activity had not adequately dealt with the storage, transport or treatment of hazardous wastes.<sup>5</sup>

In tandem with reducing wastes, we have overhauled the environmental management of residual wastes by: developing waste regulations and waste assessment guidelines; developing guidelines for effective landfill management; introducing a new scheme for tracking hazardous and industrial wastes; participating in the development and implementation of the National Environment Protection Measure for the Interstate Movement of Controlled Wastes; ensuring a proper disposal mechanism for non-hazardous industrial wastes; and introducing a new Act to expand New South Wales anti-littering laws.<sup>6</sup>

The rapidly growing recycling industry is now operating without the regular crises that characterised the mid-1990s. Kerbside collection systems provide a significant net benefit to communities. A recent national study of kerbside recycling estimated that the benefit was \$68 per household per year. The same study reported average net financial costs amount to \$26 per household per year, giving an overall net benefit of \$42 per household per year, or an estimated \$266 million per year nationally.<sup>7</sup>

Very good progress has been made on reducing waste. Looking across all waste streams, for every dollar’s worth of economic activity in NSW, today we produce 25% less waste than 10 years ago. When we look at municipal waste only, the reduction is over 40%. Progress has been slower in both the commercial & industrial waste and construction & demolition waste sectors.<sup>8</sup>

The Government set up a rural pilot program to explore other models of cooperation in rural areas of the state. The program attracted four participating groups of councils. These have

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<sup>5</sup> NSW EPA 2001a. p. 2

<sup>6</sup> NSW Legislative Assembly Hansard 2001.

<sup>7</sup> NSW EPA 2001a p. 3

<sup>8</sup> NSW EPA 2001a. p. 3



been successful in providing forums and planning frameworks for a regional approach to rural waste issues. The regional groups have managed some cost-effective rural collection contracts for specific services, including garden organics and household/farm hazardous waste.<sup>9</sup>

In addition to the significant changes and achievements noted by the Minister, the following initiatives are also important.

#### NSW Government waste reduction and purchasing policy

NSW Government agencies purchase approximately \$10 billion worth of materials every year and have the potential to generate large quantities of waste. To encourage waste reduction in the public sector, the Government introduced an Australian first – a mandatory *Waste Reduction and Purchasing Policy* (WRAPP) in 1997. The policy requires all NSW Government agencies to develop plans to reduce waste sent to landfill and use their purchasing power to increase markets for recycled materials.

Last year the EPA identified that agencies needed to take more action on paper purchasing and recycling. During 2000-01, agencies included recycled content as a requirement in paper and office machine contracts, worth collectively \$50 million. Agencies are also planning similar requirements for other contracts worth over \$100 million.

#### Community waste reduction grants

Since its establishment in 1996, a community waste reduction grants program has allocated almost \$6 million to 108 projects to reduce and recover waste. Initiatives by schools, industry, local councils, community groups and individuals have been supported.

#### Earth Works

Earth Works is a community education based program that has operated since 1997. It trains interested participants about a range of environmentally sound management practices including composting, no dig gardens and mulching and environmentally friendly purchasing. Since it was launched, over 60 councils (35% of the NSW total) have conducted Earth Works programs and more than 100 trainers now have the skills to deliver courses in their localities. The program has been an excellent example of partnerships with courses having been run by local government, waste boards, communities from non-English speaking backgrounds and community colleges.

#### Regional Illegal Dumping (RID) squad

Since 1999, the NSW Government has supported the Regional Illegal Dumping Squad in a joint initiative with Western Sydney councils. An evaluation of the RID Squad's trial period noted the success of the squad in tackling illegal waste dumpers in Western Sydney, with the following outcomes: 240 illegal dumping cases identified; 153 fines issued with a total value of \$99,000; and six briefs prepared for prosecution.

The evaluation found that investigation of reported and identified incidents during patrols was generally the most effective use of resources, with aerial surveillance also effective in identifying large dump sites and illegal landfills. This initiative is currently being expanded around the Sydney rural-urban fringe.

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<sup>9</sup> NSW EPA 2001a. p. 7

## Litter reduction

The EPA has established and is coordinating a Litter Reduction Taskforce of government agencies with land management responsibilities. The Taskforce is driving whole of government initiatives that will deliver more consistent education, awareness and enforcement. The *Environment Operations Amendment (Littering) Act 2000* has ensured that penalties reflect the nature and often harmful effect of the litter. These now range from \$60 for cigarette butts to between \$375 and \$750 for 'aggravated' littering, such as broken glass. Cigarette butts are a major source of litter, accounting for over 50% of litter items in NSW (or approximately 9 million butts each year).

To support the new litter laws, the EPA has trained 500 council and relevant government agency staff on the recent changes to help them educate people to reduce litter and enforce penalties. The EPA also prepared and distributed litter prevention manuals to all NSW councils and interested community groups. There has been a significant increase in the use of fines for littering offences since the change of law and the training program. The total number of litter fines issued in 2000-2001 nearly doubled compared with 1999-2000. Fines for littering from motor vehicles accounted for around 62% of those issued during this period.

Under the *Protection of the Environment Operations Amendment (Littering) Act 2000*, measures were also introduced to make it illegal to put advertising material under vehicle windscreen wipers, in a public or open private place, or any other areas where it may become litter. Advertising material must now be delivered either directly into letterboxes or under doors to premises.<sup>10</sup>

The Beverage Industry Environment Council launched "Don't Waste Australia – Do the Right Thing" program in November 2002. The program is designed to change consumer behaviour about littering. It is based on the highly successful "Do The Right Thing" campaign and is funded through the Don't Waste Australia Foundation.

## Cleaner production initiatives

The EPA has been working with business over a number of years to apply cleaner production approaches to business management to reduce the use of energy, water and material resources and to minimise waste and pollution. This has involved a shift in environmental protection from an "end-of-pipe" approach where pollution is managed after it is created, to a 'front-of-process' approach where the creation of pollution is avoided or minimised at the source. There are now many examples documented for industry to use to help them change their practices and improve competitiveness. Building on this, the Government has established the Profiting from Cleaner Production Industry Partnership Program with \$5 million over three years from the Waste Fund. The EPA is managing and participating in the program.

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<sup>10</sup> NSW EPA 2001b

## 2.8 Current waste reduction and recovery performance

Three main sectors produce waste in Sydney: the municipal sector, the commercial & industrial sector and the construction & demolition sector. 'Municipal' waste comprises household materials from kerbside collections; any material transported by a householder to a waste facility; and any material collected by local councils from public places, the street (e.g. street sweeping) and special event venues. 'Commercial & industrial' waste includes material collected from retail, wholesaling, manufacturing businesses, but excludes construction & demolition waste. 'Construction & demolition' waste refers to material collected from construction, renovation, repair, alteration or demolition work of any structure, mainly building, and infrastructure and engineering projects.

Under previous waste legislation, waste data was only collected for the Sydney Metropolitan Area. New reporting requirements will mean that data for all of NSW will be available in the future.

It is estimated that in 2000 (from reports submitted by landfills in NSW), almost 6 million tonnes of waste was disposed of to landfills throughout NSW. Of this, almost 4.5 million tonnes was disposed of in the Sydney region, almost 1 million tonnes in the Hunter, Central Coast and Illawarra and over half a million tonnes in rural NSW.<sup>11</sup>

When waste disposal is normalised on the basis of economic activity, the total waste disposed of in Sydney decreased by 24% between 1990 and 2000.<sup>12</sup>

Better waste practices in the construction industry and higher disposal costs have reduced the quantity of construction & demolition waste disposed of to landfill in the last two years, when normalised for building activity.<sup>13</sup> Reduction of waste generated by the commercial and industrial sector remains a major challenge.

### Kerbside recycling

In NSW in 2001-02, preliminary data indicates that almost nine out of ten households (89%) are within a council area that has a kerbside recycling service. The average participation rate in household kerbside recycling is 78%.<sup>14</sup>

Kerbside collection of domestic recycling materials in Sydney has been stable relative to economic activity since 1994, following a substantial increase between 1991 and 1994. Kerbside recycling collections currently recover about 20% of domestic waste generated in the Sydney metropolitan area compared with 8% in 1991.<sup>15</sup> There is a big difference in recovery rates across Sydney with council recycling rates varying between 12% and 40%.<sup>16</sup>

Paper accounts for about two-thirds of kerbside materials collected by weight, glass around 28%, plastic 6%, steel 1% and aluminium cans less than 1%. In 2000, each person in Sydney set aside about 84 kilograms for recycling, compared with around 30 kg per year in 1991.

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<sup>11</sup> NSW EPA 2002.

<sup>12</sup> NSW EPA 2001b. p.43.

<sup>13</sup> NSW EPA 2001b. p. 44

<sup>14</sup> NEPC 2001. p. 235

<sup>15</sup> NSW EPA 2001b.

<sup>16</sup> Wright 2002.

Due to the kerbside recycling collection system, each person's annual contribution on average is now:

- 54 kg of paper
- 24 kg of glass containers
- 5 kg of plastic containers
- 1 kg of steel cans
- Less than 1 kg of aluminium cans <sup>17</sup>

Newsprint recycling in Australia is world class. Australia had a 72.4% recovery rate in 2001. In NSW, the recycling rate was 74.8 %.<sup>18</sup>

It is recognised that in many parts of regional NSW, kerbside recycling collections are not viable due to small populations and limited rate revenue and distance to markets. However, a number of these councils offer drop off facilities at transfer stations and landfills.

### Organics

Organic material is generated from all waste streams; it makes up over 30% of the total waste stream and is a much higher proportion of municipal waste. Organics include garden organics, food organics and timber. There has been a great increase in collections and reprocessing capacity for these materials over the past 3-4 years. For example:

- 60% of Sydney councils now provide a separate garden organics collection service.
- Port Stephens Council sends its residual waste (paper and containers collected separately) to the Bedminster facility at Raymond Terrace.
- A new facility at the South Windsor landfill will take some of the residual waste stream of 4 Western Sydney councils. The material will be sorted into its organic and inorganic categories for further processing elsewhere.
- Lismore Council has introduced an organics only waste collection system (food organics and garden organics) for processing at the large Tryton Worm Farm.
- Hastings Council sends its residual waste for pre treatment by static pile composting. Green waste and biosolids are treated by tunnel composting.
- The Earthpower digestion technology under construction at Camellia will take separated organic wastes from the commercial & industrial sector, including supermarkets and fresh fruit and vegetable markets.

The State of the Environment Report 2000 stated that 680,000 tonnes of garden organics was generated in the Sydney region in 1998 and of this, 270,000 tonnes (almost 40%) was recycled.<sup>19</sup>

More recent EPA data (2000) on garden organics (garden and vegetation and wood waste only) shows that the amount separated for reprocessing has increased to over 350,000 tonnes. The data is obtained from landfill reports on waste received and then exported for recycling/reprocessing. This does not include tonnages of garden organics received directly at processing operations (such as composters), so the data does not provide a complete picture

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<sup>17</sup> NSW EPA 2001b.

<sup>18</sup> PNEB 2001.

<sup>19</sup> NSW EPA 2000b

of reprocessing in NSW. Around 200,000 tonnes of this material comes from the Sydney region, 100,000 tonnes from the Hunter, Central Coast and Illawarra and almost 70,000 tonnes comes from rural NSW. Around 8-9% of the material has unacceptable levels of contamination and is disposed of to landfill.<sup>20</sup>

#### Government agencies

Performance data for NSW Government agencies is based on reports submitted to the EPA by each agency. One hundred and twenty one government agencies purchased 3.3 million reams of photocopying paper of which 13% contained recycled content. Of the 1.5 million reams of printing paper purchased, 38% contained recycled paper.

Agencies reported that 82% of total paper waste generated was recycled and 81% of the 120,000 toner cartridges purchased were recycled. Approximately 72% of construction & demolition materials and 88% of vegetation waste was also recycled.

NSW Government agencies appear to be making progress, though more work is required in some areas. A recent example of improved performance is at Parliament House where, over a two-month period, changes to the recycling system have resulted in a five-fold increase in paper recovered for recycling. This increased the amount of paper recovered from 3.2 tonnes to 15.2 tonnes over that period.

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<sup>20</sup> NSW EPA 2002.

## 2.9 Comparing our performance nationally and internationally

It is difficult to make valid comparisons about performance in different jurisdictions due to different reporting methods and varying methodology used to collect the data. Also, definitions of terms such as “generation”, “recycling”, “disposed of” and waste stream definitions often have different connotations in other countries. Furthermore, the prevailing regulatory framework in a jurisdiction must be considered when assessing performance in waste management and resource recovery.

The best comparable data available from interstate is from Victoria. Data from EcoRecycle Victoria indicates that in 2000-01, 8.3 million tonnes of waste was generated of which 4.3 million tonnes was disposed of to landfill.<sup>21</sup> In 2000/01, 1.6 million tonnes of solid waste was collected through municipal kerbside collection services, an average of 947 kg per household per year. Garbage accounted for 70% of the total, with recyclables (21%), garden organics (6%) and waste from clean ups (3%) making up the remainder.<sup>22</sup>

About 1.7 million tonnes of organic material was disposed to landfill in Victoria. In 1998/99 this accounted for about 40% of the total waste disposed.<sup>23</sup> As part of its *Green Waste Action Plan*, EcoRecycle Victoria has set a target of reducing the amount of garden organics going to landfill by 15% in 2003/04 and by 50% by the end of the decade.<sup>24</sup>

Internationally, performance is variable and difficult to compare with NSW. The proportion of municipal waste that is landfilled is reported to be increasing in Denmark, Spain and Portugal but decreasing in Germany, France, Ireland, Italy, Austria and Sweden. However, the total amount of waste being generated appears to be increasing.<sup>25</sup>

Wright (2002) reports that current NSW recycling performance roughly matches the European average, though this is only half of the best performing nations. Germany, for example, has a municipal recycling rate of 32% and compost 12%.<sup>26</sup> The UK on the other hand recycles 9% and composts 2%. Less than 50% of households in the UK have access to recycling collections.

Most US states have reported a growth in the amount of waste generated. The national average US performance for municipal waste was 32% recycling (including composting), 7% incineration and 61% landfilled. Some of the best recycling performers were Delaware (59%) and Arkansas (45%).<sup>27</sup>

Many countries have set performance targets for particular waste streams or sectors. In the majority of cases, performance against these targets is not available or has not been assessed yet. Further information on targets and performance for various countries is included in Appendix 5.

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<sup>21</sup> EcoRecycle Victoria A Material Efficient Future for Victoria 2002. p. 5.

<sup>22</sup> EcoRecycle Victoria 2002. p. 2

<sup>23</sup> EcoRecycle Victoria 2001. p. 50

<sup>24</sup> EcoRecycle Victoria website, [www.ecorecycle.vic.gov.au](http://www.ecorecycle.vic.gov.au)

<sup>25</sup> Warmer Bulletin, March 2002

<sup>26</sup> Wright 2002.

<sup>27</sup> Biocycle Dec 2001 The State of Garbage in America 2001

## 2.10 Our resource recovery challenge

Both the amount and types of waste we are disposing of varies throughout NSW, reinforcing the fact that a single solution will not work for NSW and highlighting the different waste stream challenges in different regions. Lower municipal tonnages reflect a more sustained focus on kerbside recycling in the Sydney region over the past decade. The concentration of industry and commerce in Sydney is reflected in the fact that almost half of the waste disposed of comes from these sources. The diversion of organic material (eg food and garden materials) which make up a large proportion of both municipal and C&I wastes remains a significant challenge.

Sources of waste by waste stream in the Sydney Metropolitan area, the Extended Regulated Area (Hunter, Central Coast and Illawarra regions) and rural NSW (2000) are shown in the following pie graphs:

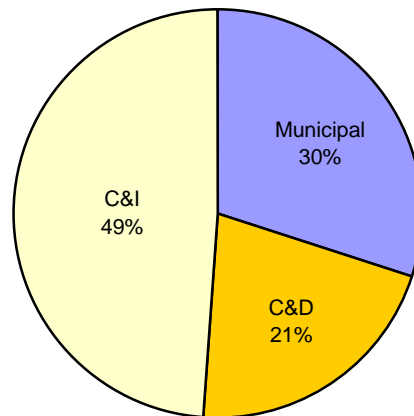


Figure 2. Waste disposed per sector – Sydney Region<sup>28</sup>

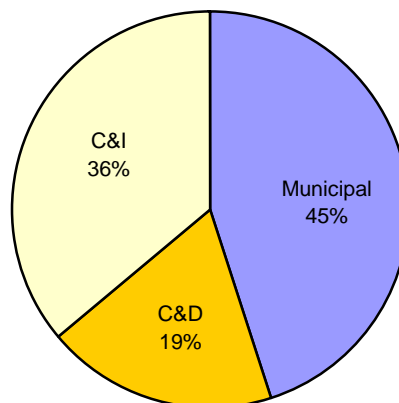


Figure 3. Waste Disposed per sector – ERA (Hunter, Central Coast and Illawarra)<sup>29</sup>

<sup>28</sup> NSW EPA 2001b

<sup>29</sup> NSW EPA 2002.

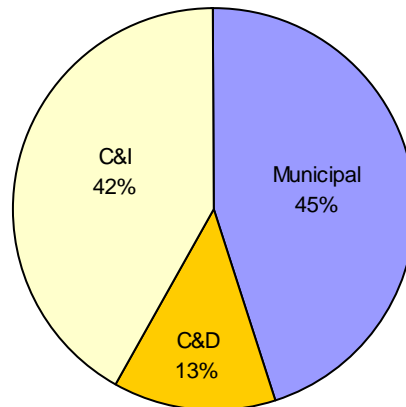


Figure 4. Waste Disposed per sector – Rural Areas<sup>30</sup>

## 2.11 Waste avoidance and resource recovery in regional NSW

Regional NSW faces its own unique waste avoidance and resource recovery challenges. These are governed by population numbers and distribution and distances required to aggregate materials or to reach markets that have historically been in Sydney or other large urban centres. Available waste tonnages and types and opportunities for recovery vary throughout regional NSW and it is recognised that a different support structure is required to support initiatives in these areas.

Resource NSW is providing funding support for regional plans developed by groups established throughout NSW. This is a collaborative partnership of state government and council funding. These plans focus on specific waste streams and initiatives which vary from region to region. Regional communities will also benefit from the roll out of statewide programs such as education programs and grants. A map of regional waste groups currently operating in NSW is contained in the Appendix 6.

## 2.12 Key outcomes which will deliver sustainable use of resources

Based on the impacts of our planning as well as commercial and environmental decisions at various points within the materials flow system, there are four key areas where we must achieve outcomes.

The areas are:

- Preventing and avoiding and waste.
- Increased use of renewable and recovered materials.
- Reducing toxicity in products and materials.
- Reducing litter and illegal dumping.

Each of these areas will contribute to better use of our finite resources and reduce the cumulative impact on our environment.

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<sup>30</sup> NSW EPA 2002.



## Outcome 1: Preventing and avoiding waste

Our goal is to prevent waste generation levels from increasing in the medium term.

Preventing or avoiding waste is the most important thing we can do as a community in order to preserve resources. It is the area where communities worldwide have achieved the least progress and this must be a major focus for our efforts in NSW.

Avoiding waste can:

- Use less natural resources per capita.
- Lower waste management costs since there is less waste to manage.
- Reduce environmental and health impacts from waste.
- Reduce community concern about siting new waste management and reprocessing facilities.

Prevention and avoidance is all about taking action before products or materials are identified or recognised as waste as shown in Figure 5.<sup>31</sup>

This is different to recycling, which deals with a product or material after it has done the job that it was designed to do, e.g. a cardboard box and packaging that has now become waste.

Preventing and avoiding waste can impact the quantity, hazard and energy content of materials and products that may become waste.

Waste avoidance requires actually changing the way something is done. It starts by not using a particular material or substance at all, by reducing its use or re-using materials. Activities such as product re-design and re-use need to be undertaken primarily by product and service designers, deliverers and purchasers.

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<sup>31</sup> The definitions of waste avoidance and prevention used in the Strategy are the same as those adopted by the OECD (see OECD 2000).

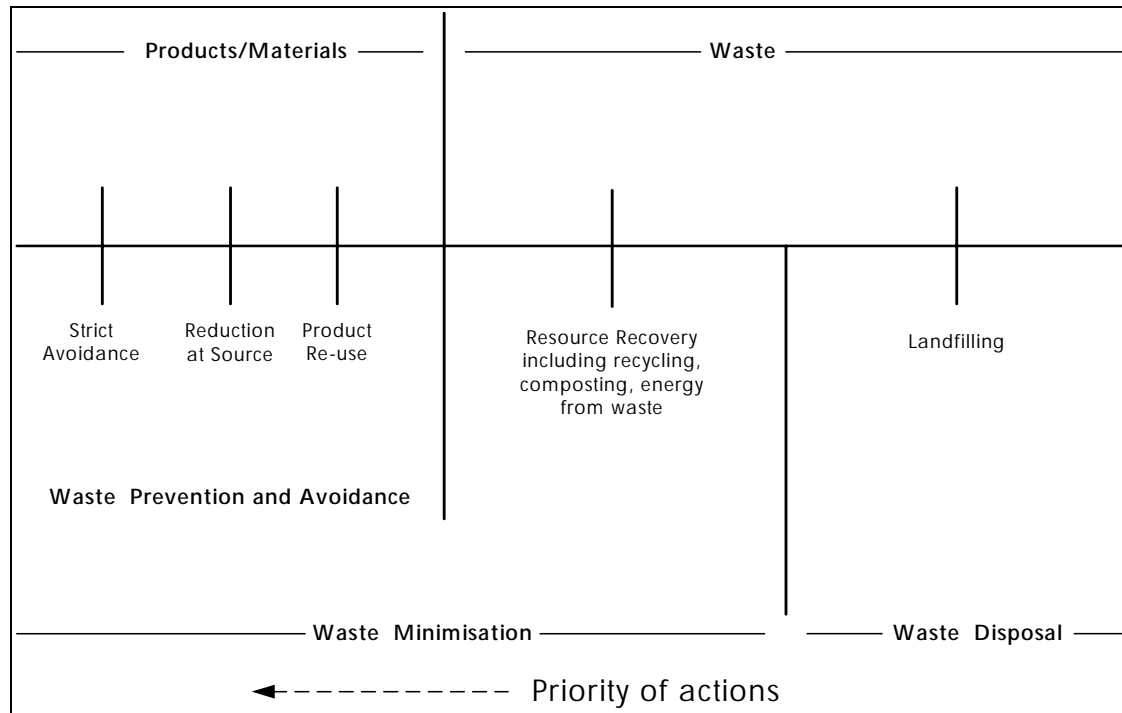


Figure 5. Waste prevention and avoidance in context<sup>32</sup>

There are three types of actions which can avoid or prevent waste:

a) Strict avoidance

Strict avoidance means you do not create the waste in the first place. It means eliminating the use of hazardous substances and reducing material or energy intensity in production, consumption and distribution.

Examples of strict avoidance can relate to:

- *Quantity*, such as avoiding use of materials in production or consumption (e.g. through eliminating interim packaging for cosmetics and toothpaste or the substitution of continuous casting for ingot casting at steelworks).
- *Hazard*, such as eliminating and/or substituting materials that are hazardous to humans or to the environment (e.g. removal of potentially harmful substances in electrical and household goods, PCBs and ozone depleting substances).

b) Reduction at source

Reduction at source means minimising use of toxic or harmful substances and/or minimising material or energy consumption.

Examples of reduction at source include:

- *Quantity*, such as using smaller amounts of resources to provide the same product or service (e.g. reducing foil thickness, introducing re-use or refill systems, miniaturisation, resource-orientated purchasing and consumption), and using less resource-dependent construction principles and materials.

<sup>32</sup> Adapted from Stutz in OECD 2000. p. 38.

- *Hazard*, such as reducing the use of harmful substances in products, production, sales systems, consumption and disposal systems and reducing the use of substances that hinder re-use or recycling (e.g. particular inks or glues on labels, use of chlorinated solvents as cleansing agents).

c) Product re-use

Product re-use involves the multiple use of a product in its original form, for its original purpose or for an alternative use.

By re-using, we are preventing waste since we don't use the energy and materials for a new product. Re-use can require reconditioning, for example, in order to refill a glass or plastic bottle, it needs washing. Items can also be re-used without reconditioning, e.g. using shopping bags and containers more than once.

Some important strategies for waste prevention include increasing the durability and "use-time" of products and making products more material and energy efficient. Product manufacturers and anyone who makes purchasing decisions can play a key role in making positive changes to prevent waste.<sup>33</sup>

Outcome 2: Increased use of renewable and recovered materials

Our goal is to maximise the use of material recovered from post-consumer and manufacturing processes as feedstock to make new products so that less of the Earth's non-renewable resources need to be extracted and less pollution is generated.

There are many opportunities for us to recover material for recycling and reprocessing. This means taking a used product, once it has finished doing the job it was created for and sending it to a reprocessor who will turn it into the raw material for another product or ideally, remake it into the original product. Examples include:

- turning offcuts from a production process back into the raw material input which makes the product.
- newsprint into tomorrow's newspapers.
- glass jars and bottles into new glass containers.
- plastic milk bottles into plastic agricultural pipes.
- leftover food, garden and wood waste into compost.
- used office paper into new office paper and packaging.

We must also make it a priority to use as few non-renewable resources as possible. These are the resources produced by the earth often over millions of years ago. They include all mined resources such as coal, oil and precious metals. Once these are gone there will be no more so we need to extend their lives as much as possible. We can conserve non-renewable resources by substituting renewable materials which can be replenished within a reasonable timeframe, including "new" raw materials made from recycled material.

Recovering materials for reprocessing isn't always easy. If reprocessed materials cannot compete economically with virgin materials, very few companies will use them. Improving or designing new collection systems, developing material specifications, designing economic instruments and policies so that recycled material can substitute for virgin materials,

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<sup>33</sup> OECD 2000, pp. 37-39

encouraging people to use recycled materials in the products they make, buy products which contain recycled content, and creating new markets for recycled materials are all part of the challenge.

### Outcome 3: Reducing toxicity in products and materials

Our goal is to reduce substances harmful to human health and the environment in all products and materials.

We are using more complex and increasing quantities of chemicals to make the products we use and consume. This increases the potential for risks to both the environment and our health. We must avoid using chemicals that have known impacts on our health or environment and, applying the precautionary principle, make a greater effort to replace potentially harmful substances with more benign ones where these can deliver a similar performance.

Reducing the toxicity or use of harmful substances is also important to make sure that we can recover our resources for reprocessing. For example, if garden and food organics being sent to make compost are mixed with waste containing batteries, the heavy metals can transfer into the compost that would pass these through to the plants and ultimately lead to contamination of the food chain. There are currently standards for compost that protect us against such contamination however the above example illustrates how material in one product can affect whether a material stream can be re-used. Another example is the presence of treated timber, which is mixed-in with other wood collected for recycling. The presence of these substances in the mixed load of timber mean there are very few ways to recover it for future use.

Tackling toxicity needs to begin with actions to redesign the product to remove the potentially harmful substances. Other approaches include collecting materials with potentially harmful contaminants separately so as to avoid contamination of the rest of the recoverable resource which they might be mixed with. This would mean the substances can be specifically treated and safely disposed of if necessary. It also keeps the remaining waste stream clean and more able to be recycled. Technology and process redesign or improvement can also be used to screen out or recover potentially harmful substances before they are discharged into the environment (air, liquid or solid waste).

### Outcome 4: Reducing litter and illegal dumping

Our goal is to reduce total volumes of litter and illegally dumped material.

There are quite large amounts of materials that are illegally disposed of and dumped in our open spaces and waterways or in back alleys and on footpaths in inner city areas. Materials include soil, building waste, tyres, cars and household products. Commonly littered materials include cigarette butts, beverage containers and fast food packaging.

We must work harder to stop litterers and illegal dumpers since their behaviour has major impacts on our environment. If materials are littered or dumped, we also lose the opportunity to keep these materials within the system by reprocessing them.

## 2.13 Making system wide changes

The flow of materials within our community

There is a long chain of economic activity that produces goods and materials. It starts with extraction of raw materials to make products and services, followed by production, distribution, purchase and consumption. Then there are systems for collecting, sorting and aggregating materials and sending them for re-use, recycling or disposal.

The life cycle of goods and materials is shown in the figure below:

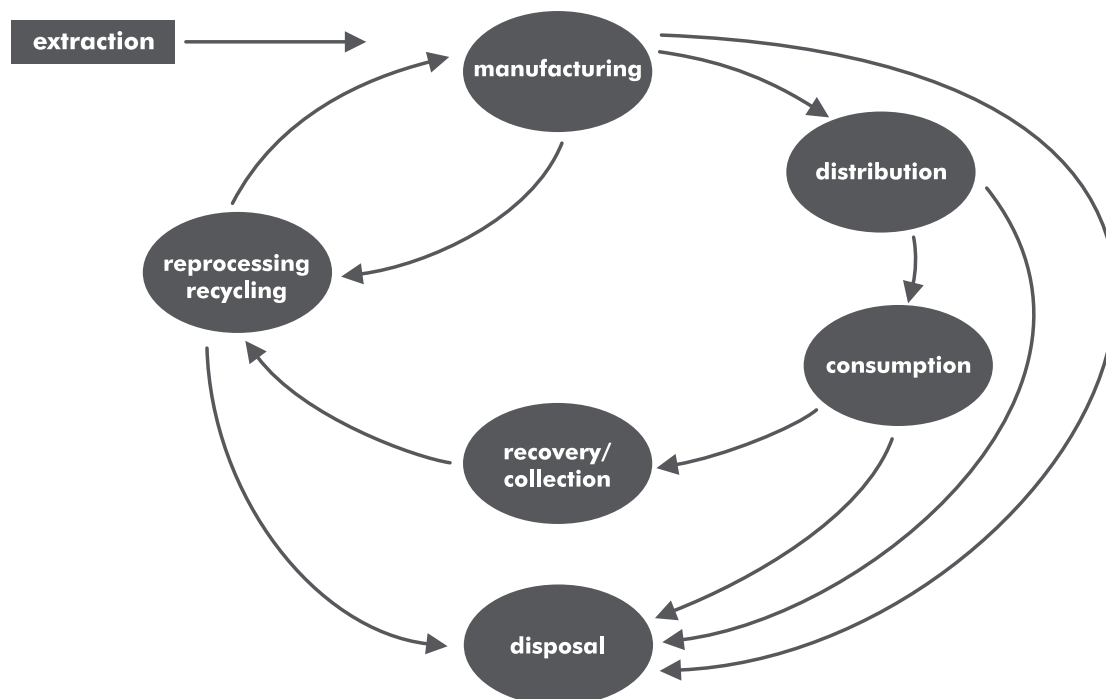


Figure 6. Life cycle of goods and materials

At every step along this chain, we can take action to avoid and prevent waste. Many of the decisions that can result in waste avoidance and prevention lie with those who design products, those who manufacture materials as inputs into products and those who manufacture the products themselves.

Decisions about material composition at the design and manufacture stage can also affect our ability to recover the products and keep them within the materials cycle. Products and packaging which contain a mix of different materials, e.g. different types of plastics (containers, cars) or paper and plastic mixes (packaging, stationery) make it difficult to ensure that it can be recovered for continued use. Even some materials that are recycled into new products can only be recycled once due to the mix of materials used in the new product, e.g. mixed plastics.

People in other parts of the system also have a role to play. Transporters and distributors of goods must introduce re-usable systems and ensure that their handling processes maximise

ability for recycling of packaging. Retailers can specify requirements for both supply and take back of products supplied for sale.

As consumers (individuals, governments or businesses) we must reduce our consumption where we can. We must also buy products with recycled content or which are designed to minimise waste and utilise available recycling systems properly to return the maximum amounts of quality materials for reprocessing.

If recyclables are spoiled with materials that contaminate them (e.g. glass or food mixed with paper, or plastics or glass with organics), this can sometimes mean that the whole load is only suitable for energy recovery or disposal, therefore losing it from our materials cycle.

## 2.14 Adopting new technologies and practices to improve resource use and recovery

New technologies and practices are available at different points in the product or supply chain to avoid and reduce waste, to recover resources or to reprocess the collected materials for other uses. The number and types of available technologies are increasing at an exponential rate.

At the manufacturing end of the supply chain, many companies undertake ongoing review of their technology and processes to improve their performance and make them more competitive. Changes to process systems are necessary and while costs may increase to achieve long term environmental and resource preservation, the community derives the environmental benefits.

New technologies and practices are also being applied to manage materials in the post consumption stage. These can apply at the post consumer collection, aggregation, reprocessing or disposal points in the system.

A decision making model which assesses individual organisational and local needs within a broader regional, environmental and social context is currently not being applied consistently at these points by decision makers in industry and local government.

Decisions about the adoption of new technologies are being driven by narrow consideration of individual technology components, sometimes without clear evidence of a performance record. There is little consideration about how to optimise system-wide operation and performance.

More rigor and a greater strategic context must be integrated into the evaluation process. It must include economic, environmental and social costs and benefits for local communities but this must be considered within a broader regional context and the whole materials flow system of which an individual technology is just a very small part.

The lack of an overall strategic plan for processing and aggregation facilities means that there is potential for ad hoc decisions based on poor information or relying on inappropriately sized collection areas. The cumulative effect of ad hoc decisions will result in a dysfunctional system. As a community, we must be able to maximise avoidance and achieve integrated resource recovery systems that obtain optimum value from the raw material.

## Responsible decision making

Decision-making must demonstrate:

- An understanding of quantities, composition and flows of materials potentially available locally for recovery, set against a consideration of different options that may be available based on a broader regional approach. This can be especially relevant in guaranteeing feedstock supply and other minimum operating requirements for the facility.
- Contribution of potential options to meet the goals and targets identified in this Strategy.
- An ability for potential options to integrate with established components and operational principles, waste management and resource recovery systems within NSW, e.g. kerbside and other recycling systems for source separated materials recovery, user-pays garbage systems, etc.
- Local planning and environmental issues, local industry resource demands and geographic circumstances.
- The reliability and proven record of the technology as evidenced by a record of efficient commercial operating success.
- Demand for end-product and the extent to which this contributes to keeping available resources cycling within the materials system.
- The economic viability of the commercial arrangement secured with the proponent, covering both financial outgoings and local economic effects.
- The environmental outcomes of the project including residual wastes and other emissions.

## 3 Framework for action

This section describes the goals and targets for each of the key outcome areas. It also identifies actions which can be taken by people in every part of the materials flow system and identifies sectors, products and materials where there are substantial opportunities for action to achieve positive change.

Achieving change in each of the system areas will not usually be able to be achieved solely by the key players in that area. Cooperation and partnerships will be needed across industry, state and local government and the community. For example, changing consumer systems and practices will need assistance from manufacturers, retailers and governments as well as individual consumers.

### 3.1 Performance targets

Broad targets are proposed for each outcome area. Material or sector specific targets relating to specific participants in the system are also proposed (see Section 3.2). These will be developed during 2003.

The broad targets for each outcome area are shown in Table 3 below. They are global targets which no single sector or group can deliver on its own. They rely on each individual, organisation, region or sector identifying the specific contribution, which they can make to help achieve them.

Outcome area	Target
Preventing and avoiding waste	To hold level the total waste generated for the next 5 years (a)
Increased recovery and use of secondary resources	By 2014, to: Increase recovery and utilisation of materials from municipal sector from the current 26% to 66% Increase recovery and utilisation of materials from the commercial & industrial sector from the current 28% to 63% Increase recovery and utilisation of materials from the construction & demolition sector from the current 65% to 76% (b)
Reducing toxic substances in products and materials.	By 2014 or earlier: To phase out priority substances in identified products as a first choice or if not possible to achieve maximum recovery for re-use and; where identified products containing these priority substances require disposal as a last resort, the permitted "leachability" of the substances will be reduced to the levels that are permitted for inert waste (c)
Reducing litter and illegal dumping	Reduce total volume and tonnages of litter reported annually. Reduction in total tonnages of illegally dumped material reported by regulatory agencies and RID squads annually.(d)

Table 3. Broad targets for each outcome area



- a) The baseline year will be 2000; waste generation will be measured by adding together the amount of waste disposed of plus amounts recycled/reprocessed.
- b) Based on Wright Aggressive scenario as set out in the *Independent Public Assessment – Landfill Capacity and Demand*. Based on scheme 7, which estimates 6-year intervals to move from our current situation to the improved scenario and then a further 6 years from improved to the aggressive scenario. Performance against the targets will be measured by calculating the proportion of material recovered and reprocessed as a proportion of the total waste generated.
- c) To be determined once products and substances are identified.
- d) Both of these targets will need to be benchmarked against 2003 performance.

In setting dates for meeting particular targets, the following issues have been taken into account:

For the waste prevention and increased recovery targets, the date for benchmarking is the baseline year 2000 since this is the most recent data available. Where new data needs to be collected, for example for the litter target, 2003 will be the baseline year.

The broad targets chosen for each area have been selected to be both practical and challenging. They take account of the strong interest in the community, business and the waste management industry in making substantial improvements in avoidance and resource recovery.

Prevention of waste adopts a target of holding waste generation level for the next five years. This means that in five years time, we are aiming to be generating no more waste than we were in 2000, even taking into account a projected population growth of around 1% per year and economic growth of around 2.5% per year.

This target will be challenging but it will also provide us with the time we need to prepare and activate a detailed Waste Prevention Strategy which will aim to reduce future generation rates instead of simply holding them steady. Resource NSW will develop this Strategy in close consultation with councils, industry and the community during 2003.

The waste prevention target will be measured in kilograms per \$100 gross state product (GSP), adjusted for inflation. This is because waste generated varies with economic activity so the most accurate measure is achieved by dividing total tonnages generated by a standard measure of economic activity, which in NSW is its GSP. We will also seek to provide information on trends per capita.

The target, baseline data, discussion about how to measure and report on waste avoidance and prevention actions, priority programs and roles and responsibilities will all be incorporated into the Waste Prevention Strategy.

Increased recovery and use of secondary materials is receiving a lot of attention with the exhaustion of landfills in metropolitan and regional areas. The Woodlawn landfill decision that capped disposal quantities for Sydney, also anticipated significant growth in recycling and re-use.

The recovery targets adopted in this Strategy are the Aggressive Resource Recovery targets proposed by Tony Wright in the *Independent Public Assessment – Landfill Capacity and*

*Demand.* Based on Wright Scenario 7, we will aim to achieve these targets over the next 12 years.<sup>34</sup> This means we need to increase our recovery levels according to the table below:

Stream	Current resource recovery <sup>35</sup>	Aggressive scenario recovery (by 2014)
Municipal	26%	66%
C & I	28%	63%
C & D	65%	76%

*Table 4. Resource recovery targets*

Applying the Wright calculations to each waste stream, we would ultimately need to recover more than 2 million additional tonnes per year on current levels for re-use and recovery in the Sydney metropolitan area. By sector, this would mean:

- Recovering an extra 700,000 tonnes from the current amount disposed of by the municipal sector
- Recovering an extra 1 million tonnes from the current amount disposed of by the C & I sector
- Recovering an extra 300,000 tonnes from the current amount disposed of by the C & D sector

Identifying extra tonnages that should be recovered in the Hunter, Central Coast and Illawarra region and rural NSW still needs to be calculated. Waste disposal data has been estimated, however, there is not a complete picture of materials recovered in NSW. Resource NSW and the EPA are currently collecting this data.

Diversions will be achieved by increasing the range and capacity of resource recovery technologies and practices to recycle and re-use more materials. In achieving these extra diversions, we will be diverting a total of 68% from disposal in 2014.

The extra tonnages we would need to recover are based on 2000 data estimates. Benchmarking and data collection for specific sectors and materials over the next 12-18 months may necessitate a refinement of the targets identified in this Strategy.

It is also important to understand that recovering additional tonnages for reprocessing is not going to happen in a regular, linear fashion, with recovered tonnages building up evenly between now and 2014. A more accurate picture will see stepwise progress with periods of time where we largely maintain current recovery levels as we lay the groundwork for the next surge forward. For example, installations of new plants are dependent on investment decisions, satisfying planning and community consultation requirements and sourcing feedstock. Experience to date suggests that this can take up to 5 years.

The adoption of the Wright Aggressive scenario, scheme 7, is a strong signal to those considering new infrastructure, that appropriate technology and practices should be adopted so that the targets can be met. Clearly, the infrastructure that we will have in 2014 will largely be that which is decided upon in the next few years. Thus 2014 is a useful planning horizon

<sup>34</sup> Wright 2000. Scheme 7 estimates 6-year intervals to move from our current situation to the improved scenario and then a further 6 years from improved to the aggressive scenario.

<sup>35</sup> Wright 2000. Sydney Metropolitan data

and is supported by analysis undertaken in the *Report of the Alternative Waste Management Technologies and Practices Inquiry* and *Independent Public Assessment – Landfill Capacity and Demand*.

The reduction of potentially toxic substances is important as small amounts can cause serious and ongoing environmental damage. Specifically, we are aiming to phase out priority substances in identified products as a first choice. If it is not possible to achieve maximum recovery for re-use<sup>36</sup>, and where identified products containing these priority substances require disposal as a last resort, the permitted “leachability” of the substances will be reduced to the levels that are permitted<sup>37</sup> for inert waste.

Initially, we will be focussing on a small number of priority substances, particularly those which, if mixed in with other wastes, potentially block or limit the recovery and recycling of the whole stream. These will be established through robust research managed by a cross sectoral steering group.

The targets focussing on reduced toxicity, to be achieved by 2014 or earlier, should encourage government to use effective regulatory, economic and educational initiatives as well as providing an incentive to industry to take action and for the community to maintain a focus on the issue. It is possible that technological and cleaner production breakthroughs could allow our targets to be met well before 2014.

Less litter and illegal dumping does not have a quantitative target since an accurate picture of the amounts of litter and illegal dumping is not available yet.

The EPA will shortly be releasing a methodology for measuring and reporting on the amount of litter we create. This will be used to benchmark our current performance and establish targets. We also need to do further work on measuring illegal dumping and measuring the effectiveness of the various strategies to tackle litter and illegal dumping.

### 3.2 Sub targets to help progress along the way

During 2003, Resource NSW will work with industry, government and the community to develop material or sector or system specific sub-targets in the four outcome areas. These sub-targets will help to provide momentum and will provide shorter-term milestones for us to work towards as we head towards the big picture targets by 2014. The sub targets will also provide a focus for action for those working in particular sectors eg retailers, manufacturers, government agencies or producing or generating particular products or materials eg office paper, food wastes, asphalt.

We will be working with key participants including industry sectors and associations, councils, government agencies and community groups to develop these targets during 2003. These could cover a variety of outcomes or commitments. Examples of sub targets could include:

- Commitments by companies or associations on behalf of members to initiate work which will deliver a measurable contribution to one or more of the 4 outcome areas

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<sup>36</sup> To be determined once products and substances are identified

<sup>37</sup> As published by the EPA

- Undertakings by Covenant signatories to report against specific and measurable waste reduction and resource recovery commitments in Action Plans for the outcome areas identified in the Strategy.
- Undertakings by companies/industry associations to publicly report waste prevention and waste reduction outcomes
- Sectors identified in Extended Producer Responsibility (EPR) Priority Statement produced by the EPA to publicly report on initiatives undertaken to prevent and recover waste
- State and local government commitments to increase purchase of recycled content office paper, recycled organics and recycled C&D materials
- Individual state and local government organisations to report against relevant Strategy outcomes in their annual reports
- Establishing minimum % recovery (yields) of dry recyclables from households with the main types of kerbside systems
- Establishing commitments to work towards established good practice for particular systems or processes
- Providing access to household hazardous waste collections to the majority of households in NSW by an agreed date eg 2005
- Providing access to collections for specified electronic wastes (e.g. computers, TVs) to households in Sydney, Hunter and Illawarra by an agreed date eg 2005
- Establishing targets to increase access to systems to recover cardboard & paper and food for offices, retail and hospitality sectors
- Establishing targets to increase access to systems to recover spoil & rubble and concrete from building & demolition sites
- Introducing public place recycling facilities across major transport nodes, adjoining council facilities and key public access areas managed by government agencies by an agreed date eg 2005
- Establishing targets for reprocessing increased tonnages of materials including garden & food organics, timber, office paper, electronic equipment, spoil and rubble and asphalt.

In developing sub targets and measuring progress, various instruments ranging from voluntary to regulatory or economic, will need to be kept under review.

### 3.3 Monitoring and reporting progress

#### Resource NSW

Resource NSW will report annually against the broad targets identified for each of the four outcome areas in the Strategy. This will commence in December 2003. Reporting will be timely so as to be included in the State of the Environment Report.

Resource NSW will also publish on its website by December 2003 those sub targets which have been established. In setting sector or material specific targets Resource NSW will be making recommendations to the Minister following consultation with interested parties.

Once the targets are established progress and milestones will be reported on as part of Resource NSW's annual reporting. This report will also include progress against key actions and initiatives identified for each part of the materials flow system.

In reporting annual performance and progress against the Strategy, Resource NSW will provide an overview of selected world-class programs and performance (both national and international) to provide a context for performance in NSW.

The annual report will be used to assess progress against the NSW Strategy. It can also be used to inform subsequent EPR Priority Statements prepared by the EPA.

#### Other key participants

All government agencies and State Owned Corporations are required to report on implementation of their Waste Reduction and Purchasing Plans in their Annual Reports. Business is also moving towards better environmental reporting which could also include their contributions to each of the four outcome areas identified in the Strategy.

Sectors identified in the EPR Priority Statement produced by the EPA should report product stewardship initiatives annually for each outcome area. Industry associations can also play a major role by facilitating data collection and reporting sector performance for wastes and sectors identified in this Strategy.

A cross-sectoral working group established to oversee a research process will identify the most potentially harmful contaminants in commercial & industrial, household and construction & demolition wastes and report by December 2003. Companies producing products containing these priority substances should report on actions to avoid or recover them; priority substances identified through this research should be also included as part of the next EPR Priority Statement prepared by the EPA.

### 3.4 Getting better data

Good data that enables all sectors in the community to measure and evaluate the progress being made in avoiding waste and recovering resources is critical. To date, the information available has been very patchy. The following initiatives will be implemented as a matter of priority and will be coordinated by Resource NSW working with the EPA.

- Undertake audits of commercial & industrial and building & demolition wastes being disposed of to confirm program priorities and gain benchmark composition data for measuring performance.
- Undertake municipal garbage audits to identify priority types and quantities of potentially recoverable materials that we must focus on.
- Develop a methodology to measure and report on waste prevention and avoidance measures.
- Undertake an infrastructure scan across NSW to identify current capacity and gaps in reprocessing capability.
- Improve current transport mapping to inform development of reverse logistics solutions to re-aggregate post-consumer resources.
- Compile data on current reprocessing capacity and tonnages of materials being reprocessed.
- Introduce standardised methodology for measuring and reporting tonnages diverted through public place and public event recycling.
- Develop and encourage use of a standardised methodology for measuring and reporting use of recycled content in products.

- Introduce standardised methodology for measuring and reporting access to resource recovery services in the municipal and commercial & industrial sectors.
- Establish benchmarks for priority sectors or materials identified for negotiation of targets.
- Establish and publicise best practice performance (including yields and participation) for priority systems such as kerbside recycling and office recycling, recovery from building sites, and for the retail and hospitality.
- Establish a methodology for surveying litter generation and illegally dumped material. Establish performance benchmarks.

In almost every case, substantial collaboration will be required with key parties including councils, specific industry sectors and facility operators to develop methodologies and measurement and reporting systems which are both accurate and user friendly.

It is recognised that although additional and better data is critical that this must not be achieved through onerous or costly requirements on councils and business. Links with, or enhancement of, existing data processes such as SOE reporting, data required by various regulatory authorities, reporting on national measures such as the packaging NEPM and mandatory WRAPP reporting by government agencies will be the first priority. Where data does not exist, mechanisms such as representative snapshots will be considered.

### 3.5 Tools for achieving change

To achieve our goals and targets we will need to use a mix of tools and approaches, not just rely on new technology. Some approaches will be implemented by industry or local government or government agencies or individuals, and some by a combination of these groups. Specific tools and approaches can:

- Support the establishment of infrastructure and systems to foster prevention and resource recovery.
- Educate people within an organisation or an organisation's customers about why we need to change our approach and how to do this in the most effective way.
- Offset or share economic and resource risks to develop improved practices or trial new ways to use reprocessed material.
- Create economic incentives to change our practices.
- Mandate requirements in order to achieve particular behaviour.
- Provide data and information to show progress being achieved by individual organisations, sectors or waste streams.

A description of some key tools and approaches is provided in Appendix 7.

### 3.6 Partners in achieving change

Key groups that must work together to achieve the outcomes and targets identified in the Strategy are outlined below.

#### Resource NSW

Resource NSW has a specific role to facilitate and implement waste avoidance and resource recovery programs on behalf of the government and community of NSW. It will support local government, business, industry and individuals to implement programs that achieve the waste avoidance and resource recovery outcomes in the priority areas identified in the Strategy. Resource NSW may also provide advice to the Minister for the Environment on matters of waste policy, expenditure under the Waste Fund and prohibition of materials or substances from landfill or other treatment processes and the resource recovery options for these.

Programs will include development and promotion of standards, best practice and assessment methodologies, cleaner production, waste avoidance research, education, data collection, benchmarking against world-class practice, evaluating, monitoring and reporting. Assistance may include expertise, financial or physical resources to assist implementation.

#### Local Government

This includes both individual councils and regional groups such as the Regional Organisation of Councils and Regional Waste Forums.

Local government needs to continue to play a significant role in the areas of:

- Service delivery and integration of systems.
- Planning and development - Local Orders Policies, Development Control Plans and infrastructure development.
- Educating their communities.
- Local delivery of programs to avoid waste and resource recovery.
- Data collection and reporting.

Local government must also play a lead role, along with state government in purchasing products and materials with recycled content where these are cost and performance competitive. This will help to support and expand markets for products with recycled content.

#### Business

The commercial sector includes businesses that work across the entire supply chain. These include industry suppliers, manufacturers, retailers, wholesalers and distributors to offices and building owners, property developers, building designers, engineers and construction and demolition companies.

The sector has two distinct groups. The first group comprises large corporations, often national or multinational, with a significant capacity to influence their supply chains and to drive internal practices that support better resource use. The other group, which forms the majority, are small to medium enterprises employing only a few people. Individually this group has a limited capacity to drive change although there are still actions that they can participate in to reduce and recover waste. Collectively they can have a significant influence.

Business has an ability to initiate change in the following ways:

- Development of waste management plans which address avoidance, reduction and recovery.
- Adoption of cleaner production techniques, including product and process redesign.
- Extended Producer Responsibility and Product Stewardship on the life cycle of products.
- Introduction of internal avoidance and resource recovery mechanisms.
- Purchase of products and materials with recycled content.
- Research and development.
- Data collection and reporting.

#### Waste and recycling industry

This sector includes operators involved in waste and resource recovery activities such as collection contractors, transporters, waste and recycling facility operators and reprocessors.

This group has an ability to drive change by working to develop new or improved:

- Integrated service delivery systems and infrastructure.
- Material specifications for recycled content products.
- Data collection and reporting.
- Information and education for system users and suppliers.

#### Industry associations

There are numerous industry associations who can play an active role in supporting and promoting new initiatives and improve their practices to reduce and recover waste. Actions include:

- Co-ordinating EPR or product stewardship initiatives.
- Supporting system redesign.
- Providing information and education to members about international and national best practice.
- Working collaboratively with others such as Resource NSW and local councils to establish best practice, standards for materials, market specifications and uptake of recycled content products.

#### Community/non-government organisations

This group includes community and environmental groups and non-profit environmental agencies and organisations that are responsible for the delivery of:

- Local programs and management.
- Education and information dissemination.
- Resource recovery businesses.

#### Education providers

The education sector spans a large number of organisations both public and private. It includes primary and secondary schools, tertiary and vocational training providers,



Cooperative Research Centres and other specialist research organisations housed within universities such as the Recycled Organics Unit at the University of NSW. Government agencies, private companies and non-government organisations also play a key role in delivering education and awareness to different groups within the community.

They can influence actions to avoid waste and recover resources through:

- Integration of information into various parts of the formal curriculum.
- Applying techniques, skills and practices in a practical setting.

A priority is the development of consistent and coordinated approaches and messages involving education providers from both formal education institutions and programs run through councils, industry associations, individual companies, ethnic communities and environment and community organisations.

#### Government agencies

All government agencies and State Owned Corporations are required to implement waste reduction and purchasing initiatives contained within their WRAPP Plans. State government needs to play a lead role along with local government in purchasing products and materials with recycled content where these are cost and performance competitive. This will help to support and expand markets for products with recycled content.

In addition, involvement through regulatory, policy and education strategies can influence waste avoidance and resource recovery. These include:

- Supporting better integrated infrastructure and systems.
- Encouraging implementation of best practice systems and process operation.
- Reviewing policies and regulation to promote waste avoidance and maximise resource recovery.
- Assisting with data collection and analysis.
- Information dissemination, education and training of key sectors within the community.
- Provision of development approvals or guidance which can influence design, construction and ongoing occupancy of dwellings.
- Trialing and assisting with development of new recycled content applications or markets.
- Development of more effective communication and community support relationships.

Some key government agencies involved in activities such as those listed above include the Environment Protection Authority, PlanningNSW, Department of Local Government, NSW Health, Department of State and Regional Development, Department of Public Works and Services, Sydney Catchment Authority, State Rail Authority, National Parks and Wildlife Service, Sustainable Energy Development Authority, NSW Waterways, Department of Agriculture, Department of Housing and the Department of Minerals and Energy Utilities.

### 3.7 Whole of system actions

The following actions will impact on waste avoidance and resource recovery across the whole system and influence each of the four outcome areas. They will need support and input from every part of the system and will be coordinated by Resource NSW. Key groups will also be involved on an ongoing basis in implementation and delivery:

1. Develop a Strategy Implementation Plan that details programs, budgets, milestones and responsibilities under each outcome area in the Strategy in collaboration with key participants.
2. Develop a Waste Prevention Strategy over the next 12 months as a companion document to this Strategy. It will identify a methodology for measuring amounts of waste prevented, specific targets for key sectors and materials, where appropriate, and detailed actions needed to achieve these.
3. Establish whole of supply chain monitoring and reporting.
4. Initiate whole of system product stewardship initiatives to prevent waste, recover resources, phase out identified toxic substances and reduce litter and illegal dumping.
5. Establish a cross-sectoral group to oversee research to establish the most potentially harmful contaminants in commercial & industrial, building and demolition and household hazardous waste. Use this research to identify priority substances.
6. Establish a NSW Litter and Illegal Dumping Action Alliance.
7. Establish a coordinated, statewide education strategy to support waste avoidance and resource recovery which involves and integrates the efforts of education providers from formal education institutions with programs run through councils, other state government organisations, individual companies, industry associations, ethnic and other community organisations. This strategy will be consistent with the NSW Environmental Education Plan 2002-05, recently endorsed by the Government.

### 3.8 Action opportunities for specific products and materials

The following table provides a summary of those materials which offer substantial opportunities for action. They are grouped according to the 4 outcome areas in the Strategy.

Outcome area	Products/materials offering substantial opportunities for action
<b>Avoiding and preventing waste</b>	Household hazardous waste, especially paint, oil, batteries & smoke detectors Paper & cardboard Food Packaging, including plastic bags Treated timber Office paper
<b>Reducing non renewable and recovering resources</b>	Paper & cardboard Office paper Packaging, including plastic bags Food & garden organics Timber Electrical (computers, TVs) Concrete, asphalt & bitumen Spoil & rubble Paint Tyres Batteries (all types) Dry recyclables Household hazardous wastes Electrical/computers Oil
<b>Reducing toxic substances</b>	Household hazardous wastes, including paint, oil, batteries, smoke detectors, medical wastes Treated timber Electrical products especially TVs & computers
<b>Reducing litter and illegal dumping</b>	Packaging, including plastic bags Cigarette butts Building & demolition materials Tyres Household wastes Sharps

Table 5. Materials offering action opportunities for each outcome area

### 3.9 Actions needed in each key outcome area

This section identifies the specific participants who will need to work together or make individual efforts to contribute to a particular outcome area and the broad actions and initiatives that are needed.

These actions, including roles and responsibilities for making them happen will need to be further developed during 2003. This will involve the development of an Implementation plan which includes roles, responsibilities and milestones for delivery. In many cases, these more detailed actions and roles will flow from sub targets that are established for particular materials or parts of the system.

The actions identified in this section should also be used by participants and sectors to guide their own organisational planning and consideration of possible sub targets for discussion with Resource NSW during 2003.

In addition, a Resource NSW work plan will be published during 2003 outlining the specific activities and support programs that will be undertaken by Resource NSW to progress the Strategy.

Outcome 1: Preventing and avoiding waste

#### Key players

Key players who must make a major contribution to avoid and prevent waste are:

*Manufacturers* – product redesign to reduce total material and energy inputs used per unit of production and to design for re-use.

*Offices* – review and improve office systems and practices to avoid the unnecessary use of resources, particularly paper.

*Retailers* – review and improve stock management and product purchasing practices to reduce waste from spoilage and to proactively support re-usable and recycled content products. Introduce systems to encourage less use of and re-use of packaging e.g. plastic bags.

*Transporters* – review and improve transport packaging and systems to enable re-use.

*Households* – review purchasing habits including reducing food wastage and support re-use and repair centres where available.

#### Key actions needed

The actions needed to achieve progress towards this outcome will be expanded in the Waste Prevention Strategy which will be developed during 2003.

#### System improvement mechanisms

We need system improvements to:

- Reduce material inputs per unit of production in manufacturing.
- Redesign products and systems to enable disassembly and re-use or repair of various components.
- Improve capacity to minimise rejection of material and treat or utilise more highly contaminated recovered materials for feedstock.
- Enable increased use of recovered materials to replace virgin materials.

- Expand availability of re-use and repair options for products and materials.

### Education

We must develop and implement education programs to assist people in all aspects of their lives to avoid and prevent waste. Education will need to play a pivotal role, however, at present we have insufficient information about current knowledge, motivations and practices to enable us to design and evaluate programs. Gathering of this information through social and other research will be a priority for 2003.

Priorities for action include workplaces where there is potential to avoid large quantities of office waste, e.g. paper and increasing awareness about preventing waste when we purchase products and materials – for home, work, production or leisure. Increasing community awareness of and access to facilities for re-use and repair is another important part of our recovery system which is currently under developed.

In addition, information and assistance needs to be available to manufacturers and others in the supply chain to improve product design and processes. This will reduce material and energy inputs. Those working within the supply chain, including industry associations, have the primary responsibility for this; however, there is also a role for government programs such as cleaner production partnerships to assist.

### Waste Reduction and Purchasing Plans

Waste Reduction and Purchasing Plans must all include a component that specifically focuses on actions to prevent the creation of waste in the first place. These must be supported as a high priority within the organisation. Efforts and successes should be included as part of reporting and internal feedback to the members of the organisation.

### Extended Producer Responsibility and Product Stewardship

System and process improvement, product redesign and increased community information to prevent waste are primarily the responsibility of the manufacturer and brand owner in the supply chain to the consumer. Initiatives must be driven by all industry sectors responsible as part of their product stewardship obligations.

### Corporate environmental reporting

Businesses are moving towards better environmental reporting and should ensure that their initiatives and achievements to reduce material and energy inputs are reported. This provides leadership and guidance to others as well as illustrating their role in product stewardship to the community.

### Eco-efficiency and cleaner production support

The NSW Government will continue to support cleaner production initiatives through the work of the EPA and Resource NSW. Industry associations and individual industries, assisted by government should ensure that the results and outcomes of such initiatives are widely distributed.

It is also critical for those organisations that have participated in cleaner production initiatives work to integrate the new practices and systems into daily work. Too often, the initiative is restricted to a single system or element and is not continued or integrated across the organisation on an ongoing basis.

### Economic tools

The use of economic tools represents an emerging field for development of innovative approaches to achieving improved environmental and resource management. It is recommended that ongoing work be undertaken to identify potential for applying economic instruments to encourage greater waste prevention and avoidance. This includes mechanisms for increasing the effectiveness of the waste levy, increasing the range of economic tools applied by local government and investigating opportunities for applying economic tools not currently used to encourage effective waste management and resource recovery.

Outcome 2: Increased use of renewable and recovered materials

### Key players

Key players who must make a major contribution to enable increased recovery and re-use of these materials are:

*Manufacturers* – redesign and recovery of materials such as food products, packaging, paint, batteries and products using batteries, electrical goods.

*Offices generating office paper* – education and systems for tenants, building owners and managers.

*Collection infrastructure managers* – new or improved systems for recovery of packaging, electrical, paint, food and garden organics, office paper, paper and cardboard, spoil and rubble, batteries, concrete and asphalt.

*Reprocessors* – new or improved processes for electrical, food and garden organics, office paper, concrete, brick and timber.

*Regulatory authorities* – EPA, Planning NSW, councils.

*Consumers* – purchase recycled content products including paper, recycled organics and recycled construction and demolition materials.

*Local and state government* – use more recycled organics and recycled building and construction material and paper.

*Retailers* – purchasing policies and practices for all products.

### Key actions needed

There are many recoverable materials that are currently present in large quantities in our municipal, commercial & industrial or construction & demolition waste. Systems must be established or improved to collect and recover these in ways that preserve their value and quality. Markets need to be expanded or developed to enable these recovered materials to be used as feedstock for new products.

### System improvement mechanisms

An important challenge of this Strategy is to support better integration of waste management within the environmental planning system. The PlanFirst initiative of Planning NSW provides a good opportunity to achieve this. We need to create decision-making processes that can integrate considerations about the need for new waste or resource recovery infrastructure with growth strategies. The integration of such facilities with broader infrastructure requirements, such as transportation systems, is another important benefit that could flow from a more strategic alignment with the planning system.

Development control and assessment and approval processes under the *Environmental Planning and Assessment Act 1979* can more actively support the establishment of resource recovery facilities and infrastructure which are responding to the opportunities and actions identified in the Strategy. There is a significant opportunity to work to undertake broader strategic environmental assessments at a sectoral level, which would help streamline and facilitate an improved assessment process at the project level.

To address these issues, Planning NSW will co-ordinate the preparation of a planning and assessment framework to facilitate the implementation of this Strategy and its infrastructure requirements. The framework will clarify the locational, statutory and planning and environmental performance aspects. Further, the use of a strategic environmental assessment approach to the sector will be explored.

Other major changes which are needed include:

- Developing guidance material for decision makers to ensure that decisions relating to new systems and technologies reflect full consideration of total system needs and operation.
- Providing an accurate picture of overall infrastructure availability and relationships; this is another important tool that will assist planners and decision makers.
- Developing best practice guidelines and specifications for targeted materials. Priorities include best practice for office paper, electrical goods and food collection systems; re-use specifications for timber, asphalt, plastics and organic materials.
- Supporting implementation of best practice systems – especially kerbside, offices, organics.
- Introducing collection or take-back systems for household hazardous wastes and electronic equipment, particularly computers and TVs.
- Supporting introduction of standardised public place recycling stations with priority areas being major public spaces run by government agencies, major transport routes and nodes and council areas adjoining these.
- Developing re-usable distribution packaging and processes and exploring innovative reverse logistics solutions for re-aggregating post-consumers materials and delivering these back to reprocessors.
- Increasing R&D to enable more recycled materials to be used in product manufacture.
- Improving systems for management of household medical wastes, particularly sharps in order to reduce contamination of recycling streams or disposal in mixed waste which can limit options for resource recovery.

### Education

Key areas where additional information and education strategies will be critical to deliver change include:

- Undertaking research to establish consumer attitudes and behaviour (government, business and individuals) to recycled content products and develop strategies to overcome these.
- Developing an integrated government agency approach to working with primary and secondary schools to assist them to develop and implement the new School Environmental Management Plans required by the Department of Education and Training.
- Providing consistent and coordinated education for users of material collection systems, e.g. kerbside, at work, public place, to use the system to maximise yields and reduce contamination.

- Providing increased awareness and support to enable companies in all parts of the supply chain to exercise and participate in product stewardship initiatives.
- Providing training and assistance including through formal training and vocational courses to increase awareness of and capability to use more recycle in products.

#### Environmental assessment tools

Our priority must be to identify key areas in need of Life Cycle data and initiate programs to gather this. Such data will enable consideration of the relative merits of systems and processes for recovering materials. Priorities for consideration should include food and garden organics collection and potential recovery processes.

#### Waste Reduction and Purchasing Plans

Key actions should include:

- Establishing purchasing priorities for recycled office paper and other products containing recycled materials. This should include equipment that can reduce waste, e.g. printers that can print double-sided.
- Local and state governments making a concerted effort to use more recycled organics and recycled construction and demolition material. These products are both cost and performance competitive and the quantities used by these organisations will provide a substantial boost to the market.
- Major businesses and government agencies (state and local) need to put in place systems to recover office paper and paper and cardboard. If systems exist, they should be reviewed to ensure they are working efficiently and collecting maximum amounts of materials, without contamination, so their future use is assured.

#### Extended Producer Responsibility and Product Stewardship

Manufacturers must work with their supply chains to demonstrate increased producer responsibility and product stewardship. Key actions must include:

- A more concerted effort to support the National Packaging Covenant through robust Action Plans that deliver waste avoidance and substantially increased recovery of packaging and paper products.
- Initiatives to establish greater recovery and capacity for re-use of office paper, food organics, electrical products, paint, packaging and timber. Changed practices throughout the supply chain must be driven by those who have the greatest influence within the chain, often major manufacturers and retailers.
- Establishment of product specifications to encourage increased use of recovered materials.
- R&D to develop new uses for recycled material and to improve materials recovery systems.
- Collection of data to demonstrate use of recycled material and rates of recovery.
- Sector specific support to improve waste avoidance and resource recovery in retail food, accommodation and hospitality sectors.
- Information for consumers to assist with product choice.
- Internal company reviews to identify further opportunities for product and process re-design.



- Work on a supply chain level to identify opportunities for better integration of parts of the chain and potential for reverse logistics to increase recovery of post-consumer material for delivery to new users.

#### Corporate environmental reporting

Individual companies or sectors are missing opportunities to inform the community about the actions they are taking to improve their environmental performance. Annual reports should include information about specific product stewardship initiatives relating to improving product or material design or processes to reduce waste, incorporation of recycled material into manufactured products and purchasing products with recycled content, increased yields and quality of recovered material and measures taken to assist new market development.

#### Research and development support

The Government has established a research and development program to support new approaches for recovering resources and reducing the environmental impacts of technologies and processes. The program will address barriers that are impeding operation or efficiency of new or existing resource recovery technology. It will help to refine feedstock from waste materials that can be incorporated into products and it will also provide comparative research into environmental impacts of alternative uses for particular materials and the different resource recovery and waste treatment options that currently exist.

Initiatives that achieve change in six key areas are being considered:

- Improved whole of system outcomes
- Technology development/commercialisation
- Feedstock and product development
- Reduction of environmental impacts
- Increased resource efficiency
- Regional technology and system needs

#### Eco-efficiency and cleaner production support

EPA and Resource NSW currently run programs that support companies to identify opportunities to introduce improved processes to avoid and reduce waste and other emissions. A number of these programs are run in collaboration with industry associations and there may be opportunities to expand these programs.

To further support uptake of eco-efficiency and cleaner production:

- Industry associations must become more proactive in informing members about international, national and local examples and results of process redesign.
- Industry associations should collect and distribute information on cost savings and environmental and social benefits that may have resulted from changes, therefore encouraging take-up by others.

#### Recyclate market development mechanisms

Increasing demand for recovered materials is critical to making the system sustainable. If we cannot find uses for the recovered materials by substituting them for virgin materials in existing products and by finding new uses for them there is no point in collecting them.

Areas for priority market development or expansion include office paper, garden and food organics, tyres, components from used electrical products, including plastics, asphalt and spoil and rubble.

To achieve increased use of recovered materials, the following actions are needed:

- Local and state governments must make a concerted effort to use more recycled organics and recycled construction and demolition material. These products are both cost and performance competitive and the quantities used by these organisations will provide a substantial boost to the market.
- User specifications must be developed for the priority materials listed above so that both participants in the collection and reprocessing sectors can ensure the best quality materials are recovered.
- Development of a coordinated program to support expanded use of recycled organic materials.
- Demonstration trials and case studies for specific products to illustrate performance and costs. These include recycled organics and recycled construction & demolition materials.
- Specific research to identify user needs so that products containing recycled material can be tailored to these needs. This is particularly important for potential users of recycled organics and construction and demolition materials.
- More cost and performance information to be made available to potential users.
- Information available on the relative costs of virgin materials compared with recycle (including any current subsidies for virgin materials)

### Regulation

In some cases, a regulatory approach may prove to be the most appropriate response to achieve change.

The EPA should establish data and monitoring processes to report performance on EPR Priority Statement wastes. It should also research the full range of tools available to apply specific regulatory instruments such as Advance Disposal Fees to identified priority products, including a detailed assessment of any barriers to the implementation of these tools.

### Economic tools

The use of economic tools represents an emerging field for development of innovative approaches to achieving improved environmental and resource management. It is recommended that ongoing work be undertaken to identify potential for applying economic instruments to encourage greater waste avoidance and resource recovery. This includes mechanisms for increasing the effectiveness of the waste levy, increasing the range of economic tools applied by local government and investigating opportunities for applying economic tools not currently used to encourage effective waste management and resource recovery.

## Outcome 3: Reducing toxicity in products and materials

### Key players

Key players who must make a major contribution to reduce toxicity in products and materials are:

*Manufacturers* – product or process redesign to remove or phase out potentially harmful substances; consumer education to ensure safe storage, recovery and disposal.

*Retailers* – consumer information to enable support for products containing more benign substances.

*Transporters* – industry and generator education to enable safe storage and disposal.

*Councils* – consumer education to ensure safe storage, recovery and disposal.

*Consumers* – right to know and acting on information; participation in post consumer collection systems and safe disposal practices.

#### Key actions needed

##### System improvement mechanisms

We need to develop improved systems to enable those products with potentially harmful substances to human health or the environment to be stored and managed safely. Where possible these should be collected separately so they do not contaminate the materials they are mixed with and make these harder to recover and re-use.

During 2003, Resource NSW will be funding household chemical collections throughout NSW. Householders will be encouraged to clear out old and unwanted products. The aim is to clear historical stocks of household chemicals which social research suggests are present in many homes.

##### Education

We need to improve access to information to assist various sections of the community to improve their storage and disposal of materials containing potentially harmful substances. We also need to increase awareness to enable purchasing choices where more benign alternatives exist.

##### Environmental assessment tools

Life cycle analysis or other assessment tools may be useful to help to identify those substances in products that are most critical to remove or phase out. We need to identify where existing research has already indicated potential to affect human health or the environment and determine whether additional research in Australian conditions is required. Applying the precautionary principle, we must also identify where a more benign substance may be available and should be used, regardless of whether an impact has been proven.

##### Waste Reduction and Purchasing Plans

Plans should, where appropriate, include actions to remove or replace potentially harmful substances with more benign ones.

##### Extended producer responsibility and product stewardship

Manufacturers must work on redesign and phase out mechanisms for potentially harmful substances as part of their extended producer responsibility obligations. Other supply chain members should identify opportunities to eliminate such substances in their processes and increase education for better handling, storage and disposal.

### Corporate environmental reporting

Reporting should include initiatives to remove or replace potentially harmful substances with more benign ones.

### Research and development

Removal of harmful substances from products and materials must be undertaken by industry in order for us to achieve sustainability. There will be opportunities for support for initiatives to phase out potentially harmful substances as part of the Government's R&D programs. Allocations for R&D in this area should also be identified as a priority EPR initiative for companies whose materials are identified as priority substances.

### Eco-efficiency and cleaner production support

Cleaner production initiatives should ensure that consideration is given to options for more benign substances in processing and products.

### Regulation

Where alternative substances exist or where potential environmental impact can be proven, consideration should be given to regulation which bans particular substances from disposal or requires phase out from products.

## Outcome 4: Reducing litter and illegal dumping

### Key players

Key players who must make a major contribution to reduce littering and illegal dumping:

*Manufacturers* – product redesign to reduce potential for littering and support for anti-litter and anti-dumping measures throughout the supply chain.

*Retailers* – improved systems to reduce litter, e.g. improved bin placement, increased numbers of bins; consumer education.

*Transporters* – sector wide best practice, education and quality assurance to deter illegal and irresponsible operators.

*Waste industry* – facility management to reduce littering from sites.

*Councils and the State Government* – increased education and increased enforcement and prosecution of illegal dumpers and litterers; support and participation in Regional Illegal Dumping (RID) Squads

*Construction and demolition industry* - sector wide best practice, education and quality assurance to deter illegal and irresponsible operators.

*Real Estate Agents and public housing providers* – tenant information and education about responsible disposal practices and available recycling services.

*Individuals* – increased vigilance to identify irresponsible transporters; personal responsibility for not littering.

### Key Actions needed

Reducing littering and illegal dumping needs effective education so that the community understands the potential impacts of dumping and littering and the consequences of

undertaking such actions. We also need appropriate infrastructure and product design to reduce the likelihood of littering. Supporting this, we need a strong regulatory system which supports regulatory authorities to take swift and effective action against those who choose to dump and litter.

Using the tools outlined above, priority actions that will be critical to achieving our goal and targets include:

#### System improvement mechanisms

We need to:

- Review and analyse sources of litter.
- Support better bin placement through observation of litter behaviour and analysis of crowd flows to minimise littering potential.
- Foster sector wide support to ensure that everyone is following monitoring and reporting requirements for waste tracking.
- Encourage increased vigilance from site managers who consign materials for disposal to require accountability from transporters to ensure that charges are realistic and that the proposed disposal point is known.
- Review the adequacy and placement of litter bins in public areas. Co-location with recycling containers may also serve to reinforce the value of the container and encourage positive recycling behaviours.

The EPA will shortly be releasing a methodology for measuring litter generation in NSW. This will provide the basis for benchmarking our current performance, setting litter reduction targets and identifying additional system improvements.

#### Education

Both broad-based and sector-specific education is needed and this must be ongoing. The Government's Litter Taskforce drives coordinated litter action across government land management agencies. The proposed new cross-sectoral Litter and Illegal Dumping Action Alliance must promote and support action to reduce the environmental, health and financial impacts of littering and dumping. Representation will be sought from government agencies, local government, environment and community groups.

Assistance should also be provided to those within the community who may unwittingly assist dumpers. For example, some landowners unknowingly accept materials onto their land that may not lawfully be disposed there, others may be unaware of tracking and reporting requirements, or those consigning materials may not think to check the intended destination. Increased support should be provided to regulatory authorities such as councils to increase their ability to effectively enforce and prosecute litterers and dumpers.

We must also continue to research why people litter or illegally dump and identify those measures that will be most effective in deterring or addressing this.

#### Environmental assessment tools

Life cycle analysis data may be useful to identify key substances that could be replaced or reduced in a product in order to reduce the longevity or potential environmental or ecological harm caused if the product is littered or dumped.

#### Waste Reduction and Purchasing Plans

Waste Reduction and Purchasing Plans should include a review of littering or dumping within an organisation's grounds or properties that it manages. Litter and dumped material are part of the

waste stream. They carry a cost of clean up which is sometimes quite substantial. Actions to reduce these will reduce operational costs.

#### Extended Producer Responsibility and Product Stewardship

Manufacturers need to review product design to minimise littering potential. This could include reducing detachable parts or design for re-use, thereby discouraging disposal. Retailers and manufacturers of frequently littered products must work harder to encourage responsible disposal practices through provision of adequate numbers of properly placed and serviced bins. This includes containers for cigarette butts.

#### Corporate Environmental Reporting

Companies should be encouraged to report initiatives to support less littering. They should also report initiatives to reduce littering within the company's own building and surrounds, or broader community initiatives to support cleanup and anti-dumping.

#### Regulation

Regulatory measures and penalties related to illegal dumping and littering should be regularly reviewed. The upcoming EPA review of the regulatory framework for waste management should consider any mechanisms for increasing the effectiveness of current tracking and reporting requirements by facility operators, waste generators and activities.

In cases where littered or dumped material is a key consideration in identifying a sector or product in the EPA Priority Statement produced by the EPA, the EPA should ensure that processes established to track and report performance of the sector include contribution to the litter stream or reported dumping incidences.

### 3.10 Actions needed in key parts of the materials system

To provide extra guidance for those in each part of the materials flow system, key actions and improvements aimed at achieving the four outcome areas have been described in the following tables. Collectively, the tables cover the whole system as shown in Figure 7 below:

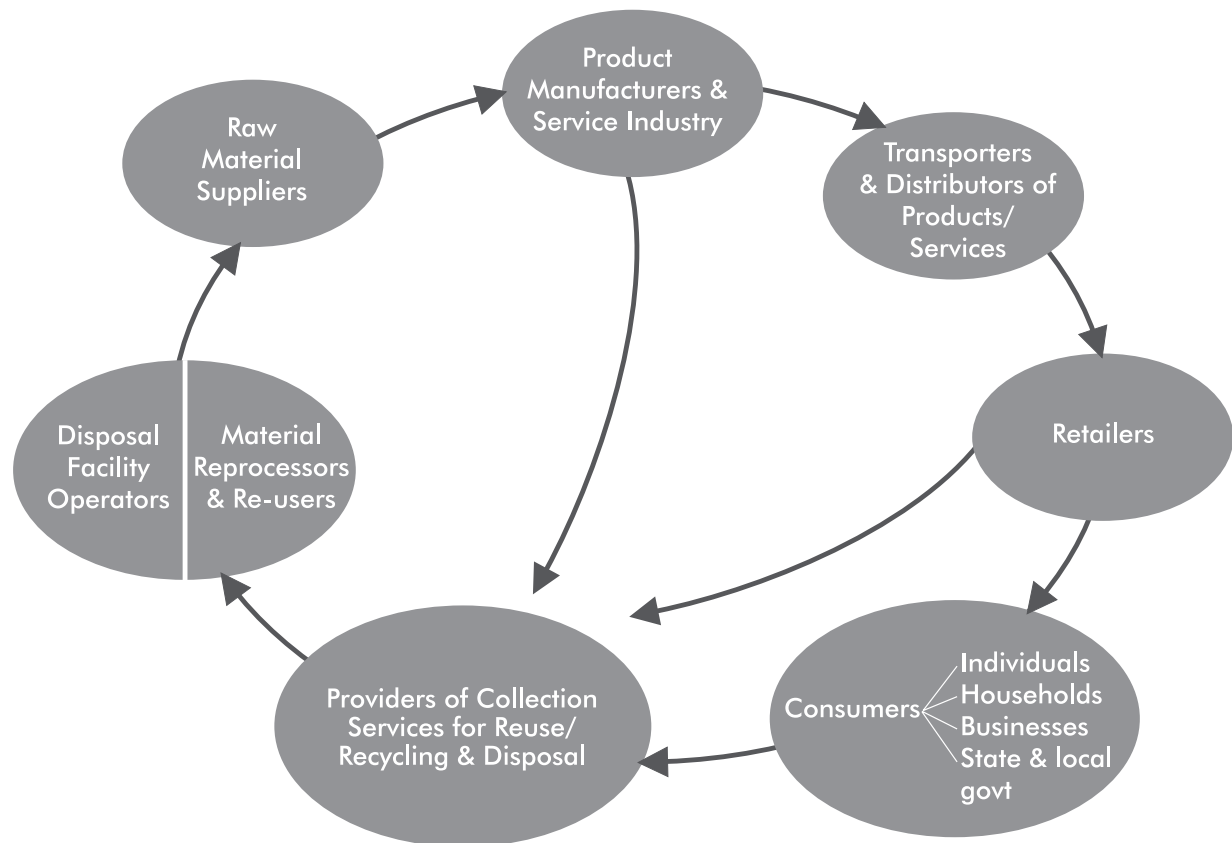


Figure 7. The materials flow system

Proposed actions have been divided into two types:

- *Support framework* actions refer to work needed to improve the physical, technical and information systems that form the framework for achieving our outcomes. For example, we cannot achieve recovery of resources without a physical system to collect them, reprocessing facilities, information about how the system works and what it needs to work at optimum capacity, e.g. material specifications, information about what can be accepted for recycling. This framework is needed for the broader community, councils and industry alike. It forms the materials flow and supply chain system for products and services.
- *Changing practice* actions assume that the framework and system is already there to enable people to make decisions and take actions to prevent waste and use our resources better. What is needed are support programs and materials to influence and assist people to actually change their behaviour and to use the support framework that has been

established. Again, supporting people to change their actions needs to happen at every level i.e., involving households, commerce, industry, governments and consumers. Examples of actions to change practice include awareness and education campaigns to encourage people to use recycling systems and present materials correctly or to exercise their power as consumers to purchase products containing recycled content.

Actions listed in the following tables only represent a selection of initiatives which could be considered in each part of the system.

Actions required in the raw material supply part of the system

Outcome area	Key actions to achieve change		Groups involved in delivery
	Support Framework	Changing Practice	
<b>Preventing and avoiding waste</b>	Refine product feedstock processes to minimise rejection and maximise process performance.	Develop performance specifications to encourage recycled feedstock.	Individual companies, industry associations, Resource NSW, local government.
<b>Increasing use of renewable and recovered resources</b>	Explore reverse logistics solutions to re-aggregate post-consumer materials Overcome technical and economic barriers to incorporating recycled materials into feedstock	Establish standards and specifications for supply of key materials: paper & cardboard grades organics timber spoil & rubble concrete/asphalt	Individual manufacturing companies, industry associations, transporters, reprocessors
<b>Reducing toxic substances in products and materials</b>	Work with manufacturers on product stewardship initiatives		Industry, industry associations
<b>Reducing litter and illegal dumping</b>	Support product stewardship initiatives		Industry, industry associations

Table 6



Actions required in the product manufacture and service provision part of the system

Outcome area	Key actions to achieve change		Groups involved in delivery
	Support Framework	Changing Practice	
<b>Preventing and avoiding waste</b>	<p>Undertake product stewardship initiatives to:</p> <p>Address technical barriers to substituting less harmful substances.</p> <p>Introduce/support re-use and/or recovery schemes for products.</p> <p>Develop LCA data for key products.</p> <p>Re-design products to reduce material inputs or potentially harmful substances.</p>	<p>Increase take-up of waste prevention measures, e.g. cleaner production, product re-design.</p> <p>Increase training to focus on redesign and waste prevention measures through cleaner production initiatives, etc.</p>	Individual companies, industry associations, Resource NSW.
<b>Increasing use of renewable and recovered resources</b>	<p>Overcome technical and economic barriers to incorporating recycled materials into products.</p> <p>Company/sector wide commitment to increasing use of recycled materials and buying recycled content products.</p>	<p>Product stewardship initiatives to:</p> <p>Reduce waste in production process, designed for recycling and incorporate more recycle into products.</p>	Sectors identified in EPR Priority Statement produced by the EPA should report on initiatives undertaken to prevent and recover waste.
<b>Reducing toxic substances in products and materials</b>	<p>Initiate/participate in product stewardship initiatives, e.g.:</p> <p>Overcome technical barriers to substituting less harmful substances.</p> <p>Undertake life cycle analysis studies on products.</p> <p>Undertake product re-design measures to reduce material inputs or substances that hinder recycling, which enable re-use, increase durability.</p> <p>Evaluate options for recovery/take back or treatment of post-consumer products.</p>	<p>Staff training to increase focus on redesign and identification of waste prevention measures through cleaner production, eco-efficiency initiatives, etc.</p>	Those sectors, identified in EPR Priority Statement produced by the EPA, with potential to reduce toxicity of material inputs should identify specific initiatives being undertaken and to report these.
<b>Reducing litter and illegal dumping</b>	<p>Review product or service design to reduce components which can be littered.</p>		Individual companies, industry associations.

Table 7

Actions required in the transport and distribution parts of the system.

Outcome area	Key actions to achieve change		Groups involved in delivery
	Support Framework	Changing Practice	
<b>Preventing and avoiding waste</b>	Increase transport packaging and hardware which is re-useable or which use less materials.	Educate users to maximise life of re-usable transport and packaging systems.	Individual companies, industry associations.
<b>Increasing use of renewable and recovered resources</b>	Explore reverse logistics solutions to re-aggregate post-consumer materials. Increase transport packaging and hardware which is recyclable or has recycled content.	Redesign transport packaging for re-use.	Individual companies, waste industry, industry associations.
<b>Reducing toxic substances in products and materials</b>	Develop improved handling techniques.	Training to ensure responsible handling and disposal.	Waste transport industry, EPA.
<b>Reducing litter and illegal dumping</b>	Review and improve company systems and regulatory frameworks for monitoring reporting and verifying delivery of loads.	Promote and support adoption of best practice. Education about requirements for monitoring and reporting material movements. Raise awareness about illegal landfilling.	Waste industry, individual companies, EPA, Resource NSW, council RID squads.

Table 8

## Actions required in the retail and service provision parts of the system

Outcome area	Key actions to achieve change		Groups involved in delivery
	Support Framework	Changing Practice	
<b>Preventing and avoiding waste</b>	Explore new sales and marketing approaches to increase options for leasing, renting, etc. rather than sale of product.	Promote alternative use/service options available.	Individual companies, industry associations.
<b>Increasing use of renewable and recovered resources</b>	Introduce new or improve existing systems for recovery of materials for recycling.  Introduce better source separation systems (back of house).	Support participation in product stewardship initiatives.  In-house education about recycling systems to encourage participation and minimise contamination of materials.	Individual companies, industry associations, Resource NSW.
<b>Reducing toxic substances in products and materials</b>	Initiate/participate in product stewardship initiatives.  Information for consumers.  Explore options for take-back for return to manufacturer.	Promote responsible use, storage and recovery & disposal options to consumers.	Individual companies, industry associations, product manufacturers & designers.
<b>Reducing litter and illegal dumping</b>	Initiate product stewardship initiatives.  Improve systems and services in proximity to retail outlets to minimise opportunities for littering.	Promote responsible disposal.	Individual companies, industry associations, councils, EPA, Resource NSW.

Table 9

Actions required by and for consumers (individuals, households, businesses and governments)

Outcome area	Key actions to achieve change		Groups involved in delivery
	Support Framework	Changing Practice	
<b>Preventing and avoiding waste</b>	Provide easy access for consumers to product information Provide information about practices which can avoid and prevent waste.	Use available information on products to choose no waste & re-useable products Practise waste prevention.	Individuals, government, all purchasing departments, retailers, product suppliers.
<b>Increasing use of renewable and recovered resources</b>	Provide information about re-use and repair opportunities and recycling facilities and systems. Improve useability of reuse and recycling operations.	Use available information on products to choose re-cyclable and repairable products. Use available recycling systems. Purchase recycled content materials.	Retailers, industry associations, environment groups, Resource NSW, councils
<b>Reducing toxic substances in products and materials</b>	Develop information on safe use, storage and disposal of product.	Use and store and dispose of products safely Purchase products containing benign substances	Councils, Resource NSW, industry, industry associations, environment groups.
<b>Reducing litter and illegal dumping</b>	Improve systems to support correct disposal. Raise awareness about illegal landfilling.	Generators exercise responsible care in dispatching loads for disposal. Responsible disposal behaviour from individual consumers.	Individuals, EPA, Resource NSW, companies, councils.

Table 10

## Actions required for recycling collection &amp; service parts of the system

Outcome area	Key actions to achieve change		Groups involved in delivery
	Support Framework	Changing Practice	
<b>Preventing and avoiding waste</b>	Refine systems to maximise recovery of materials delivered to reprocessors.	Educate collection system users to increase yields of clean, uncontaminated material.	Feedstock suppliers, manufacturers, transporters, reprocessors, councils, industry associations.
<b>Increasing use of renewable and recovered resources</b>	Explore reverse logistics solutions to re-aggregate post-consumer materials. Establish clear specifications for material received. Improve operational efficiency of systems to maximise yields and useability of recovered material.	Promote and adopt best practice.  Promote material specifications.	Individual companies, waste industry, industry associations, councils.
<b>Reducing toxic substances in products and materials</b>		Educate users about the collection system and reducing contaminants	Waste industry, facility operators, councils
<b>Reducing litter and illegal dumping</b>	Improve system management and container design to reduce litter	Improve system management and container design to reduce litter  Educate system users	EPA, councils, waste industry

Table 11

## Actions needed in the reprocessing part of the system

Outcome area	Key actions to achieve change		Groups involved in delivery
	Support Framework	Changing Practice	
<b>Preventing and avoiding waste</b>	Refine systems to maximise recovery of materials delivered to reprocessors.	Educate collection system users to increase yields of clean, uncontaminated material.	Feedstock suppliers, manufacturers, transporters, reprocessors, councils, industry associations.
<b>Increasing use of renewable and recovered resources</b>	<p>Explore reverse logistics solutions to re-aggregate post-consumer materials.</p> <p>Expand systems for recovery of priority materials.</p> <p>Establish and support adoption of best practice.</p> <p>Improve material separation and streaming.</p> <p>Introduce a comprehensive standardised system of public place and event recycling.</p>	<p>Promote best practice.</p> <p>Increase industry awareness of actions for improving system efficiency.</p>	Transport companies, waste industry, industry associations, councils, Resource NSW, environment groups, Planning NSW.
<b>Reducing toxic substances in products and materials</b>	Initiate/participate in product stewardship initiatives.	Explore technologies for recovering potentially harmful substances.	Facility operators
<b>Reducing litter and illegal dumping</b>	Improve system management and container design to reduce litter.	Increase education about requirements for monitoring and reporting material movements.	EPA, councils, waste industry.

Table 12

Actions required in the disposal facility and waste collection part of the system

Outcome area	Key actions to achieve change		Groups involved in delivery
	Support Framework	Changing Practice	
<b>Preventing and avoiding waste</b>	Establish or support re-use centres at disposal facilities or transfer/drop off centres.	Encourage customers to sort out products and materials for re-use	Facility operators, councils, community organisations
<b>Increasing use of renewable and recovered resources</b>	Provide facilities for drop off of streamered wastes to increase resource recovery. Explore systems for recovering recyclable materials from mixed waste loads.	Educate & encourage customers to stream wastes for recycling.	Facility operators, waste industry, industry associations, councils.
<b>Reducing toxic substances in products and materials</b>		Educate customers about safe disposal and other available recovery systems.	Facility operators; service providers.
<b>Reducing litter and illegal dumping</b>	Improve collection service and facility management to minimise creation of litter.		Facility operators

Table 13

# Appendices

- Appendix 1. Glossary of terms
- Appendix 2. Consultation
- Appendix 3. List of other relevant legislation
- Appendix 4. Relevant provisions of the *Waste Avoidance and Resource Recovery Act 2001*
- Appendix 5. International waste minimisation targets
- Appendix 6. Groups addressing waste management and resource recovery issues in Regional NSW
- Appendix 7. Tools to achieve change
- Appendix 8. References



## Appendix 1: Glossary of terms

### **Advance disposal fee**

A fee is levied at the point of production and can be used to support recovery or safe disposal of the product. This approach can be both voluntary and mandated. There is currently a levy on domestic and imported oils in Australia which is paid by oil producers and importers.

### **Australian Standard**

A Standard is a published document which sets out specifications and procedures designed to ensure that a material, product, method or service is fit for its purpose and consistently performs the way it was intended to.

### **Avoidance**

Eliminating the generation of waste at its source. Avoidance encourages the community to reduce the amount of waste it generates and to be more efficient in its use of raw materials. SYNONYMS: prevention; waste reduction.

### **Best Practice**

For any area of waste management, this represents the current 'state-of-the-art' in achieving particular goals. Best Practice is dynamic and subject to continual review and improvement.

SYNONYMS: industry best practice; world class

### **Cleaner production**

An approach to business management which reduces the use of energy, water, mineral resources and minimises wastes and pollution.

SYNONYMS: Eco-efficiency.

### **Commercial & Industrial waste**

Inert, solid or industrial generated by businesses and industries (including shopping centres, restaurants, offices warehousing and logistics, manufacturing, repair workshops, all retail outlets, hotels, clubs etc.) and institutions (such as schools, hospitals, universities, nursing homes and government offices), excluding construction & demolition waste, municipal waste, clinical & related waste and hazardous waste.

ACRONYMS: C&I waste.

### **Compost**

An organic product that has undergone controlled aerobic and thermophilic biological transformation to achieve pasteurisation and a specified level of maturity. Compost is suitable for the use as soil conditioner or mulch and can improve soil structure, water retention, aeration, erosion control, and other soil properties.

### **Compostable Organics**

Compostable organics is a generic term for all organic materials that are appropriate for collection and use as feedstocks for composting or in related biological treatment systems (e.g. anaerobic digestion). Compostable organics is defined by its material components: residual food organics; garden organics; wood and timber; biosolids, and agricultural organics.

SYNONYMS: recyclable organics; recyclable organic material, green waste.

## Construction & Demolition Waste

Materials in the waste stream which arise from construction, refurbishment, demolition, excavation activities.

ACRONYMS: C&D waste.

## Container deposit legislation

See Deposit-Refund Systems

## Contamination

Any introduction into the environment or a product (water, air, soil, or recyclable materials) of micro organisms, chemicals, wastes, or wastewater in a concentration that makes the environment or the product unfit for its intended use. Contaminants can have a detrimental impact on the quality of recycled materials and can spoil the potential for resource recovery.

## Deposit-Refund Systems

Deposit-refund systems can be voluntary or mandated through regulation. They involve the payment of a deposit by the consumer when the product is purchased. The deposit acts as an incentive for the consumer and the deposit is redeemed when the used product is returned to the producer or agent. Producers are then responsible for ensuring that the product is recycled or, depending on the product, disposed of safely.

## Domestic Waste

Component of the municipal waste stream generated from households.

SYNONYMS: household waste.

## Drop-off Recycling

Places where materials or goods can be lawfully deposited for resource recovery or special management.

SYNONYMS: collection centres.

## Eco-efficiency

The concept of creating more goods and services while using fewer resources and creating less waste and pollution.

## Ecologically Sustainable Development (ESD)

Ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. ESD can be achieved through the implementation of the following principles and programs:

*The precautionary principle* namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

*Inter-generational equity* namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

*Conservation of biological diversity and ecological integrity* namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.

*Improved valuation, pricing and incentive mechanisms* namely, that environmental factors should be included in the valuation of assets and services, such as:

- (i) polluter pays that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
- (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
- (iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

### **Council on Environmental Education**

Forum established to advise the state government on strategic directions for environmental education.

### **Energy from waste**

Energy from waste technologies can convert materials such as compostable organics, tyres, plastics clinical and related wastes into heat and electricity using a number of processes including:

Combustion: the burning of biomass, such as the use of bagasse by the sugar industry in NSW to produce heat and electricity using steam turbine generators.

Gasification: the efficient conversion of solid fuel to gaseous fuel such as was used to produce "town gas" from coal, before the advent of natural gas. The gas made can produce heat and electricity using gas engine generators.

Pyrolysis: the production of a carbon rich solid fuel and a hydrocarbon rich gas by heating a biomass feedstock in the absence of oxygen, such as used to produce charcoal from wood.

SYNONYMS: combustion as concerned with energy recovery; waste-to-energy; gasification; pyrolysis.

### **Environment Protection Authority (EPA)**

The NSW Environment Protection Authority administers environment protection legislation, licensing and guidelines to protect the community and the environment. The EPA develops policy and guidelines in relation to the environment. See [www.epa.nsw.gov.au](http://www.epa.nsw.gov.au)

### **Environmental Education**

Programs and activities which facilitate the development of environmental awareness, knowledge, skills and attitudes leading to environmentally responsible practices and behaviour.

### **Extended Producer Responsibility (EPR)**

Shared responsibility for the life-cycle of products including the environmental impact of the product from the extraction of virgin materials, to manufacturing, to consumption and through to and including ultimate disposal and post-disposal consequences.

## Food Organics

Food organics include:

- Fruit and vegetable material;
- Meat and poultry;
- Fats and oils;
- Seafood (including shellfish, excluding oyster shells);
- Recalcitrants (large bones > 15mm diameter, oyster shell, coconut shells, etc.);
- Dairy (solid and liquid);
- Bread, pastries and flours (including rice and corn flours).

Such materials may be derived from domestic or commercial & industrial sources. The definition does not include grease trap waste. Food organics is one of the primary components of the *compostable organics* stream.

SYNONYMS: food waste; kitchen organics; restaurant waste; food residuals.

## Garden Organics

Garden organics include:

- Putrescible garden organics (grass clippings);
- non-woody garden organics;
- woody garden organics;
- trees and limbs;
- stumps and rootballs.

Such materials may be derived from domestic, commercial & industrial and commercial & demolition sources. Garden organics is one of the primary components of the compostable organics stream.

SYNONYMS: garden waste; green waste; green organics; yard trimmings; yard waste.

## Greenhouse Gases (GHG)

Refers to gases that help warm the planet to a comfortable and liveable temperature range. Examples of greenhouse gases include, carbon dioxide, methane and nitrous oxide. Excessive quantities of GHG in our atmosphere can increase global temperatures, resulting in rising sea levels, melting glaciers and erratic weather patterns.

## Household Medical Waste

Waste generated in the home from treatments designed to alleviate illness or injury, and objects of the kind used to pierce or penetrate the skin regardless of use. This includes such items as dialysis bags and tubing, colostomy bags, medicines, needles and syringes, and finger prick lances.

## Kerbside Recycling

A formalised kerbside collection system for recyclables from households, where the generator segregates wastes according to material type and places them in containers on the kerbside for separate collection. The system is usually administered by local government authorities.

SYNONYMS: kerbside collection; domestic recycling.

**Landfill site**

Waste disposal site used for the controlled deposit of solid waste onto or into land.

SYNONYMS: dump; tip; refuse disposal area.

**Life Cycle**

Consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to the final disposal.

**Life Cycle Analysis (LCA)**

Analysis of the environmental impacts incurred during the life cycle (the production, consumption and disposal) of a product.

**Materials Recovery Facility (MRF)**

Plant and equipment for sorting and pre-processing materials from the waste stream for resource recovery.

SYNONYMS: Resource Recovery Facility.

**Municipal Solid Waste (MSW)**

The solid component of the waste stream arising from household waste placed at the kerbside for council collection and waste collected by council from municipal parks and gardens, street sweepings, council engineering works and public council bins. Excluding hazardous, clinical and related wastes.

SYNONYMS: domestic waste; household waste.

**Normalised for Economic Activity**

Waste disposal varies with economic activity. To remove the effect of economic activity it is necessary to divide the total tonnage of waste disposed of annually by a standard measure of economic activity. Economic activity is usually measured as gross domestic product (GDP) in the case of Australia or gross state product (GSP) in the case of New South Wales. This may be done by converting annual tonnages of waste disposed of to kilograms per \$100 of GSP.

**Organic Matter**

Chemical substances of animal or vegetable origin, consisting of hydrocarbons and their derivatives.

**Prevention**

Eliminating the generation of waste at its source. Avoidance encourages the community to reduce the amount of waste it generates and to be more efficient in its use of raw materials.

SYNONYMS: avoidance; waste reduction

**Processing**

Subjecting a substance to a physical, chemical or biological treatment or a combination of treatments. Composting, for example, is a form of processing.

**Processing Capacity**

The maximum amount (mass or volume) of feedstock that can be added to a processing technology (e.g. composting technology, concrete crushing, timber shredding, soil screening, tyre shredding etc.) per unit time (e.g. per week) without causing system failure. System failure is evident when the

processing technology produces problematic environmental emissions and/or declines in processing efficiency and/or produces product of unacceptable quality.

### **Product Stewardship**

A system of shared responsibility relating to the whole product chain sharing responsibility for the life cycle of a product.

### **Putrescible Waste**

Component of the waste stream liable to become putrid. Putrescible waste usually breaks down in a landfill to create landfill gases and leachate. Note: Usually applies to food and animal product. Paper, cardboard, garden waste will also breakdown to create landfill gas and leachate.

### **Recyclable**

Able to be processed and used as a raw material for the manufacture through a commercial process of either the same product or another product.

Note ; Downcycling is sometimes used as an alternative term to describe materials that are recycled into a different product.

### **Recycled Organics**

The term Recycled Organics has been adopted by Resource NSW and EcoRecycle Victoria as a generic term for a range of products manufactured from compostable organic materials (garden organics, food organics, residual wood and timber, biosolids and agricultural organics).

Specific recycled organic (RO) products are defined in the following Australian Standards and NSW EPA guidelines:

AS 4454 (2001-draft) Composts, mulches and soil conditioners

AS 3743 (1996) Potting mixes

AS 4419 (1998) Soils for landscaping and garden use

AS/NZS 4422 (1998) Playground surfacing: specifications, requirements and test methods

Whilst quality standards exist, there are also many raw RO products which are not defined in any standard and are completely unregulated, certain risks are associated with their use.

### **Recycling Collection**

A system of gathering, transporting and storing recyclable materials from diffuse sources for export from or processing at a centralised facility.

### **Renewable Resource**

A material that can be replenished or regrown within a reasonable timeframe, for example, any organic matter that can be regenerated.

### **Resource Recovery**

Process that extracts material or energy from the waste stream.

### **Re-use**

Using a product again for the same or a different purpose without further manufacture, e.g. use of second-hand boxes for repacking goods or for storage of household goods.

**Sharps**

Any object capable of inflicting a penetrating injury, which may or may not be contaminated with blood and/or body substances. This includes needles and any other sharp objects or instruments designed to perform penetrating procedures.

**Source Segregation**

Physical sorting of the waste stream into its components at the point of generation.

SYNONYMS: source separation; sorting.

**Waste**

Waste in this Strategy refers to those materials that are generally disposed of at solid and inert waste landfills. It does not include materials such as medical wastes that are prohibited at solid and inert waste landfills.

For a technical definition of waste, refer to the *Protection of the Environment Operations Act 1997*.

**Waste Collection**

A system of gathering, transporting and storing waste materials from diffuse sources for export from or processing at a centralised disposal facility.

**Waste Minimisation**

Application of activities such as waste avoidance, reduction, re-use and recycling and behaviour modification to minimise the amount of waste that requires disposal.

SYNONYMS: waste reduction.

**Waste Reduction**

Limiting of waste through product design, material selection, policy and management. To lessen the amount of waste that already has been generated.

SYNONYMS: waste minimisation; waste avoidance.

**Waste Reduction and Purchasing Plan (WRAPP)**

A company wide plan to reduce waste and increase purchases of recycled content products.

**Waste Stream**

Flow of materials from a point of generation to ultimate disposal. NOTE: Components may be diverted from this stream for resource recovery.

SYNONYMS: waste flow.

Primary source: Recycled Organics Unit (2002).

## Appendix 2: Consultation

In drafting this Strategy, Resource NSW engaged in discussion with key groups within the NSW community from March to July 2002. These initial discussions were 'blank sheet of paper' discussions and sought feedback on:

- what the Strategy should focus upon including key issues, roles and responsibilities;
- targets – what these should address; and
- strategies for improving our waste avoidance focus:

Australian Business Chamber	Northern Sydney Regional Organisation of Councils (NSROC)
Australian Council of Recyclers (ACOR)	
Australian Industry Group (AIG)	NSW Environment Protection Authority
Beverage Industry Environmental Council (BIEC)	Paper Recycling Action Group of Australia (PRAGA)
Buy Recycled Business Alliance (BRBA)	Planning NSW
Environment Business Limited (EBL)	Plastics and Chemicals Industries Association (PACIA)
Ethnic Community Council	Publishers National Environment Bureau (PNEB)
Housing Industry Association	Riverina Eastern Regional Organisation of Councils (REROC)
Hunter Waste Panel	
Illawarra Business Chamber	Shore Regional Organisation of Councils (SHOROC)
Illawarra Regional Organisation of Councils (IROC)	South East Regional Councils
Master Builders Association (MBA)	Southern Sydney Regional Organisation of Councils (SSROC)
Mid North Coast Waste Forum (MNCWF)	Total Environment Centre (TEC)
Nature Conservation Council of NSW (NCC)	Waste Crisis Network
NetWaste	Waste Contractors and Recyclers Association
North East Waste Forum (NEWF)	Waste Management Association of Australia (WMAA)
Northern Inland Regional Waste (NIRW)	Western Sydney Regional Organisation of Councils (WSROC)

Feedback was sought on the draft Strategy from 17 September to 28 October, 2002. During this period, meetings and forums were conducted to enable open discussion and feedback on the document. These included the following groups and/or events.



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Australian Business Chamber  
Australian Electrical & Electronic  
Manufacturers' Association Ltd (AEEMA)  
Australian Environment Business Network  
(AEBN)  
Australian Industry Group (AIG)  
Australian Information Industry Association  
(AIIA)  
Australian Retailers Association  
Beverage Industry Environmental Council  
(BIEC)  
Coffs Harbour Waste Conference 2002  
Ethnic Communities Council of NSW  
Housing Industry Association (HIA)  
Illawarra Business Chamber  
Local Government Forums (9)

Master Builders Association (MBA)  
Nature Conservation Council (NCC)  
Packaging Council of Australia  
Paper Recycling Action Group of Australia  
Plastics and Chemicals Industries Association  
(PACIA)  
Property Council of Australia  
Publishers National Environment Bureau (PNEB)  
Road Transport Association (RTA)  
State Chamber of Commerce  
Total Environmental Centre (TEC)  
Waste Management Association of Australia  
(WMAA)  
Waste Contractors and Recycling Association  
Waste Management Association, C & D Division  
NSW Government Agencies

## Written submissions

### Councils

Botany Bay City Council  
Cooma-Monaro Shire Council  
Crookwell Shire Council  
Gosford City Council  
Hornsby Shire Council  
Hurstville City Council  
Illawarra Region of Councils (IROC)  
Lane Cove Council  
Leichhardt Council  
Lismore City Council  
Liverpool City Council  
Manly Council  
Mid North Coast Waste (MNCW)  
Mosman Municipal Council  
North Sydney Council  
Northern Inland Regional Waste (NIRW)  
Penrith City Council  
Pittwater Council

Randwick City Council  
Riverina East Regional Organisation of Councils  
(REROC)  
Ryde City Council  
Shore Regional Organisation of Councils  
(SHOROC)  
South East Resource Recovery Group (SERRG)  
Southern Sydney Regional Organisation of  
Councils (SSROC)  
Warringah Council  
Waverley Council  
Wingecarribee Shire Council  
Wyong Shire Council  
Joint submission from Officers of the 8 Councils:  
- Bankstown City Council  
- Blacktown City Council  
- Camden Council  
- Campbelltown City Council  
- Penrith City Council  
- Sutherland Shire Council  
- Randwick City Council  
- Wingecarribee Council

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## Environment/Community/Organisations/Individuals

Acuiti Legal  
Baker, David  
Chapman, Douglas P BE LGE FIEAust.  
Compost Away  
Cook, Sherry  
Commonwealth Scientific and Industrial  
Research Org. (CSIRO)  
Ecosteps Pty Limited  
Griffith University  
Hi-Tech Consulting Pty Limited  
Hunter Residents Against Sydney Garbage  
Dumps  
Hush, Barbara RN

Impact Environmental Consulting Pty Ltd  
M-co, The Marketing Company  
McCormack, Lyndall  
Nature Conservation Council of NSW Inc.  
Psaila, Marcelle BA(Hons) MEM  
Rage at Clyde  
Ryde-Hunter's Hill Flora and Fauna  
Preservation Society  
Stammbach, Marc  
Taylor, Ann  
The Manly Greens  
The Vaucluse Progress Association  
Total Environment Centre (TEC)

## Industries and Associations

Australian Council of Recyclers Inc. (ACOR)  
Australian Environment Business Network  
(AEBN)  
Australian Industry Group (AIG)  
Australian Information Industry Association  
(AIIA)  
Australian Water Association  
Beverage Industry Environment Council  
(BIEC)  
Boral Recycling Pty Ltd  
Global Renewables  
NSW Road Transport Association Inc  
Publishers National Environment Bureau  
Limited (PNEB)  
Pymont Raw Materials Pty Ltd

Rethmann Australia Environmental Services Pty  
Limited  
SITA Environmental Solutions  
Waste Contractors and Recyclers Association  
of NSW  
Waste Management Association of Australia  
(WMAA)  
Waste Management Association of Australia,  
C & D Recycling Division  
Waste Management Association of Australia,  
COMMPOST NSW  
Waste Management Association of Australia,  
Energy from Waste Division  
Worley Ltd

## Government Agencies

Community Relations Commission  
Department of Land and Water  
Conservation  
Independent Commission Against  
Corruption (ICAC)  
NSW Environment Protection Authority (EPA)  
NSW Health

Northern Territory Government  
Planning NSW  
Rail Infrastructure Corporation  
Roads and Traffic Authority (RTA) Planning  
NSW  
Sydney Catchment Authority (SCA)

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## Appendix 3: List of other relevant legislation

Environmental Planning and Assessment Act 1979

Local Government Act 1993

Protection of the Environment Administration Act 1991

Protection of the Environment Operations Act 1997

Legislation is available online at [www.austlii.edu.au](http://www.austlii.edu.au)

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## Appendix 4: Relevant provisions of the *Waste Avoidance and Resource Recovery Act 2001*

### Section 3 Objects of Act

The objects of this Act are as follows:

- (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 re-use, 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 re-use 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.

### Section 6 Functions

(1) The functions of Resource NSW are as follows:

- (a) to develop, implement or co-ordinate the implementation of (and evaluate strategies and programs for state-wide achievement of) government policy objectives in respect of:
  - resource efficiency and waste reduction and management in relation to regions, industry sectors or material types, and
  - community education and awareness in relation to resource efficiency and waste reduction and management, and
  - programs for the prevention of litter and illegal dumping, and
  - market development for recovered resources and recycled material, and
  - information dissemination,
- (b) to assist local communities to enter into arrangements for regionally-based secondary resource recovery from waste,

- 
- (c) to assist in developing co-ordinated waste management services, including system and contract reform (such as contracts for waste and recycling services and system co-ordination),
  - (d) to research and develop waste reduction and resource efficiency infrastructure, technologies and systems,
  - (e) to develop and support training and education programs for resource efficiency, waste reduction and waste and litter management,
  - (f) to monitor, report on and evaluate the regional implementation of State-wide policies and strategies with respect to waste,
  - (g) such other functions as may be conferred or imposed on it by or under this or any other Act or law.
- (2) Resource NSW may provide advice to the Minister on matters relating to waste policy and expenditure from the Waste Fund established under section 19.
  - (3) Resource NSW is, in the exercise of its functions, to have regard to the principles of ecologically sustainable development.

## Section 12 Development of waste strategies

- (1) Resource NSW is to develop a waste strategy for the State.
- (2) A waste strategy:
  - is to be based on continuous improvement and benchmarked against international best practice, and
  - is to include targets for waste reduction, resource recovery and the diversion of waste from landfill disposal, developed by an expert reference group appointed by Resource NSW.
- (3) A waste strategy does not take effect until it is adopted by Resource NSW.
- (4) The first waste strategy is to be adopted within 12 months after the establishment of Resource NSW.
- (5) Subsequent waste strategies, to replace existing waste strategies, are to be developed at intervals of not more than 2 years.
- (6) For the purpose of developing any waste strategy, the adequacy of the waste strategy is, if appropriate, to be assessed by means including the technique known as life cycle analysis.
- (7) Before adopting a waste strategy, Resource NSW:
  - must cause notice of the proposed strategy to be published in a daily newspaper circulating throughout the State, and
  - must cause copies of the proposed strategy to be made available for public inspection on the Internet and at each of its offices, and
  - must allow a period of at least 28 days for members of the public to send written comments to Resource NSW in relation to the proposed strategy, and must take any such comments into consideration.

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### Section 13. Resource NSW and EPA to co-ordinate activities to give effect to waste strategy

The EPA and Resource NSW are required to co-ordinate their activities so as to implement the current waste strategy.

### Section 14. Power to request councils to report on waste strategy compliance

- (1) Resource NSW may request a local council to provide the reasons for any specified non-compliance by the local council with the objectives of the current waste strategy.
- (2) Such a request must be in writing and must specify the date by which the local council is requested to provide the reasons to Resource NSW.

### Section 15. Extended producer responsibility schemes

- (1) For the purposes of this Part, an extended producer responsibility scheme is a scheme for giving effect to an environmental policy in which the producer's responsibility for a product (including physical or financial responsibility) is extended to the post-consumer stage of the product's life cycle.
- (2) Any such scheme includes a scheme for product stewardship (that is, shared responsibility for the life cycle of products including the environmental impact of the product from the extraction of virgin materials, to manufacturing, to consumption and through to and including ultimate disposal and post-disposal consequences).
- (3) In this Part:
  - producer of a product includes a supplier of the product in this State or person having a proprietary interest in the name under which the product is supplied in this State.
  - product includes any substance.

### Section 16. Regulations for implementation and operation of schemes

The regulations may make provision for or with respect to the implementation and operation of extended producer responsibility schemes in connection with a product, group of products or an industry in New South Wales.

### Section 17. Circumstances in which schemes may be implemented

- (1) The Minister is not to recommend the making of a regulation for or with respect to the implementation of an extended producer responsibility scheme unless the Minister is satisfied that it is necessary to do so having regard to the following matters:
  - the volume of waste requiring ultimate disposal or the toxicity of the waste generated,
  - whether there is a national scheme in place that adequately addresses waste issues in New South Wales,

- 
- whether there is an effective voluntary scheme in place (nationally or State based) that is able to achieve the desired outcomes and is being actively implemented, monitored and reported on,
  - whether economic analysis supports the implementation of the scheme,
  - whether there are any constitutional or other impediments to New South Wales acting unilaterally in implementing the scheme.

(2) A regulation with respect to the implementation or operation of a scheme cannot be challenged or invalidated because of this section.

## Appendix 5: International waste minimisation targets

The following table provides a summary of research conducted by Resource NSW to identify current international targets and performance.

Sector	Targets	Country	Date to be achieved	Summary of performance / findings
Landfill	All substandard landfills will be upgraded or closed.	New Zealand <sup>1</sup>	December 2005	To be assessed.
	To recycle 35% of Municipal Solid Waste	USA	2005	Generation rates grew by an estimated 40%, in ten years to 2000 i.e. 4% pa.  Recycling increased by 5 times in a decade (21 to 126m tonnes) to 2000  Plateau of 35-40% diversion rates  Landfill relatively constant (226 to 230m tonnes pa1990 –2000)
	50% diversion of waste from landfill	California, USA	December 2000	Achieved 42% diversion 1997 to 2000  Resulted from focusing on market development for materials that comprise major portions of the waste stream: organics and C & D material.
	Eliminating the landfilling of all unprocessed MSW	Minnesota, USA	2008	Strategy developed 2002. To be assessed.



Sector	Targets	Country	Date to be achieved	Summary of performance / findings
Landfill	50% reduction in disposal rates (using 87/89 as base year)	Canada	December 2000	<p><i>7% reduction in waste generation 1992-96</i></p> <p><i>18% diverted to recycling/composting in 1992;</i></p> <p><i>24% (5.9m tonnes) in 1996</i></p> <p>15% decrease in waste disposed of between 1992 (0.82 kg/c/y) and 1996 (0.63 kg/c/y or 17.9m tonnes).</p>
	50% diversion of solid waste from disposal.	Nova Scotia, Canada	December 2000	<p>Achieved 50% diversion of solid waste from landfills and incinerators in March 2000 (from 1989 levels)</p> <p>Much of this reduction can be attributed to the implementation of new programs for kerbside recycling and general household recyclables and the banning of compostable organic materials from landfills in Nov 1998.</p> <p>In 2000:</p> <ul style="list-style-type: none"> <li>▪ 100% of residents having access to kerbside recycling.</li> <li>▪ 100% of businesses having access to recycling through collection programs and resource recovery</li> </ul>

Sector	Targets	Country	Date to be achieved	Summary of performance / findings
				centres <ul style="list-style-type: none"> <li>72% of residents having access to kerbside organic collections,</li> </ul> Promotion of backyard composting.
<b>Landfill</b>	50% diversion of waste from disposal, (based on 1987 levels.)	Ontario, Canada	December 2000	Target was not reached and the goal revised to be a 50% reduction per capital in waste produced per person, not total and the target date has been dropped.  Between 1990 - 98 waste generation increased 5%, annual MSW generation remained constant at 0.41 tonnes.  A few communities achieved high diversion rates (50-60%). These were typically small and isolated with homogenous populations
	Landfill Directive reduces the amount of biodegradable municipal waste going to landfill:  - to 75% of the 1995 level  - to 50% of the 1995 level  - to 35% of the 1995 level	European Union <sup>2</sup>	2010  2013  2020	For all EU member nations:  Average recycling rate is 26% of the household waste stream (108 kg/person/yr).  Generation rates average 422 kg/person/yr.  Total waste generated within the EU increased by 10% between 1990-95 (during

Sector	Targets	Country	Date to be achieved	Summary of performance / findings
	<p>Banning of landfilling whole tyres</p> <p>Banning of landfilling of shredded tyres</p>		<p>2003</p> <p>2006</p>	<p>period economic growth was 6.5%).</p> <p>Most of waste stream is biodegradable.</p> <p>Waste production is outstripping economic growth rates.</p> <p>Paper and glass recycling are moderately successful, but the rate for plastics packaging remains poor.</p>
<b>Landfill</b>	Only non-re-usable, non-recyclable and non-dangerous waste can be disposed of to landfill.	France <sup>2</sup>	July 2002	To be assessed.
	<p>Reduce landfill to 12%</p> <p>Attain 24% Incineration</p>	Denmark	<p>2004</p> <p>2004</p>	<p>To be assessed</p> <p>Denmark has the highest per capita incineration capacity in the EU.</p>
	End to the landfilling of inadequately pre-treated wastes	Germany <sup>2</sup>	June 2005	To be assessed
	6% reduction in MSW generated from 1997	Spain	2002	To date not close to targets. E.g. Catalonia waste generation increased by 5.7% in 95-96 and by 8.2% in 96-97.

Sector	Targets	Country	Date to be achieved	Summary of performance / findings
	<p>Reduce biodegradable municipal waste landfilled:</p> <ul style="list-style-type: none"> <li>- to 75 % of that produced in 1995</li> <li>- to 50 % of that produced in 1995</li> <li>- to 35 % of that produced in 1995</li> </ul>	United Kingdom	<p>2010</p> <p>2013</p> <p>2020</p>	<p>In 1997/98:</p> <p>Recovery of municipal waste was 14%</p> <p>Amount recycled/composted was 8%</p>
	<p>The quantity of landfilled waste will be reduced by at least 50% compared to 1994 levels.</p> <p>All landfill sites will conform to uniform standards and will meet stringent environmental requirements in accordance with Council Directive 1999 / 31 / EC on the landfill of waste</p>	Sweden <sup>2</sup>	<p>2005</p> <p>2008</p>	<p>Recycling of newspaper, tyres, cars and packaging materials in Sweden continues to increase, although the national target for aluminium packaging was not reached in 1999.</p>
	<p>95% of the population will have access to community recycling facilities.</p> <p>Building regulations to incorporate space allocation for appropriate recycling facilities.</p>	New Zealand <sup>1</sup>	<p>December 2005</p> <p>December 2005</p>	<p>To be assessed.</p> <p>To be assessed.</p>
<b>C&amp;D</b>	Attain 64% recycling rate of C&D waste	Denmark <sup>2</sup>	2004	To be assessed
	35% materials collected separately by law	Italy <sup>2</sup>	2003	Recovery increased from 6% (1996) to 9.4% (1997)
	To recycle or compost :			

Sector	Targets	Country	Date to be achieved	Summary of performance / findings
	<ul style="list-style-type: none"> <li>- at least 25 % of household waste.</li> <li>- at least 30 % of household waste.</li> <li>- at least 33 % of household waste</li> </ul>	United Kingdom	2005 2010 2015	To be assessed
	<p>All territorial local authorities will have instituted a measurement program to identify existing construction &amp; demolition waste quantities and set local targets for diversion from landfills.</p> <p>50% reduction of construction &amp; demolition waste to landfill of the December 2005 levels measured by weight.</p>	New Zealand <sup>1</sup>	December 2005  December 2008	To be assessed  To be assessed
	90% recycling of waste from construction & demolition	Denmark <sup>2</sup>	2004	To be assessed.
<b>C&amp;I</b>	10 major businesses to be participating in waste minimisation programs.	New Zealand <sup>1</sup>	December 2005	To be assessed.
	65% recycling of waste from industry	Denmark <sup>2</sup>	2004	To be assessed
	To reduce the amount of commercial & industrial waste sent to landfill to 85 % of that landfilled in 1998.	United Kingdom	2005	To be assessed
<b>Garden Organics</b>	All local authorities will have instituted a measurement program to identify existing organic waste quantities.	New Zealand <sup>1</sup>	December 2003	To be assessed

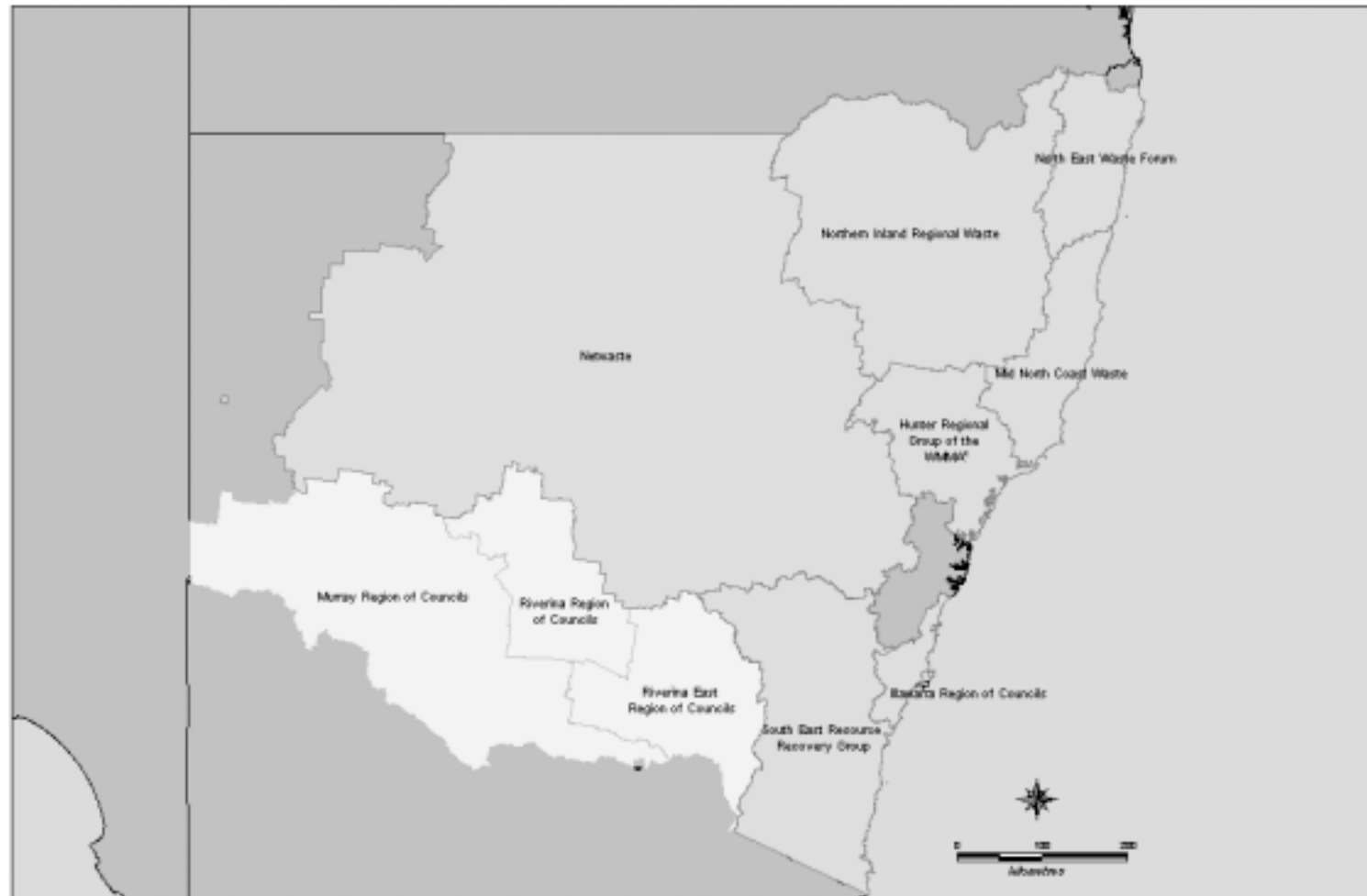
Sector	Targets	Country	Date to be achieved	Summary of performance / findings
	60% of garden wastes will be diverted from landfill and beneficially used.  95% diversion of commercial organic wastes from landfill to beneficial use		December 2005  December 2010	
<b>EPR</b>	8 businesses in different sectors will have introduced extended producer responsibility pilot programs.	New Zealand <sup>1</sup>	December 2005	To be assessed
<b>Hazardous wastes</b>	20% increase in recovery and recycling rates for priority hazardous waste.	New Zealand <sup>1</sup>	December 2012	To be assessed

<sup>1</sup> New Zealand targets are notional and will be reassessed in 2003 after further data is available.

<sup>2</sup> Denotes countries with regulatory directives.

For references, see Appendix 8.

Appendix 6: Groups Addressing Waste Management & Resource Recovery Issues in Regional NSW



<sup>1</sup>Group Addressing Waste Management & Resource Recovery Issues in Regional NSW

<sup>1</sup>Waste Management Association of Australia

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## Appendix 7. Tools to achieve change

To achieve our goals and targets we must use a mix of tools and approaches, some of which need to be implemented by industry, local government, government agencies and individuals, and some by a combination of these groups. Specific tools and approaches may:

- Support the establishment of infrastructure and systems to foster prevention and resource recovery.
- Educate people within an organisation or an organisation's customers about why we need to change our approach and how to do this in the most effective way.
- Offset or share economic and resource risks to develop improved practices or trial new ways to use reprocessed material.
- Create economic incentives to change our practices.
- Mandate requirements in order to achieve particular behaviour.
- Provide data and information to show progress being achieved by individual organisations, sectors or waste streams.
- Enable a comparison of our progress against best practice nationally and internationally.

Some of the key tools and approaches are outlined briefly below.

### System improvement mechanisms

A number of actions can be taken to help build a more efficient and integrated system that minimises use of natural resources and maximises recovery for re-integration into the system. The following list is not comprehensive but actions need to include the development of best practice guidelines for different parts of the system, e.g.

- Various recycling systems, operation of reprocessing facilities, MRFs, landfills, case studies relating to best practice, process improvement, reverse logistics applications.
- Guidelines to assist assessment of technologies and waste classification.
- Development of standardised systems for public place recycling and other recycling systems.
- Infrastructure mapping to assist decision-making; materials flow analysis and transport modeling.

### Education

Provision of information and support to understand and apply new knowledge and skills is critical to achieve changes in attitude and behaviour at all levels of the system. Education should support individuals to make more conscious avoidance and resource preservation decisions in all aspects of their lives. This means developing programs such as the following:

- Workplace programs to support positive behaviour to reduce resource use and to use recovery systems properly.
- Community education about using public place recycling, waste wise behaviour at public events, littering and illegal dumping.
- Householder education about using recycling systems properly, about safe use and storage of potentially harmful substances and about strategies at home to reduce waste.
- Education and information from regulators about obligations of generators, transporters and reprocessing and disposal facility operators to minimise impact on health and the environment and to optimise resource use.



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- Primary, secondary, tertiary and vocational training.
  - Assistance to businesses and event organisers to help avoid waste and recover resources.
  - Information for businesses, including case studies about triple bottom line benefits of process redesign and cleaner production.
  - Trials and case studies about the performance of recycled content materials in order to promote increased purchasing.
  - Directories and other information to support access to recycled products and reprocessing opportunities.

### Environmental assessment tools

There are a number of tools used internationally which deal with materials flows, however, these are generally nationally based measures and do not deal solely with solid waste and resources. Tools include Total Material Requirements and Mass Balance.

The European Environment Agency uses the Total Material Requirement (TMR) indicator as one of its environmental signals. TMR indicates the total volume of material throughput of the economy i.e. the total amount of products, waste and emissions (in tonnes). An assessment of material flows entails a substantial increase in collation of data in addition to that used for measurement of solid waste arisings.

The concept requires tonnage information on all waste streams (including mining, agricultural, industrial), emissions to air and water as well as hazardous and liquid wastes. The other side of the equation is material inputs. This means collation of all mineral resources, energy sources, agricultural inputs and an assessment for imports and exports. This is an extensive data gathering exercise that can only be coordinated at the national level.

Another approach that is increasingly being used is an Ecological Footprint. This approach expresses materials and energy consumption and emissions in square metres of equivalent land area. Material and energy requirements of a nation are measured and compared with available national land area. A similar tool, the Sustainable Process Index, works at a geographical regional scale and looks at total requirements to provide a person with a good or service for a year. Comparisons among different goods can then be made.<sup>38</sup>

The UK Government uses an approach called Mass Balance, which is about measuring resource flows within the economy. The framework assumes that the mass of inputs to a process, industry or region equals the mass of outputs as products, emissions and wastes plus any change in stocks. When applied in a systematic manner, this concept of balancing resource use with outputs can give a good picture of resource flows. The framework has been developed and data is currently being collected nationally. The UK Government intends to use the approach to encourage increased resource efficiency and producer responsibility.<sup>39</sup>

Other environmental assessment tools include life cycle analysis and environmental economic analysis.

### Life cycle analysis

Life cycle analysis (LCA) can be applied at the project or system level and it was developed originally to calculate the environmental impact of different products or practices. It takes the concept of material flows an extra stage. The inputs and outputs associated with each of the elements of the project or system are calculated and the environmental impact of each of these

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<sup>38</sup> Moore & Brunner 1998.

<sup>39</sup> Linstead & Ekins 2001.

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elements is assessed. For example, LCA of a building can include evaluation of the inputs and outputs of:

- Extracting the raw materials.
- Refining the raw materials.
- Producing the energy.
- Transport of materials.
- Constructing the building.
- Operating the building.
- Demolishing the building.
- Re-use, recovery or disposal of the final wastes.

LCA has been used in the waste industry to compare different methods of waste processing and disposal and as part of assessments of different collection methods. For each analysis, the first task is to determine the boundaries of the 'life' of the project or system, e.g. the life of a building could start with its construction, rather than with the extraction of materials for its construction. Depending on the agreed boundaries, a degree of uncertainty can be introduced through judgments regarding the proportion of inputs and outputs from earlier life cycle stages that should apply to the final project.

A further level of uncertainty is introduced with evaluating the environmental impact of the inputs and outputs at each stage of the product chain. This will depend on the particular 'brand' of process used and where the process has taken place. For example, aerobic and anaerobic processes may produce a similar construction product but the emission pathways are very different. The first will have more air emissions and the second more aqueous emissions. One plant may be located in a region with stringent environmental regulation and the other not. Similarly, aqueous emissions will have different environmental impacts in a dry region to a wet region. For this reason, when comparing two options (the subjects of the assessment), the same assumptions must apply to both.

Once quantities of emissions are calculated, evaluation of their impacts is based on scientific studies of ecological systems and toxicity data from databases of international studies, many of which are derived from animal experiments. A subjective assessment often has to be made regarding the applicability of the scientific studies to the particular environment in question, e.g. using international data in Australian studies, and the relevance of the toxicity studies to humans. Many practitioners of LCA submit their work to peer review in order to minimise subjectivity at this level.

Impacts are then grouped into a number of categories such as:

- Resource consumption
- Land use
- Toxicological impact on human health
- Toxicological impact on ecosystems
- Global warming
- Ozone depletion
- Acidification
- Eutrophication
- Formation of smog
- Noise impact.

The number and nature of the categories used are not universal and a further degree of subjectivity is involved in selection of categories and their ranking for any given study. Where

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government policy is clear on the relevant importance of different impacts, rankings can be deduced. Where there is no clear policy, this can become very subjective.

LCA therefore introduces more levels of data collection. The quantities of raw materials used in the project (and their source), the amount of energy used in each stage of the production process needs to be known, as well as the emission and solid waste data associated with different processes. Finally, ecological and toxicity data from relevant, up-to-date, and reputable studies must be compiled.

LCA is usually costly, time consuming, and involves a degree of subjectivity that is not always accepted in the market place. However, assessments can be simplified by limiting the boundaries of the analysis, and in the absence of other tools they can provide a valuable basis for decision making, given that the same criteria and assumptions are built into the evaluation of different options.

### Environmental economic analyses

An environmental economic analysis provides for the costs of environmental (and often social) externalities, in addition to normal economic inputs and outputs, to be included into the assessment of a project or system. The subject of an analysis may be a comparison between options once a commitment to invest has been made, or assessment of benefits and costs of options (including the 'do nothing' scenario) when deciding whether any investment is warranted.

The approach is similar to that of LCA. The technique is applicable at the project/system level and includes assessment of the environmental costs associated with each stage of the product chain. As for LCA, the boundaries of the analysis must be clearly defined and comparisons between options subject to similar criteria. However, instead of evaluating environmental impacts through ecological and toxicity data and having to rank their relative importance, the cost (or environmental value) to society of each impact or loss of amenity is estimated instead. There are several methods for defining these costs, but since there is no 'market' for an amenity and the value most certainly varies with individuals, a degree of subjectivity similar to that for LCA can be involved.

As for LCA, an economic assessment can be simplified by limiting the range of inputs to the analysis by agreeing on a point in the product chain where data input and comparison between options commences.

### Waste Reduction and purchasing plans

A Waste Reduction and Purchasing Plan (WRAPP) is undertaken at a company or organisation wide level. It involves an audit of all aspects of an organisation's operation to identify quantities and composition of products and materials being disposed of and recovered for recycling. It also involves a review of purchasing to identify major materials purchased. There is huge purchasing potential across state and local government alone. Combined with purchasing by business, the potential to drive market growth and support for products containing recycled content is massive. Audits of waste and purchasing also represent significant opportunities for cost savings through reduced disposal costs, aggregated purchasing and re-use and waste reduction.

The WRAPP itself uses the waste audit and purchasing review and identifies areas for improvement. This may be introducing or improving existing systems for recycling, e.g. office paper, containers and organic waste. It also identifies areas where a positive effort can be made to increase quantities of products containing recycled material.

Plans usually set goals or targets for improved performance in both waste reduction and purchasing and progress is reported annually. Programs to support the goals are included in the Plan. These could include new education and information to everyone in the organisation

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about how to recycle properly or how to avoid waste, reviews and research to identify products containing recycled material to purchase or trials of recycled material. The NSW Government's WRAPP website ([www.wrapp.nsw.gov.au](http://www.wrapp.nsw.gov.au)) has a lot of information and ideas to help.

Currently, all NSW State Government agencies have produced a WRAPP and are implementing it. They will be reporting annually commencing with their 2001-02 Annual Reports. Some businesses and a few councils have also produced Plans. A national industry driven initiative called the Buy Recycled Business Alliance (BRBA) seeks specific commitments from its corporate members to proactively support purchase of products containing recycled content. It currently has membership from 18 companies. The BRBA website ([www.brba.com.au](http://www.brba.com.au)) provides details.

### Extended producer responsibility and product stewardship

Extended Producer Responsibility and Product Stewardship are key elements of the *Waste Avoidance and Resource Recovery Act 2001*.

Extended Producer Responsibility, or EPR, is a scheme where the producer's responsibility for a product (including physical or financial responsibility) is extended to the post-consumer stage of the product's life cycle. Product Stewardship is a more shared responsibility and relates to the whole product chain sharing responsibility for the life cycle of products including the environmental impact of the product from the extraction of virgin raw materials, manufacturing, consumption and through to and including ultimate recovery or disposal.

All companies have some level of responsibility for their resource use and the waste produced in creating a product or material for consumption. This also extends to the waste and potential resource recovery after the product is consumed.

The *Waste Avoidance and Resource Recovery Act 2001* encourages industry to deal effectively with its wastes. However, it introduces a process for mandating EPR where the market fails to do this. Criteria set out in the Act must be satisfied in order for the Government to regulate industry in this manner (see Appendix 3).

Numerous examples both nationally and internationally have shown that a proactive and preventative approach to product improvements offer companies substantial cost savings. These savings result from reduced resource use, reduced energy consumption, lower pollution control costs, lower cost of raw materials, less waste production, better product design and increased consumer support.

### Corporate environmental reporting

Increasing numbers of companies are beginning to recognise the benefits of the "triple bottom line", a way of thinking that brings social, environmental and economic issues into consideration in running the organisation. The challenge is to increase uptake of this approach and most importantly, to support the integration of this thinking into daily operations. It is only by applying these three considerations in daily decision making and prioritisation across all aspects of company's operation – design, marketing, process management and purchasing – that sustainability will be achieved.

Practising triple bottom line reporting and decision-making can have real benefits for companies. It can reduce costs through greater process efficiencies and reduced use of products and materials throughout the organisation. It can also reduce waste disposal costs. Transparent reporting about the work a company is doing to improve design for the environment and to improve its own internal operations and performance can also build a company's reputation, a factor that consumers and investors are increasing by considering in their support of particular companies and brands.

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## Research and development support

In some areas, research and development (R&D) is needed to break through barriers to increase avoidance or resource recovery. This could relate to finding ways to substitute or remove potentially harmful substances from products and materials, to refine production processes to enable greater use of recycled materials or to minimise emissions or to redesign existing technologies for smaller scale applications, for example, in regional areas.

Whilst R&D should be a key responsibility of the private sector, governments can play a role by identifying key areas that need greater attention from a whole-of-system perspective. Achieving significant change can also be dependent on rapid uptake and application of breakthroughs. Research and development undertaken by individual organisations is often subject to confidentiality and is not available to share with others. This can be overcome through R&D partnerships involving government, private sector organisations and academia. Programs that currently exist include the NSW EPA's cleaner production partnerships program and the Commonwealth Government's R&D tax concessions that allow companies to deduct up to 125% of qualifying expenditure incurred on R&D activities when lodging their corporate tax return. A 175% Premium (Incremental) Tax Concession and R&D tax offset are also available in certain circumstances.

## Eco-efficiency and cleaner production support

Eco-efficiency means, "getting more from less". It involves producing more goods and services with less energy and fewer natural resources, thereby using resources more efficiently resulting in less waste and pollution. This term is used by the World Business Council.

Cleaner production is a similar approach to business management that reduces the use of energy and water and material resources and minimises waste and pollution. It involves a shift in environmental protection from an 'end-of-pipe' approach where pollution is managed after it is created, to a 'front-of-process' approach which reduces the quantity and toxicity of all emissions and wastes before they leave a process and reducing impacts along the entire life cycle of a product or service.

The NSW EPA has established a cleaner production partnership program. This program assists small and medium-sized businesses to reduce waste through the adoption of cleaner production techniques. Resource NSW has also assisted some individual businesses to achieve redesign and reduce waste inputs. There are some excellent examples of cleaner production initiatives on the EPA website ([www.epa.nsw.gov.au](http://www.epa.nsw.gov.au)).

## Recyclate market development support

Building demand for secondary resources recoverable from the economy is a key challenge. It involves the development and implementation of programs that create or increase the capacity to take-up recovered secondary resources.

Resource Demand Development programs will need to build on existing opportunities and be integrated with other programs throughout the materials supply system. To support this, robust potential material supply data and market trend information is needed. Improved collection networks will be critical to provide both security of supply and quality product at a competitive price that can perform comparably with virgin materials. Work is also needed to improve the performance of existing recyclate and develop new applications for recovered materials. Increasing purchase of recycled materials and recyclate into products will also require strategic R&D and targeted education and information campaigns.

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## Regulation

A number of regulatory instruments are available to assist the management of waste and to encourage increased avoidance and resource recovery. Some of them are more effective at a National rather than a State level. A number of them are already in use in Australia.

Regulatory mechanisms include:

- Regulations relating to waste disposal, waste classification, licence requirements for generators, facility operators and waste activities.
- Bans on disposal of certain materials to landfill. For example, the disposal of loads of more than 5 whole tyres to landfill is banned in NSW.
- Deposit refund systems. A system of deposits on beverage containers operates in South Australia.
- Advance disposal fees where a fee is levied at the point of production and can be used to support recovery or safe disposal of the product. This approach can be both voluntary and mandated. There is currently a levy on domestic and imported oils, and is paid by oil producers and importers. The product stewardship levy was introduced on 1 January 2001 at 5 cents/litre and was subsequently indexed to 5.2 cents/litre under general excise indexation arrangements.
- Mandatory take back and utilisation of products.
- Mandated recycled content.
- Mandated information for consumers.
- Subsidies/tax credits that promote use of secondary materials or resource recovery and cleaner production activities.
- Regulations under National Environment Protection Measures (NEPMs).
- Regulation of hazardous waste imports and exports.

## Economic tools

The *Protection of the Environment Operations Act 1997 (Section 88)* requires waste facilities (other than those used strictly for re-use, recycling or reprocessing operations) to pay a levy to the EPA. This provides a financial mechanism to ensure that users of waste facilities pay a contribution to the environmental costs of waste disposal and provides an incentive to divert materials from disposal to reprocessing.

In 2002/03, the levy on waste disposed of in the Sydney metropolitan area was \$18.20 per tonne. Waste disposed in the extended regulated area, comprising Cessnock, Gosford, Kiama, Lake Macquarie, Maitland, Newcastle, Port Stevens, Shellharbour, Shoalhaven, Wingecaribee, Wollongong and Wyong is levied at \$9.60 per tonne.

The levy is gradually increasing to \$25 per tonne (in 2001/02 dollars) by 2009 in the Sydney metropolitan area and 2012 in the extended regulated area respectively. This involves annual increments of \$1 per tonne for the Sydney metropolitan area and \$1.50 per tonne for the extended regulated area and is adjusted for CPI annually. The levy does not apply to areas outside the Sydney metropolitan and extended regulated areas.

In addition to the waste disposal levy, two other economic mechanisms have been used in NSW. A number of waste facility operators have used differential pricing of disposal to landfill to encourage source separation of materials such as paper and garden organics that can be sent for recycling. In addition, many local councils have introduced user pays garbage systems whereby ratepayers are provided with a standardised recycling bin, e.g. 120 litre. Those who wish to have increased disposal capacity may choose to have an additional bin for an increased charge. Other councils have introduced rate reduction incentives to residents who choose to have a smaller bin, e.g. 80 litre.

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## Appendix 8: References

The following is a list of key references that we have referred to in preparing the Strategy.

Alternative Waste Management Technologies and Practices Inquiry (2000). *Report of the Alternative Waste Management Technologies and Practices Inquiry*. State Government of NSW – Office of the Minister for the Environment.

[www.epa.nsw.gov.au/waste](http://www.epa.nsw.gov.au/waste)

California Integrated Waste Management Board (2001). *Integrated Waste Management Board Strategic Plan*. Integrated Waste Management Board.

Sacramento. [www.ciwmb.ca.gov](http://www.ciwmb.ca.gov)

Department of the Environment, Transport and the Regions (2000). *Waste Strategy 2000 for England and Wales*. London.

EcoRecycle Victoria (2000). *Understanding the Waste Stream*. EcoRecycle Victoria. Melbourne. [www.ecorecycle.vic.gov.au](http://www.ecorecycle.vic.gov.au)

EcoRecycle Victoria (2002). *Municipal Data Collection 2000-2001 – Kerbside Waste Management Services*. EcoRecycle Victoria. Melbourne. [www.ecorecycle.vic.gov.au](http://www.ecorecycle.vic.gov.au)

Environment Directorate Environment Policy Committee. Sustainable Consumption:

- Sector Case Study Series (2001) – Household Food Consumption: Trends, Environmental Impacts and Policy Responses
- Sector Case Studies Series (2002) – Household Energy & Water Consumption and Waste Generation: Trends, Environmental Impacts and Policy Responses
- Policy Case Studies Series (2002) – Policies to Promote Sustainable Consumption: An Overview
- Working Party on National Environment Policy (2002) – Towards Sustainable consumption: An Economic Conceptual Framework

European Commission (1999). *EU focus on waste management*. European Communities. [europe.eu.int](http://europe.eu.int)

INCPEN (2001) Towards Greener Households – Products, Packaging and Energy

Linstead, Conner and Paul Ekins (2001). *Mass Balance UK: Mapping UK resource and Material Flows*. Royal Society for Nature Conservation. London.

Ministry for the Environment (2002). *The New Zealand Waste Strategy*. Ministry for the Environment. Wellington. [www.mfe.govt.nz](http://www.mfe.govt.nz)

Minnesota Office of Environmental Assistance (2002). *Solid Waste Policy Report: waste as a resource*. St Paul. [www.moea.state.mn.us](http://www.moea.state.mn.us)

EPHC (2001). *Annual Report 2000-2001*. Environmental Protection and Heritage Council. pp. 233-239. [www.ephc.gov.au](http://www.ephc.gov.au)

Moore, S. J. and P. H. Brunner (1998). *Application of Material Accounting Tools to Waste Management*. Proceedings of the 4th National Hazardous and Solid Waste Convention. Brisbane, April 1998. Australian Water and Wastewater Association.

- 
- Nature Conversation Council (2000). *Zero Waste by 2010*. Nature Conversation Council of NSW Inc. [www.ncc.nsw.org.au](http://www.ncc.nsw.org.au)
- Nova Scotia Department of the Environment (2001). *Status Report 2001 of Solid Waste-Resource Management in Nova Scotia*. Halifax. [www.gov.ns.ca/envi/wasteman](http://www.gov.ns.ca/envi/wasteman)
- NSW Council on Environmental Education (2001). *Environmental Education in NSW: Towards a three year-plan (Working Paper)*. NSW Council on Environmental Education. Sydney. [www.epa.nsw.gov.au/cee](http://www.epa.nsw.gov.au/cee)
- NSW EPA (2000a). *NSW Used Packaging Materials Waste Reduction Plan*. NSW Environment Protection Authority Waste Policy Section. [www.epa.nsw.gov.au](http://www.epa.nsw.gov.au)
- NSW EPA (2000b). *New South Wales State of Environment 2000 Report*. NSW Environment Protection Authority. [www.epa.nsw.gov.au/soe](http://www.epa.nsw.gov.au/soe)
- NSW EPA (2001a). *Review: Waste Minimisation and Management Act 1995*. NSW Environment Protection Authority. [www.epa.nsw.gov.au](http://www.epa.nsw.gov.au)
- NSW EPA (2001b). *Annual Report Report 2000-2001*. NSW Environment Protection Authority. pp. 41-48. [www.epa.nsw.gov.au/corporate/annrep.htm](http://www.epa.nsw.gov.au/corporate/annrep.htm)
- NSW EPA (2002), *Unpublished 2000 Waste Data*.
- NSW Legislative Assembly Hansard (2001). *Waste Avoidance and Resource Recovery Bill: Minister's Second Reading Speech*. 20 June 2001. [www.parliament.nsw.gov.au](http://www.parliament.nsw.gov.au)
- OECD (1998). *Waste Minimisation Profiles of OECD Member Countries*. [www.oecd.org](http://www.oecd.org)
- OECD (2000). *Strategic Waste Prevention: OECD Reference Manual*. [www.oecd.org](http://www.oecd.org)
- PNEB (2001). *News Limited Recycling Database: ONP Market Report 2001*. Publishers National Environment Bureau. [www.pneb.com.au](http://www.pneb.com.au)
- Recycled Organics Unit (2002). *Recycled Organics Dictionary and Thesaurus: Standard terminology for the New South Wales recycled organics industry [draft]*. Second Edition. Printed by the Recycled Organics Unit. The University of New South Wales. Sydney. <http://www.rolibrary.com>
- Schnurer, Helmut (2001). *Waste Management Policy in Germany*. Waste Management Directorate of the Federal Ministry for Environment, Germany.
- 2001 State of Garbage Report, Biocycle Dec 2001
- Swedish Ministry of the Environment (2001). *The Swedish Environmental Objectives – Interim Targets and Action Strategies*. [www.miljo.regeringen.se](http://www.miljo.regeringen.se)
- UK Cabinet Office (2001). *Tackling waste: a performance and innovation scoping paper*. London. [www.cabinet-office.gov.uk](http://www.cabinet-office.gov.uk)
- US EPA (2002). *Beyond RCRA: Prospects for Waste and Materials Management in the Year 2020 (Draft White Paper)*. United States Environment Protection Agency. [www.epa.gov/osw](http://www.epa.gov/osw)
- US EPA National Source Reduction Characterization Report for Municipal Solid Waste in the United States
- Waste Management Association of Australia (2002). *NSW Branch Strategic Directions – Discussion Paper*. Waste Management Association of Australia. [www.wmaa.org.au](http://www.wmaa.org.au)



---

White, Stuart (2001). *Independent Review of Container Deposit Legislation in New South Wales*. Institute for Sustainable Futures, University of Technology, Sydney.  
[www.isf.uts.edu.au/CDL\\_report](http://www.isf.uts.edu.au/CDL_report)

Wright. A. G. (2000). *Independent Public Assessment – Landfill Capacity and Demand*. State Government of New South Wales – Office of the Minister of Urban Affairs and Planning. [www.planning.nsw.gov.au/assessingdev/pdf/fin\\_landfill.pdf](http://www.planning.nsw.gov.au/assessingdev/pdf/fin_landfill.pdf)

Wright A. G. (2002). *Shaping the Vision and Strategy for Sustainable Waste Management in New South Wales: A Background Paper*. Wright Corporate Strategies.  
[www.resource.nsw.gov.au](http://www.resource.nsw.gov.au)