DRAFT

REPORT 3 & 4

Issues & Barriers and Implementation of an Alternative Integrated Solid Waste Management Strategy for the Greater Sydney Region.

Prepared for

THE TOTAL ENVIRONMENT CENTRE

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1 STUDY BRIEF AND SCOPE OF REPORT

The Total Environment Centre (TEC) received funding to assist in the preparation of submissions by community groups to the NSW Government's Alternative Waste Technologies and Practices Inquiry. The governments call for submissions stated that:

> "The purpose of the public inquiry is to investigate current and emerging waste management technologies and practices, taking into account the principles of ecologically sustainable development.
>
> The Terms of Reference of the Inquiry are as follows:
>
> "Describe and assess current and emerging waste management technologies and practices in Australia and overseas. These technologies are to be assessed in terms of:
>
> 1. Potential impact on the environment in terms of local, regional and global air, land and waster impacts and amenity
> 2. Contribution to waste avoidance and beneficial reuse of resources
> 3. Contribution to waste reduction
> 4. Environmental and economic benefits and costs of the alternative technologies and expressed: per tonne of waste input: per tonne of waste diverted from landfill; per tonne of recovered secondary resources or recovered energy value
> 5. technical performance and operational reliability
> 6. factors effecting the capacity for accelerating the implementation of alternative waste management technologies and practices in NSW in the short, medium or long term"

Environment groups are particularly concerned about establishment of mega-tips (city and country) for Sydney's waste and are focusing on environmentally acceptable alternative technologies and policy tools.

To assist community groups develop responses to the Government's Inquiry the TEC sought assistance from consultants to prepare reports on:

1. The likely (segregated) waste streams in firstly, the Sydney / Newcastle / Wollongong region and secondly a "typical' coastal region over the next 5, 10, 20 years – assuming major landfill and inclusion of other management regimes reasonably anticipated by waste management authorities.
2. A brief review of alternative technologies and practices in terms of feasibility (short, medium, long term) and assessment against ecologically sustainable development (ESD) principles and the inquiry terms of reference and employment generation.
3. A practical alternative waste management plan for the segregated waste streams for the next 5, 10, 20 years for Sydney / Newcastle / Wollongong region and "typical" coastal region that minimises landfill and maximises reuse and waste minimisation with data on resulting employment and economic activity.
4. Removal of barriers to accelerated implementation of the alternatives.

In response to the terms of reference of the Government's Inquiry into alternative waste technologies and practices this report only deals with technologies and practices applicable to management of solid wastes that are regulated under the *Waste Minimisation and Management Act 1995*. This report covers the issues in item 3 of the TEC brief described above.

1.1 Defining key terms

Throughout the waste planning and management field and literature in NSW there is a good deal of variation in terminology and its manner of use. As such following are definitions for terms used in this report.

ESD: *Ecologically sustainable development* is the principle under which development and activities in solid waste management should be undertaken as required by the *Waste Minimisation and Management Act 1995.* ESD:
Is considered to be the effective integration of economic and environmental considerations in decision-making processes, and can be achieved through the implementation of the following principles and programs:

(a) 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. In the application of the precautionary principle, public and private decisions should be guided by:
(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
(ii) an assessment of the risk-weighted consequences of various options,

(b) inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations,

(c) conservation of biological diversity and ecological integrity—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

(d) 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.

Secondary Materials: Recyclable materials that are recovered and used by industry or the manufacturing sectors as a substitute for materials drawn from the environment.

Technology: We adopt the broad definition of technology as being the terminology of an art, science etc. Where necessary we define particular types of technologies, ie technical (hard) or sociological (soft) technologies.

Waste management: Any reference to waste or waste management throughout this report, unless otherwise stated, relates to non-hazardous solid waste and its management, (although we recognise household hazardous type wastes are important in planning and managing solid waste streams we do not consider these in any particular detail). Any reading of the term "waste" should therefore be read in reference to this context.

1.2 Study boundaries and focus

It is important to recognise the parameters for the current debate of "technologies" and "practices" in the area of waste management are not fixed within society. In fact there are many ways that persons, groups, governments, associations etc. perceive, relate to and or approach the topic of waste and waste management.

In recognition of this we define and present the study boundaries used in the reports.

Firstly, we take a "systems" approach in dealing with society management of wastes where a number of technologies and approaches (practices) occur within the waste management system shown in Figure 1-1.

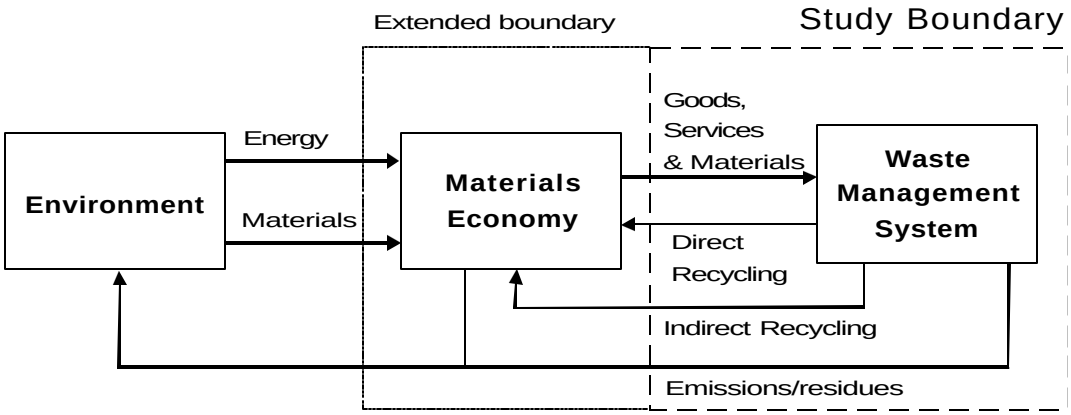

Figure 1-1: System boundaries under study

Within the materials-economy there are many and numerous complex relationships. These result from the many materials types chosen and used in the materials-economy and it involves the many and varied management styles and methods used to provide and move these through the materials-economy. This we can define as the waste management *problem*

It is not within the scope of this work to be able to explore, describe or evaluate all complexities within the *problem*. Our approach has been defined by the consultancy brief and terms of reference of the Inquiry and as such our view of the *problem* has needed to allow for a wide rather than narrow review and assessment of current and potential alternatives available within, the "waste management system" (Figure 1-1).

We have therefore developed our reports around materials (presenting as wastes) within the material economy and the management of these materials.

The task presented by the TEC brief for this report was to provide discussion on :

- a practical alternative waste management plan for the segregated waste streams for the next 5, 10, 20 years for Sydney / Newcastle / Wollongong region and "typical" coastal region that minimises landfill and maximises reuse and waste minimisation with data on resulting employment and economic activity.
- Removal of barriers to accelerated implementation of the alternatives.

As discussed in Report 1 and 2 many limitations exist as research work is required to be able to evaluate alternative integrated solid waste management systems in terms of environmental and economic impacts and benefits. As such we present in this report an alternative strategy as we can only highlight areas where opportunity exists to develop detailed strategies and plans to achieve ESD in waste management.

2 INTRODUCTION

2.1 The challenge to achieve ESD in waste management

Reports 1 and 2 outlined the scale and range of issues that make-up the challenge to reduce and better manage wastes generated in NSW. The challenge is large as there are over 4 million tonnes per year disposed to landfill in the Greater Sydney Region (GSR) alone. The GSR represents the largest population within NSW however data from Coffs Harbour City shows waste generation and management outside the GSR is also a continuing and growing problem. When data is considered from a materials-management viewpoint it becomes clear the problem with waste management is broader than just management of materials presenting as waste. The problem with excess waste has to be addressed by society redressing consumption and management of materials and considering both the role materials play in providing utility and the methods of dealing with it in an ESD framework.

Reports 1 and 2 have shown the "waste-problem" is not a technical problem as there are numerous alternative technologies available to society to treat wastes. Rather, the problem is a social and political one that requires resolution through new strategic interventions. Presently too many waste management programs and infrastructure are focused at the end of the economy. That is, where wastes are presented for treatment and disposal. A proper balance between prevention activities (avoidance, reuse and recycling), and reduction activities (treatment and disposal) is critical.

As an economy-wide approach is needed, government needs to coordinate development and implementation of strategies and plans towards these aims. If government wishes to meets its 60% reduction target it needs to shift its focus from waste management to materials monitoring, minimisation and reuse.

This is not an onerous task as government already provides incentives and it facilitates industry and community activity through many development and support programs. Government also has a range of regulatory mechanisms that it can use to shape a more resource efficient society. In many instances these need to be made proactive to be effective in managing materials flows in the economy.

Overall, ESD in waste management requires:

- A new strategic approach to be developed and integrated into the existing waste planning and management structure, and
- A range of new practices and technologies to be adopted as part of the new strategic approach.

3 BARRIERS

3.1 Introduction

Alternative technologies and practices in waste management must be supported by the society in which they are implemented, if they are to be successful. In assessing the barriers to implementing alternative technologies and practices, it is necessary to examine the structures, which currently support the production and disposal of waste in our society.

We are often described as 'a society of consumers' who associate increased consumption of goods and services with status, comfort and a high standard of living. This paradigm is supported, in part, through the promotion of consumer goods using the 'more is better' approach and through an increasing linkage between the concepts of perceived 'success' and personal 'happiness'[1]. We exist in a society that most often values its assets on an economic basis using dollars as the unit of measurement. This makes economic sustainability relatively easy to measure. The value of environmental assets and social goods is difficult, but in many cases not impossible, to quantify in dollar units. Our society finds it difficult to generate the political will to recognise and redeem environmental and social costs.

Society's attitude toward the consumption of goods and services, combined with our expectation of free or low cost waste removal and our lack of political will to quantify the value of environment and societal goods, are major contributors to the current waste crisis. The inability to redeem environmental and social costs is also likely to have contributed to the failure of most waste strategies to adequately address the social and environmental requirements of ESD[2].

In place of the current, end-of-pipe waste management paradigm, we should seek waste technologies and practices that would assist in leading society to a resource efficient society[3].

3.2 A resource efficient society

A sustainable society is one which balances the three spheres of sustainability (ecological, economic, societal) to achieve defined objectives of sustainability. A resource efficient society can be considered to be one that achieves the same aims using the least resources. There are a number of principles or frameworks that can be used to develop and evaluate sustainability in a society. For example:

- Intergenerational equity: that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

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1 Lagan, A. (1998)

2 See reference documents and earlier reports for discussion of these issues.

3 Von Weizsacker et al (1997).

- The Precautionary principle: 'where 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'.
- The conservation of biological diversity and ecological integrity.
- Polluter pays principle: those who generate pollution and waste should bear the full-cost of containment, avoidance or abatement.
- User pays principle: says the users of goods and services should pay for the full price of the life cycle cost of providing those services, including waste disposal.
- Environmental goals should be established and pursued in the most cost effective way by establishing incentive structures, including market mechanisms.
- Life Cycle Analysis: a tool to understand the movement of resources in a society which quantifies inputs and outputs, and uses information generated to measure the environmental impacts of various options, approaches or policies.
- Total Resource Costing: measures the economic cost of different options, approaches or policies. Looks at financial cost to all members of society around the provision of services as opposed to the provision of a unit of commodity (e.g. 'cold beer' instead of 'kilowatt hours and the cost of a fridge').

On the basis of these principles:

A resource efficient society is one that minimises the consumption of virgin resources, reduces the creation and deposition of waste, and maximises the cycling of resources within the society, while maintaining or increasing social and inter-generational equity.

Clearly our current resource use patterns must change if we are to move towards this outcome. The remainder of this section examines the major barriers to becoming a resource efficient society.

3.3 Barriers to Waste Reduction

3.3.1 What are they?

In managing the generation, reuse, recycling or disposal of waste:

- Social barriers exist where behavioural, institutional, and/or economic constructs cause a change in technology or practice to be perceived as more problematic than maintaining the status quo.
- Physical barriers also exist where the laws of thermodynamics preclude a process from achieving the desired outcome.

While physical barriers cannot be overcome, there are any number of practices and technologies currently available, which are adequate for achieving reuse, recycling, treatment or disposal of wastes. It is social barriers that are key impeding factors for

transition to a resource-efficient society in NSW. Barriers within the social realm can be further divided into:

- cultural, and
- economic.

Cultural barriers

Cultural barriers are probably the strongest factors against developing a resource-efficient society as resistance to change is a common factor in any change-management process. Cultural barriers exist not only in the general community but also within the political and institutional arena.

Resistance to change

Resistance to integration of ESD into mainstream strategic and day-to-day activity exists within most Waste Boards and local government bodies. This is exemplified by the fact that few have adopted the principles of ESD even though it is a basic requirement of the *Waste Minimisation and Management Act 1995*. (WMMA) Integration of ESD is important because for proper evaluation of ESD the three elements; environment, economics and social impacts and benefits need to be equitably considered. This can only be done if organisations are committed to ensuring environmental and social issues are highlighted more than they are at present.

Cultural barriers can be dismantled through persuasion, promotion, advertising, and education; by restriction, through prohibition; or punishment, for example fines[4]. The NSW Government needs to develop and adopt policies for resource efficiency through undertaking:

- Actions that ensure Waste Boards adopt and integrate ESD openly and transparently into their mainstream activities to ensure balanced decision making occurs across the environmental, economic and social areas of their responsibilities.
- Actions in liaison with industry and commerce to develop quantifiable and accountable commitments to extending producer responsibility (EPR) for resource management and improvement in resource efficiency through a range of programs and strategies. Where possible existing industry support and development programs should be used to include commitments to EPR and resource efficiency.
- Cross portfolio integration of policies and strategies in Government Departments to facilitate waste reduction and resource efficiency. This means strengthening existing waste reduction and purchasing processes and creating links between key departments. For example a cross department strategy for organic wastes returned to agriculture and horticulture in the Sydney basin would require many barriers to be overcome and would benefit from NSW Agriculture, Regional Waste Boards, the EPA and DUAP undertaking a symbiotic program.

4 For further information refer to Appendix A and earlier reports.

Information and decision-making

Understanding issues and obtaining availability of information to support decision-making is another key cultural barrier. In regard to balancing the competing issues of ESD improved, detailed information is needed about the economic, social and environmental impacts of waste planning and management options. This lack of information is holding back many decisions about whether an option can be supported or not to overcome these barriers:

- Improved dialogues between these groups to define, adopt and articulated a set of societal preferences that can then become the focal point of future planning is needed, and
- Development of formal processes of assessment of various options from an ESD perspective.

The Inquiry and subsequent government action should facilitate this.

Coordination

Coordination of action is another key barrier to change. Our discussion above regarding integration of ESD is in part also about this issue and those recommendations above will in part help assist development of coordination. The existing structure under the WMMA for coordination of industry is poor. To date little impact has been made as the efforts of Waste Boards and government departments have really been focused on the municipal waste management sector.

In considering development of a resource efficient society, industry and commerce become critical target groups as they are the main sectors that produces, develops and distributes the goods and services for the materials-economy. It is therefore critical that government works to coordinate actions and develop realistic strategies that will impact:

- Industry specification and consumption of materials used in producing goods,
- The methods by which industry produces goods,
- Adoption of EPR[5] as a mainstream activity.

These ensure the opportunity to cycle materials through the economy is optimised. However, in light of the above, it is evident in NSW and Australia no government framework or development work currently exists to bring increased materials efficiency into the mainstream economy.

Therefore, Government needs to review the current waste planning and management structure set up under the WMMA with a view to amending the Act to:

- Improve efficiency and coordination of and between Waste Boards.
- Provide a clearer role for Waste Boards to impact the Commercial, Industrial, Construction and Demolition sectors, and or provide a mechanism for making these sectors accountable for waste diversion outcomes.

5 See the detailed reference report on EPR in the USA on the TEC waste Internet or contact TEC for an electronic copy of the file.

- Provide a structure to integrate mechanisms[6] into the Act that sets-up key linkages and actions within the economy to improve resource-use efficiency.

Economic barriers

The financial cost of changing practices is perceived to be too high by some decision-makers or externalities exist and true costs of conventional management are not reflected. These can come about where the financial cost or benefit of changing practices exceed the current cost or where the true cost of impacts of a resource are not costed into the price of that resource. Costs of new practices may include;

- establishment of infrastructure; and
- administration or operating costs.

To date the economic arguments and validations used in development and choice of Waste Board and other government programs have been very narrow. We are unaware of any economic evaluations that have been carried out to date in regard to potential impacts associated with moving toward a materials-efficient economy within Australia. Such studies are needed for developing a resource efficient society that achieves the goals of ESD in waste management.

Externalisation to the environment of the costs of managing wastes continues to be major problem in the waste management planning undertaken by Waste Boards. Little effort has been given to internalising the true and full cost (in both the short and long term) in industrial production and the links to wastes management[7].

The Government Pricing Tribunals' previous work showed costs and economics of waste management is a complex matter. Moving toward a resource efficient society will increase the complexity and in absence of good information confusion may also increase in regard to what the goal, arguments and factors for consideration should be for societies achievement of ESD, resource use and waste management.

Government therefore should

- Lead a detailed review and assessment of the economics and ESD strategies needed to evolve the current resource inefficient society into a resource-efficient one. The review should ensure:
  - full-costs of future changes to the flows and management of resources are identified and considered, and
  - a database of information is kept up to date to assist ongoing and future planning by government.
- Develop a protocol for full-cost accounting to be used by government departments and Waste Boards in planning

6 See Appendix A

7 Refer to the UNEP Report on sustainable product design (SPD) available at the TEC waste homepage.

4 AN ALTERNATIVE INTEGRATED WASTE MANGEMENT STRATEGY

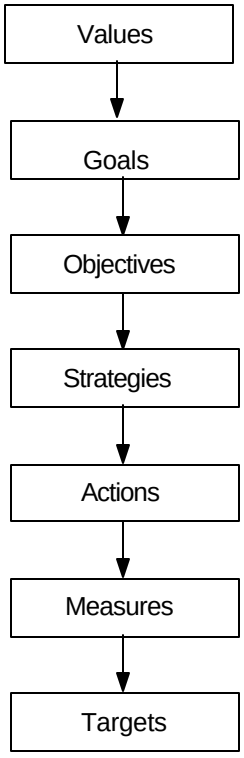
The following section outlines a draft strategy and it highlights the opportunity to develop a new suite of practices and technologies for moving waste management into a resource-efficiency structure.

Although it is possible to conclude that for Government to meet its waste reduction goals the materials-economy needs to be transformed a major barrier exists in that attempting to detail alternative strategies and plans, (and flowing from these infrastructure and systems), much information still needs to be evaluated to conclude what ESD in waste management is and what are the social preferences in response to this.

However, given the need for waste management in NSW, to be urgently set on the path of environmental sustainability, it is necessary to at least commence by developing a broad plan, addressing among other things:

- The short-term transitional actions to avoid a new major landfill;
- Recasting of strategic policy making and coordination;
- Establishment of markets for recovered materials; and
- Integrating extended producer responsibility into the waste management system. The plan will suggest timetables and specific key actions. This will be published in late October. 1999.

The following provides a foundation for alternative strategy.



4.1 Strategy for developing a resource efficient society

As stated earlier if they are to be successful, alternative technologies and practices for waste management must be supported by the society in which they are implemented. We exist in a society, which most often values its assets on an economic basis using dollars as the unit of measurement. This makes economic sustainability relatively easy to measure. The valuation of environmental assets and social goods however has been less commonly practiced.

If however we are to achieve our stated goal of ESD in waste management, the role of resources and their full life cycle costs and impacts need to be recognised and managed strategically within the economy. This is clearly stated it the WMMA definition of how to implement ESD.

Regional Waste Boards have generally remained focused on the "end-of-pipe" issues in planning and management of wastes.

Government therefore needs to facilitate adoption of an overarching strategic plan that guides Regional Waste Boards in their assessment and adoption of technologies and practices to achieve a resource efficient society[8] are the goals of ESD are achieved.

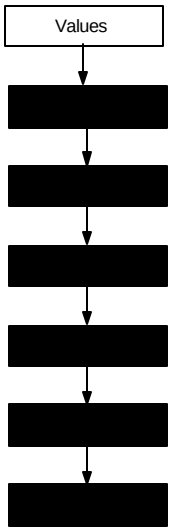
As no common strategic plan exists for sustainable waste management the following provides recommendations for development of a strategic plan for achieving ESD in waste management. The outline is structured around the typical planning process (shown in figure overleaf).

8 Von Weizsacker et al (1997)

4.2 Values for a resource efficient society

4.2.1 Issues

Expression of the values, which reflect the community's desires for sustainable waste management, is important to guide activities in waste planning and management.



It is evident many ideas and perceptions of what ESD is and how it might be achieved exist throughout the GSR[9]. Additionally for many the idea of ESD in regard to waste management remains an issue yet to be accepted as relevant or important.

Adoption of a set of values to guide further development of ESD in waste management is therefore necessary.

4.2.2 Recommendation

A set of values need to be defined and adopted by government to guide and coordinate future planing by Waste Boards, industry and the community.

A value set could be:

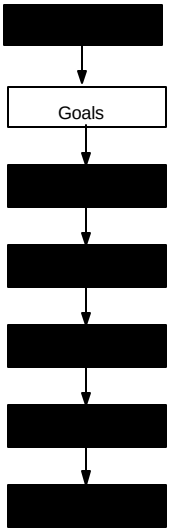
A sustainable society can be considered to be one that:

- *Values and balances the three spheres of sustainability, (ecological, economic, societal), to achieve the efficient use of resources available to it*
- *Achieves the same level of development using less material and energy resources*
- *Works to reduce the total environmental burden caused by use of materials and energy*
- *Works to reduce dependence on non-renewable resources and energy*
- *Optimises the benefit of materials and energy already cycling within the materials-economy*

9 Refer to the very different eight Regional Waste Plans adopted in the GSR

4.3 Goals for a resource efficient society

4.3.1 Issues



To strategically manage change strategically goals need to be developed which flow-on from values.

ESD is a considerable challenge for future waste management as there are many competing goals, ideas and or priorities. Across NSW examples already exist of inconsistencies in interpretation of ESD in waste management and this could increase if there is no one strategic direction require by government.

The waste management hierarchy, adopted by the NSW EPA and the WMMA, is only a set of principles and is not robust enough to act as a decision-making guide.

4.3.2 Recommendations

Goals for guiding government policy and action need to defined and adopted to coordinate operational planning by Waste Boards, Industry and the Community for ESD in waste management.

A set of goals could be:

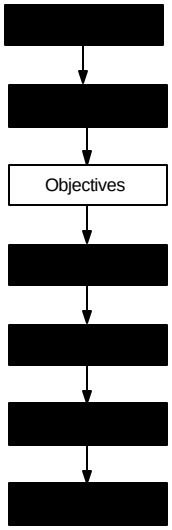
Goals for a sustainable waste management system will recognise the priority of managing material flows within the economy guided by ESD values:

- *Balanced, strategic and coherent decision-making processes*
- *Future planning including processes and structures that ensure economic, social and environmental outcomes of technologies and practices are fully evaluated in ESD terms, when development decisions are being made*
- *Future waste management will ensure the economic, social and environmental outcomes stated as a necessary part of ESD development are achieved*
- *Future waste management activities assist not only improved management of materials but also:*
    - *development of other sectors of the economy,*
    - *support for employment and local communities*

4.4 Objectives for a resource efficient society

4.4.1 Issues

When the flow-on effects of materials and product development are considered in an economic context significant negative environmental and social implications become apparent from the current "end-of-pipe" waste management approach. The economy currently wastes many non-renewable materials and does not recover many renewable materials or the inherent energy from renewables.



4.4.2 Recommendations

A set of objectives are needed to guide actions and set ESD boundaries for decision making and the choice of practices or technologies in ISWM.

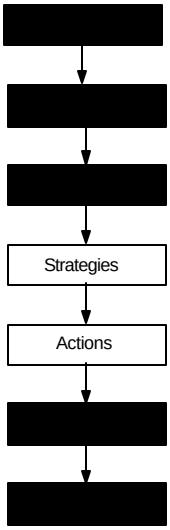
Objectives for an alternative waste management strategy could be:

Regional and local objectives for living in a resource efficient society should be:

- *Prevent unnecessary materials and goods from being produced thereby preventing generation of wastes*
- *Prevent unnecessary loss of materials and energy as wastes from the economy*
- *Rationalise the materials needed to provide for the various functions in society*
- *Decrease materials and energy intensities on a per capita basis through their efficient use in production, manufacturing and use cycles.*
- *Develop and implement strategies that:*
  - *Balances primary and secondary resources input into the economy.*
  - *Increases materials cycling in the economy.*
  - *Increases materials and energy economy in the economy.*
- *Increase employment and economic activity through waste prevention training and planning*
- *Increase employment and economic activity through reuse, recovery and recycling industry development*

4.5 Strategies and actions for a resource efficient society

4.5.1 Issues



Report 1 showed ample opportunity exists to target various components that make up the total waste stream currently disposed to landfill. Report 2 showed that there is also ample opportunity to reduce wastes at the manufacturing, production and post-use stages in the economy through prevention, reuse, and recycling activities.

Presently each year there are over 4 million tonnes of materials being disposed to landfill. Given little has changed since introduction of the new waste planning and management regime, at best this level could expect to remain static - at worst it will increase. As at 1996 [10], wastes disposed included in excess of:

- 760,000 tonnes of food and kitchen wastes,
- 345,000 tonnes of paper and cardboard,
- 300,000 tonnes of wood materials,
- 200,000 tonnes of garden / vegetation,
- 112,000 tonnes of glass,
- 130,000 tonnes of metals,
- 226,000 tonnes of plastics,
- 513,000 tonnes of concrete and rubble, and
- Over 1 million tonnes of other wastes that includes a large range of residual mixed materials.

4.5.2 Recommendations

To become a resource efficient society the strategy needs to consider a combined and balanced implementation of practices and technologies to achieve a total reduction in the amount of materials presenting as wastes and to optimise their recovery and reuse within the materials-economy.

Strategies and actions for working toward ESD in waste management should include a range of the practices and technologies reviewed in Report 2 after formal evaluations have been conducted into their efficacy in delivering ESD outcomes. The following outlines such relevant strategies and activities.

10 These figures are conservative values as the rounding to the nearest 1,000 tonne carried out Report 1 has rounded these figures down. The total waste disposed in the GSR for 1996 was over 4 million tonnes

Organic wastes

Similar management strategies will need to be applied to organic wastes from the food and kitchen, wood and garden / vegetation wastes categories shown above. In total these are over 1.2 million tonnes or about 29% of the total wastes disposed to landfill each year in the GSR.

Short-term prevention strategies and activities[11]

Government should as a short-term priority:

- Increase funding for education and promotion of domestic and commercial composting to increase at-source management;
- Provide cleaner production programs in the commercial food-processing sector;
- Promotion of spoilage resistant and seasonal produce;
- Require waste boards to implement financial incentives that promote householder reduction of organics at-source and / or provide dedicated organic waste collection services and treatment that ensures organics are recycled beneficially;
- Fund food-waste reuse programs[12] by organisations;
- Provide incentives for communities to conduct local cooperative organics waste treatment and reuse schemes;
- Provide incentives to the waste collection and processing industry to develop services for dedicated organics waste collection and treatment systems;
- Provide financial assistance for organics waste processing research and development;
- In support of the above strategies adopt a ban on untreated organic waste disposal to landfill.

Medium and long-term prevention strategies and activities

Government should adopt as medium and long-term strategies:

- Increased efficiency in the transport and storage of organics;
- Promote decentralised and urban agriculture,
- Deliver and promote cleaner production education in the retail and food industry sector;
- Develop organics recycling programs, with horticulture and agriculture industries;
- Require and assist Regional Waste Boards to develop programs and infrastructure for recovery and recycling of organics wastes;
- Provide through regional development organisations, funds for market development across NSW;
- Assist Regional Waste Boards to develop infrastructure for energy recovery from non-recyclable organic wastes in the GSR;
- Develop and implement cross-departmental programs in the recycled organics sector to support market and processing capacity.

Potential waste reduction

Of the organic waste types shown above it is estimated that:

- 80% or 600,000 tonnes per year of the 760,000 tonnes of food waste can be diverted

11 Refer to Appendix A of Report 2

12 Refer to Appendix A of Report 2

- 80% or 160,000 t/ yr of the 200,000 tonnes of garden/vegetation waste can be diverted, and
- 90% or 270,000 t/yr of the 300,000 tonnes of wood wastes could be diverted.

In total this would provide over 1 million tonnes of waste diversion or 25% of the total waste stream.

Recyclables

Similar management strategies can be applied to the recyclable materials from the paper and cardboard, glass, metals and plastics wastes categories. In total these categories represent about 851,000 tonnes or 20% of the total amount of wastes disposed to landfill each year in the GSR.

Short-term prevention strategies and activities[13]

Government should as a short-term priority:

- Increase funding for education and promotion of commercial recycling to increase at-source recovery of recyclable materials;
- Provide funding for materials efficiency and waste management research;
- Provide cleaner production programs in the retail, commercial and industrial sectors;
- Adopt waste disposal reduction targets for all recyclable waste materials and include these in all landfill operating licences;
- Link the National Environment Protection Measures for packaging materials within the industry waste reduction planning (IWRP) structure under of the *Waste Minimisation and Management Act, 1995;*
- Integrate EPR and targets for materials intensity reductions into the IWRP structure;
- Provide financial incentives through increasing the landfill levy on specific materials to promote reduction at source and provide funds to support programs in commercial and industrial waste generators;
- Develop programs and provide financial incentives for commercial and industrial reuse of recyclable materials as feedstock for manufacturing through Regional Chamber of Commerce and Regional Development organisations;
- Provide incentives to the waste collection and processing industry to develop services for dedicated recycling collection and systems for the commercial and industrial sector;
- Provide financial assistance for recyclable materials processing research and development.

Medium and long-term prevention strategies and activities

Government should adopt as medium and long-term strategies:

- Increase landfill reduction targets for recyclable materials;
- Remove barriers to increasing recyclable content of packaging through substitution of raw with secondary resource materials;
- Require and assist Regional Waste Boards to develop infrastructure for recovery and recycling of materials;

13 Refer to Appendix A of Report 2

- Provide through regional development organisations, funds for industry development to restructure or amend their processes to reduce materials intensity in production and increase substitution of secondary for raw resources in production and manufacturing;
- Assist Regional Waste Boards to develop infrastructure for energy recovery from residues of recyclable wastes and other wastes that can not be recycled in the GSR.

Potential waste reduction

If the above measures were implemented it is estimated that about:

- 60% or over 200,000 tonnes per year of the 345,000 tonnes of paper and cardboard waste could be diverted.
- 90% or 100,000 t/ yr of the 112,000 tonnes of glass wastes could be diverted.
- 90% or 117,000 t/yr of the 130,000 tonnes of metal wastes could be diverted.
- 60% or 135,000 t/yr of the 226,000 tonnes of plastic wastes could be diverted.
- Development of energy recovery from the residual paper, cardboard and plastics wastes would mean that a further 200,000 tonnes per annum could be diverted from landfill and provide a substitute energy source, with greenhouse benefits.

In total this would provide over 750,000 tonnes of waste diversion or an additional 18% of the total waste stream.

Other wastes

Other than the organics and recyclable wastes there remains over 513,000 tonnes per annum of inert materials sourced from the Construction And Demolition industries and more than 1 million tonnes of other mixed wastes from all waste sectors, that are disposed to landfill each year. As much of this residual mixed-wastes come from all waste generating sectors discussed in the above, some of the strategies can be expected to have an impact on the wastes discussed here. In some instances significant amounts of wastes might be diverted through prevention and reduction incentives discussed above, for example recovery and reuse of rubber and other materials.

Short-term prevention strategies and activities[14]

Government should as a short-term priority:

- Provide financial assistance for residual materials processing research and development
- Provide research and development funding for energy recovery from residual wastes.
- Remove barriers to utilising energy recovery from non-recyclable materials.

Medium and long-term prevention strategies and activities

Government should adopt as medium and long-term strategies:

- Require and assist Regional Waste Boards to develop guidelines for infrastructure development for energy recovery from residual wastes to ensure that thermal treatment technologies are not used as waste volume reduction processes thereby bypassing EPR responsibilities.

14 Refer to Appendix A of Report 2

- Provide through regional development organisations, funds for industry development of cogeneration from in-house wastes in line with the above guidelines.

Potential waste reduction

If the above measures were implemented it is estimated that about:

- 10% or over 50,000 tonnes per year of the 1 million tonnes of residual wastes could be diverted.
- 20% or 100,000 t/ yr of the 513,000 tonnes of construction and demolition wastes could be diverted.
- 70% or 665,000 t/yr of the 950,000 tonnes of residual wastes could be diverted.

In total this would provide over 1.1 million tonnes of waste diversion 26% of the total waste stream and provide a significant alternative energy source for the GSR.

4.6 Estimated employment and economic activity

From the strategies above it is estimated economic and employment[15] activity would result from:

- Increased economic activity from funds spent by both government and industry in response to increased costs brought about by increased waste diversion targets.
- Increased funding in education and training areas as a result of government funds to support various reduction and recycling programs.
- Increased investment and economic activity by private industry and commerce to provide services and take advantage of infrastructure to recover materials and or energy from wastes.

From the review of employment generation discussed in Report 2, employment generation from the alternative plan could be expected to be significant. The final plan in this series of reports will examine this issue more closely.

4.7 Impact on landfill space

The review of waste management practices in Reports 1 and 2 indicate that significant reduction in wastes requiring disposal is possible and the total potential reduction will be dependant on the final suite of practices and technologies chosen and implemented.

Technically there is a barrier to 100 percent diversion of waste from landfill as there always remains residual materials requiring disposal. Potentially however 80 to 90% reduction in waste disposed to landfill compared to current activity is possible. If this level of reduction was achieved pressure for development of new landfill will dramatically reduce and existing available landfill in the GSR would be likely to suffice for at least another 30 to 40 years.

15 Refer Report 2 for details of the review on employment impacts from overseas experiences

5 REFERENCES

Lagan, A. (1998). Success or Happiness? The St James Ethics Centre Winter Edition. Winter 1998.

Platt, B., Doherty, C., Broughton, C-A. and Morris, D. (1991) Beyond 40 Percent: Record-setting Recycling and Composting Programs. Institute for Local Self Reliance. Washington DC, USA.

Steutville, R. (1997) Dramatic Results from Weight Based Fees. Biocycle, 38(3): 36-38. 1997 Mar.

Von Weizsacker, E., Lovins, A. B., and Lovins, L. H. (1997) Factor Four: Doubling Wealth – Halving Resource Use. Earthscan Publications Ltd, London.

Appendix A

Mechanisms to remove economic and social barriers

There is an array of means by which barriers to waste reduction can be overcome.

Legislative

Extended Producer Responsibility (EPR) generally, and Container Deposit Legislation (CDL) specifically, are examples of legislative measures that can be considered to promote reduction in use of virgin resources.

- EPR as a policy position and strategy can be used by government as a way to ensure producers of consumer goods take responsibility for the fate of their product. In Australia industry produces goods and services for the community and other industries and then generally considers it is not their responsibility to conduct any post-production activities with regard to the environmental management of their products. Internationally, many countries have developed with industry programmes to extend their boundary of responsibility to include post-production and post-consumer use management of wastes. The extended responsibility in many cases involves acceptance of products increase their this has been changed further causes the costs of waste reuse, recycling or disposal to be factored into the cost of the article and can lead to more sustainable choices in the design and construction of consumer goods.
- Barriers to source separation and bulking of containers are overcome through CDL by offering an economic incentive for consumers to collect and return containers to a centralised point.

Another example is banning through legislation select materials from landfill disposal. This attacks and redistributes the social and or economic barriers that market forces can not address. In relation to achieving ESD in waste management, bans must be considered in terms of assisting the redistribution of materials to another part of the economy. As such a ban should only be considered where:

(a) A substitute material may be chosen that has not reuse, recycling or disposal limitations
(b) A ready market exists to absorb banned materials, or
(c) Government or the market can provide ongoing assistance / financial support to develop (a) or (b) above.

Regulatory

Licensing and land use planning controls are means of regulating the generation of waste. Recently, changes to development control planning have seen a reduction in waste produced from construction and demolition activities. The requirement to submit plans for waste disposal as part of the development approval process has removed the barrier to recycling of construction waste.

Regulation has historically been about reactive management of issues. In NSW use of landfill as the preferred treatment mechanism for putrescible wastes has meant the regulatory structure and experience has been around of this technology. Updating existing regulatory controls and attitudes to include non-traditional forms of treatment and processing is needed. Development of anticipatory regulatory measures to facilitate new practices and technology uptake is also needed.

Waste policy documentation from the NSW EPA indicates the EPA has yet to move away from such landfill regulation towards proactive materials management. This may in part be a confounding factor affecting the move away from landfill management as suggested by the Western Sydney Waste Board in its Regional Waste Plan.

Self-regulatory

Cleaner production has overcome a number of barriers to waste minimisation in industry. Cleaner production involves the analysis of production inputs, outputs and practices with the objective of identifying practices, which cause resources to be wasted. The primary objectives of Cleaner Production have been to reduce industry input costs or increase productivity. Barriers to implementation of cleaner production have largely been a scarcity of cleaner production professionals, lack of knowledge regarding production practices, perception that alterations to practices would be costly and yield little return, reluctance to change, and a traditional focus on reducing staffing levels to cut costs. Self-regulation leading to reduced waste generation in industry has also been driven by changing community perceptions and demands about the operation of the manufacturing sector. However, this method lacks consistency across industry and is often difficult to audit and self regulation is not generally effective. In the current situation self-regulation would only be a "delaying tactic" which would ultimately lead to worse outcomes

User Pays

User pays mechanisms have proven successful in reducing demand for resources in the water sector. Overall residential water consumption tends to decline by more than 20% in the wake of introduction of reasonable pay-by-volume tariffs. Evidence from the USA[16] [17] suggests that weight based fees would be an effective means of reducing waste generation in Sydney. Barriers to the introduction of such a fee structure include: the cost of refitting trucks to weigh waste; cost of administration; community perception of waste removal as a free service; and lack of will to incur the political consequences of community resistance to weight based fees. There may also be equity issues associated with weight based fees. Although, in the waste situation user pays may be more equitable than for water and no worse than for electricity. Unlike indoor water consumption, which is much more dependent on occupancy, waste generation would have an 'economy of scale' and is much more avoidable without capital costs than indoor water use reductions. Therefore, in principle the equity issues are significantly less than for water, energy or for that matter

16 Platt, et al. (1991)

17 Steutville, R. (1997)

motor fuel. Equity considerations highlight the need for introducing programs that support householders in waste minimisation prior to the introduction of usage-based charging.

Market establishment

A major barrier to recycling of many parts of the waste stream is the lack of established markets for the sale of recovered resources or goods produced from recycled feedstock. Barriers to market establishment include the social (e.g. perception of recycled goods as inferior or faulty, lack of familiarity with recycled products) and the economic (e.g. high research and development investment, high infrastructure or establishment costs, high risk) associated with manufacturing and promoting a recycled product. To effectively overcoming these barriers if industry is not willing or able to effect change, fiscal and or regulatory intervention is needed by Government.

Imports and trade

Trade liberalisation appears to be contributing to the slow start-up of markets for recycled goods. Recycled paper manufacturers claim that the low price of imported virgin paper, due in part to low offshore labour costs and poor environmental controls, is offering stiff competition to the establishment of recycled paper markets on the domestic front[18]. Change in this area will also require government intervention.

Consumer education

This along with regulation and financial incentives is one of the strongest mechanisms for removing social barriers to waste minimisation and changed resource use practices. Consumer education can include; advertising, promotion, and training. The effectiveness of this approach in changing behaviour, attitudes and expectations is apparent in the success of municipal kerb-side recycling. Approaches using community education and supporting infrastructure have achieved waste to landfill (or incinerator) reductions of up to 40% in the USA[19].

Costing the environment and society

Triple bottom line accounting is an example of a tool for costing environmental and social impacts, in addition to the more traditional economic valuation. This approach overcomes the conceptual barrier which precludes valuing the environmental and social impacts of different waste technologies and practices. The success of this approach is dependent on the indicators which are chosen to value each parameter. Economic valuation uses dollar units, environmental valuation uses indicators of environmental impact (e.g. energy consumption, greenhouse gas emissions, loss of biodiversity), and social valuation uses indicators such as public health, equity and employment.

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18 Source: Ian Bain, Shoalhaven Mills

19 Platt, et al. (1991)