INDEPENDENT REVIEW OF CONTAINER DEPOSIT LEGISLATION IN NEW SOUTH WALES

FINAL REPORT – VOLUME I

Prepared for:
Hon Bob Debus, MP
Minister for the Environment

Prepared by:
Institute for Sustainable Futures
University of Technology, Sydney

Dr Stuart White

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Principal Author:
Dr Stuart White

Project Team:

Felicity Calvert

Dana Cordell

Anastasia O'Rourke

Stuart Waters

Emma Young

institute for sustainable futures

UTS
University of Technology, Sydney

INDEPENDENT REVIEW OF CONTAINER DEPOSIT LEGISLATION IN NSW

VOLUME I

EXTENDED PRODUCER RESPONSIBILITY: PRINCIPLES, POLICY AND PRACTICE IN NSW

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Independent Review of Container Deposit Legislation in New South Wales

Executive Summary

Container deposit legislation (CDL) describes legislation that establishes a deposit and refund system for used containers. As part of the review of the New South Wales (NSW) Waste Minimisation and Management Act (1995), the NSW Minister for the Environment, The Hon Bob Debus, commissioned Dr Stuart White to conduct an Independent Review of Container Deposit Legislation in NSW (the CDL Review).

Container deposit legislation is an example of an increasingly important environmental management principle, known as extended producer responsibility (EPR). Dr White was, therefore, requested to investigate the broader principle of EPR with reference to international experience, including how it might be implemented in NSW. This investigation, contained in *Volume I* of this report, revealed that EPR is a strategy worth pursuing. It has the potential to deliver improved waste management and broader environmental outcomes in NSW, in an economically efficient manner.

The new Waste Act contains provisions which are consistent with the best practice elements of EPR recommended in this Review.

In accordance with the terms of reference of the Waste Act Review, *Volumes II* and *III* of the CDL Review *describe and assess the effectiveness of container deposit legislation in litter and waste management* in the NSW context. After initial investigation, the CDL Review focussed on CDL applying to post-consumer beverage containers made from materials currently recycled. The Review then examined the appropriateness of the introduction of such legislation in the NSW context by assessing:

- stakeholder and community attitudes to container deposit legislation;
- costs and benefits of container deposit legislation on both a whole of society basis and in respect to key stakeholder groups; and
- the feasibility of container deposit legislation given the current industry, institutional, and legislative frameworks.

The CDL Review found that stakeholder attitudes to CDL are highly heterogeneous, with strong support from local government and environment groups, majority support from the community, limited support from the recycling industry, and opposition from the beverage, packaging, and retail industries.

When both financial and environmental impacts were considered on a whole of society basis, the potential benefits of introducing CDL in NSW were found to significantly exceed the costs. The annualised net economic benefit of CDL in NSW in the case where recovered container materials are recycled was found to be of the order of $70-100 million per year compared to the current situation. This net economic benefit is largely due to environmental benefits that were valued by the CDL Review at $100-150 million per year. This valuation of environmental benefits is exclusive of the value of improved visual amenity due to litter reduction. Litter reduction is, however, an important benefit to be gained from CDL and has historically been a major driver for its introduction both in Australia and overseas.

In summary, the estimated value of the environmental cost of disposing of a single average beverage container to landfill, compared to recycling that container, is 8-9¢. The cost of

recovering that container through a combined CDL and kerbside recycling strategy is approximately 2-3¢.

Consumers of containerised beverages were identified as the stakeholder group that would bear the largest cost burden if CDL were introduced in NSW. The beverage industry and both large and small retailers would also be likely to incur net costs under such a system. The magnitude of these costs would depend strongly on the extent to which they were able to pass them on to consumers and also on the type of CDL system established.

Local government, in contrast, would realise financial benefits from the introduction of CDL, through reduced costs of kerbside collection and through the value of unredeemed deposits in the material collected at kerbside. The timing, and extent of these benefits would depend on the timing of renewal and negotiation of recycling contracts relative to the introduction of CDL, in cases where councils use contractors for kerbside collection. It would also depend on the terms of such contracts in relation to the ownership of used container materials and the unredeemed deposits.

New South Wales has a very high recovery rate for old newsprint, at approximately 75% in 2000. The frequency and convenience of kerbside collection is a major factor in this recovery rate, and therefore it would be important to ensure that CDL did not compromise this success. The modelling and analysis that has been undertaken in this Review indicates that the introduction of CDL will ultimately improve the financial performance of kerbside recycling by reducing its costs. There would be no financial justification for any council to reduce the frequency and convenience of kerbside collection of paper as a result of the implementation of CDL.

The CDL Review estimated that there would be a net employment increase of between 1,000 and 1,500 full time jobs if CDL were implemented, depending on the option. Potential long term losses of employment are mainly from kerbside recycling, MRF sorting and garbage collection, estimated at 25 jobs, with the net increase in jobs being due mainly to employment in collection centres or retail outlets.

Other stakeholder groups likely to benefit financially from CDL due to collection and donation of deposit bearing containers are charities and some disadvantaged sections of the community.

The CDL Review concluded that NSW would obtain overall benefits from the significant improvement in the container material recycling rate and the reduction in litter that could be expected to result from the introduction of a best practice form of CDL. The Review considers that the desired outcomes of high recycling rates and reduced litter are also achievable through other regulatory mechanisms such as mandatory recovery and recycling targets. However, it notes that international experience has found deposit-refund systems to be the most effective mechanism for achieving high container recovery rates.

There are several issues that would warrant further attention prior to the development of container deposit legislation or other forms of extended producer responsibility in NSW. Primary among these are potential legal impediments. These impediments would be less likely to arise if the deposit-refund or other form of EPR system were established by industry or implemented at a national level. The current opposition of important industry stakeholders to CDL will also warrant consideration, as will an effective mechanism for the administration and regulation of the system. With careful reference to previous Australian and international experience with EPR schemes in general and deposit-refund systems in particular, it would be possible to implement an effective and economically efficient container deposit-refund system in NSW.

The overall conclusion of the CDL Review is that:

The potential benefits of, and level of community support for, significantly increased recovery of used containers are such that action should be taken to ensure that the recovery rates are raised to a more economically optimal level based on total benefits to society. The current mechanisms for container collection and recycling are unlikely to achieve these rates and the current targets in relevant Industry Waste Reduction Plans are well below these optimum levels.

Recommendations

In regard to the implementation of the principles of extended producer responsibility in NSW, the CDL Review recommends that:

- *Policy and legislative frameworks in NSW be amended to incorporate the principles of EPR and to facilitate its effective implementation.*
- *The NSW Government seek agreement at a national level for the adoption of EPR. This would allow a more effective model of EPR to be developed for NSW by addressing constitutional and cross-border issues.*
- *Legal impediments to EPR, specifically those relating to constitutional, mutual recognition and taxation issues, be fully investigated.*
- *Product-specific EPR programs be developed that incorporate mandatory performance targets.*
- *Industry be given the opportunity to determine how they will meet the performance targets specified by product-specific EPR programs, e.g. via the establishment of voluntary schemes that provide appropriate environmental, economic and social benefits, with an understanding that mandatory schemes will be implemented if the voluntary schemes fail to achieve their performance targets.*
- *Products are selected for development of an EPR program based on analysis similar to that conducted for beverage containers in the CDL Review. This would include a comprehensive analysis of the total costs and benefits to society, including externalities, and the use of representative and deliberative processes of public participation.*

Regarding container deposit legislation in NSW, the CDL Review's recommendation is that either:

1. *Container deposit legislation be introduced that establishes a container deposit and return system with the following features:*
   - *Deposit applicable to all beverage containers made from aluminium, glass, PET, HDPE, PVC, liquid paper board and steel;*
   - *Mandatory acceptance of used containers and refund of deposits by all retailers of deposit bearing containers. This should be subject to exemptions and/or qualifications that would prevent an inequitable burden being placed on small retailers where these exemptions would not compromise consumer access and convenience;*

- *Should point of sale return not prove possible to implement, a depot or collection centre based CDL system should ensure accessibility, preferably requiring retailers with a threshold turnover level to provide facilities near retail outlets;*
- *A uniform deposit level of ten cents initially with provision to alter the level of deposits on certain container types at the discretion of the Minister for the Environment;*
- *A mechanism for ensuring that those parties involved in the acceptance of used containers and refunding of deposits are adequately compensated for those services, and*
- *A mechanism for expanding the range of containers subject to a deposit.*

Or

2. *The strengthening of industry recycling targets to levels that achieve equivalent outcomes to those that could be expected to result from the introduction of CDL. These targets should therefore:*
   - *Achieve recovery rates for the recycling of used container materials of ninety percent, and;*
   - *Apply as a minimum to beverage containers, with provision for expansion to encompass other container types.*

List of Abbreviations

ABS	Australian Bureau of Statistics
CBA	Cost Benefit Analysis
EEE	Electrical and Electronic Equipment
ELV	End-of-Life Vehicles
EPA	Environmental Protection Authority
EPP	Extended Public Participation
EPR	Extended Producer Responsibility
ESD	Ecologically Sustainable Development
IPP	Integrated Product Policy
IWRP	Industry Waste Reduction Plan
LCA	Life Cycle Assessment
LGA	Local Government Area
LGSA	Local Government and Shires Association
MRF	Material Recovery Facility
NCC	Nature Conservation Foundation
NEPM	National Environmental Protection Measure
NPC	National Packaging Covenant
OECD	Organisation for Economic Co-operation and Development
PCA	Packaging Council of Australia
PRO	Producer Responsibility Organisation
WTP	Willingness to pay

Glossary of Key Terms

The following is a list of key terms defined for the purpose of the EPR Review.

The Act	NSW Waste Minimisation and Management Act, 1995.
Cleaner Production	The continuous application of an integrated preventive environmental strategy to processes, products and services to increase overall efficiency and reduce risks to humans and the environment (UNEP, 2001, p.3).
Consumer	Anyone who purchases a product included in an EPR program.
Electrical and Electronic Equipment (EEE)	Products in the category of electrical and electronic equipment, such as computers, stereos.
Extended Producer Responsibility (EPR)	Extended Producer Responsibility (EPR) aims to ensure that the responsibilities of both producers and consumers are maintained from production to final disposal or recycling.
Extended Product Responsibility (EPR)	See *Shared Responsibility Model* and *Product Stewardship*.
Integrated Product Policy (IPP)	A policy framework that aims to improve the environmental performance of products throughout their whole life cycle.
Life Cycle Assessment (LCA)	An approach that studies the entire environmental effects of a product or material from production to disposal. With respect to waste management, LCA considers all aspects of resource use, waste generation, storage, transport, treatment and disposal.
Mandatory mechanisms	Legally binding policy mechanisms such as legislation, regulations and ordinances. Mandatory mechanisms require a formal authority (usually government body) to provide sanctions and ensure compliance.
Packaging	Any material or combination of materials designed for the containment, protection, preservation, marketing and handling of retail consumer products.
Polluter Pays Principle	The Polluter Pays Principle expands private sector responsibility for the conservation of resources and pollution reduction [OECD, 1998a #538, p2]. It is the notion that those who generate or handle pollutants should bear the damage costs to the environment [Commonwealth EPA, 1992 #488, p12].
Producer	The actor with the greatest control over the selection of materials and the design of the product. It can be the manufacturer, brand-owner, importer, or filler.

Producer Responsible Organisation (PRO)	Under an EPR system, such as mandatory take-back or deposit refund, a third party, often industry based, is set up to allow producers to collectively manage and collect their used products and product containers, in addition to managing the funds of the system. Such industry-based third party organizations are often referred to as Producer Responsible Organisations (PRO).
Product chain	The production process from raw material extraction to waste management of a product. This will involve importers, fillers, distributors, brand name holders, manufacturers, retailers, collectors, waste managers.
Product stewardship	An ethic of shared responsibility for the lifecycle of the product through to and including its ultimate disposal. (ANZECC, 1999, #283, p3).
Recovery rate	The proportion of end-of-life product recovered for recycling and reuse.
Refillables	Beverage containers which can be refilled and reused. The used beverage containers are usually collected and returned to the distributor for refilling. Beverage containers which can be refilled are glass, PET, and PEN.
Retailer	A person or organisation who sells a product included in an EPR program to a consumer.
Secondary packaging	Post-industrial packaging generally referring to the larger packages that contain the individual container items for storage and transport.
User Pays Principle	The user pays principle resembles the polluter pays principle, in that the users of a product or service are financially responsible for the environmental costs. See *Polluter Pays Principle.*
Voluntary mechanisms	Non-legally binding policy mechanisms initiated by industry, government, or multi-stakeholder partnerships. Voluntary EPR mechanisms are most popular in North America.

Summary

Extended producer responsibility (EPR) is an emerging policy principle and strategy in the international arena that gives Governments and industry a new approach to solving environmental problems associated with products and waste.

Background

As part of the review of the NSW Waste Minimisation and Management Act enacted in 1995, The Hon. Bob Debus, Minister for the Environment, commissioned Dr Stuart White to conduct an Independent Review of Container Deposit Legislation (CDL) in NSW. In addition, Dr White was commissioned to provide a detailed analysis of the principles and potential for application of Extended producer responsibility (EPR) in NSW.

The outcome of the work commissioned by the Minister in relation to CDL and EPR is presented in three volumes, of which this report is the first.

Volume I: Extended Producer Responsibility: Principles, Policy and Practice in NSW

Volume I provides a detailed briefing on the principles of EPR, an overview of current international 'best practice' in its application, and analysis of how these principles might affect waste policy in NSW.

Volume II: Cost-Benefit Analysis of CDL in NSW

Volume II provides the methodology used, and the results of modelling undertaken, to determine the costs and benefits of the introduction of CDL in NSW.

Volume III: Consultation and Social Research in Relation to CDL in NSW

Volume III describes the methodology and results of the social research undertaken to determine the views of NSW citizens with respect to the introduction of CDL in NSW.

This *Summary: Volume I* applies only to the work conducted in relation to extended producer responsibility. For summary or details of the "Independent Review of Container Deposit Legislation in NSW", please refer to *Volumes II & III*.

Concept and Drivers for EPR

EPR is a means of addressing the environmental impact of a product by first considering a product from a life cycle perspective, then clearly defining the responsibilities of the actors involved in the product chain. EPR has emerged in response to the growing realisation of the inefficiency of current waste management practices, which focus on the end of the product chain, and from a desire to stop the impact of waste generation and waste treatment at their source.

By transferring the economic responsibility for waste from Governments and the community to producers, EPR provides an economic incentive to producers to prevent waste generation, to reduce the use of toxic materials, to increase recycling and to enhance markets for secondary materials (OECD, 1996). It therefore addresses the impacts of products at more stages in their life cycle than just the disposal phase. This report has adopted the OECD definition of EPR as the standard definition used throughout the report.

According to the OECD, the four principal goals of EPR are:

- source reduction (natural resource conservation/materials conservation);
- waste prevention;
- design of more environmentally compatible products; and
- closure of materials loops to promote sustainable development.

Additionally, Governments may use EPR as a way to:

- signal to the consumer the 'real' (social and environmental) costs of products and their disposal;
- reduce the volume of waste and pollution; and
- provide an alternative way to fund waste treatment.

EPR policy frameworks involve a clear definition of the responsibilities carried by the different groups involved in the production, distribution, consumption and disposal of products. This responsibility can take different forms depending on the product system and industry sector involved, and is often legislated separately on a product-by-product basis (for example, beverage containers, electrical and electronic goods and vehicles). Producers may be financially responsible for liability arising from proven environmental problems, or for the fate of products via fees and charges. They may also be physically responsible for products, and retain ownership of products and/or provide information about the disposal or reuse of products. Figure 1-1 illustrates various aspects of extended producer responsibility.

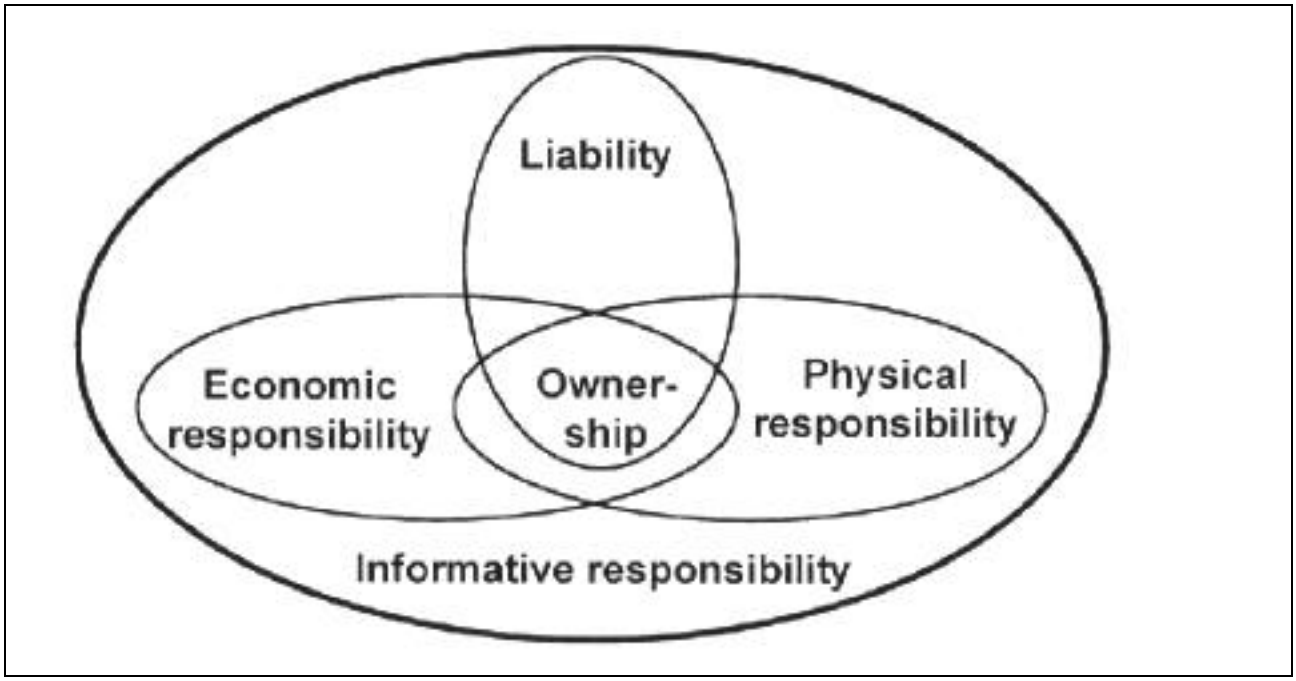

Figure 1-1: Conceptual diagram of extended producer responsibility.

Source: Lindhqvist, T. (2000), Extended Producer Responsibility in Cleaner Production: Policy Principle to Promote Environmental Improvements of Product Systems, Thesis (PhD), International Institute for Industrial Environmental Economics (IIIEE), Lund University: Lund.

EPR differs from related concepts such as 'Product Stewardship' and 'Shared Responsibility' by focusing responsibility primarily on producers as opposed to sharing responsibility equally between all stakeholders.

International Situation

A detailed international review of current EPR legislation and related programs was undertaken as part of this study. EPR as a mandatory measure is most often found in Europe, where the idea originated. EPR in Europe was often initially introduced as a guiding principle by Government using existing waste legislation, then later fully adopted via a specific bill (such as the Swedish 1993 *EcoCycle Bill* and the 1991 *Packaging Ordinance* in Germany). In Europe today various forms of EPR legislation have been adopted by a number of Governments. At the EU level EPR is a key component of the *Packaging Waste Directive* of 1994, and of specific directives on products such as vehicles.

The US Federal Government has shied away from the development of policies that are consistent with the OECD definition of EPR. Instead, EPR is defined as Extended product responsibility or 'shared responsibility', whereby responsibility is often voluntary, and shared between numerous parties. However, related legislation at the US State level is quite often mandatory (such as for deposit-return systems and disposal fees).

There are numerous examples from around the world of the application of EPR to consumer products. According to the OECD the most common product categories addressed in EPR programs are packaging, electric/electronic goods, automobiles, wastepaper and motor oils. The most common product group with which to initiate an EPR program has been beverage containers and the most common EPR program is the deposit-refund or take-back system (OECD, 2000).

An overview of international EPR programs has been provided, including a discussion of production and recovery rates within mandatory and voluntary programs.

Current Policy and Legislative Framework

Australian Commonwealth and NSW State initiatives for waste minimisation are largely voluntary and focus primarily on the packaging industry. A common feature of the initiatives is a shared responsibility between Government, industry and the community. This is referred to as a 'shared responsibility model'. Current initiatives include the *National Environment Protection (Used Packaging Materials) Measure*, the Australian and New Zealand Environment Council (ANZECC) *National Packaging Covenant*, and *NSW Industry Waste Reduction Plans.* Current initiatives in NSW include Industry Waste Reduction Plans established under the NSW Waste Minimisation and Management Act (1995).

Conclusions

EPR is an emerging and sophisticated tool that addresses many of the environmental problems associated with products in their full life cycle, including waste. Internationally, it is being developed and implemented widely with positive results.

This review has found that EPR has the potential to achieve substantially improved environmental and social outcomes compared to the current model of shared responsibility. Some aspects of the current legislative framework in NSW embody EPR principles and could be applied much more effectively if there was a corresponding degree of adoption of EPR in both State and Commonwealth policy frameworks.

Mandatory targets are an effective means of encouraging industry to accept a greater level of responsibility while allowing it to determine the most economically efficient means of achieving the specified goals.

Key Recommendations

On the basis of the investigation into EPR's potential in NSW, recommendations have been developed (see *Section 9: Implementation of EPR in NSW*). A summary of these recommendations is provided below.

- Policy and legislative frameworks in NSW should be amended to incorporate the principles of EPR and facilitate its effective implementation.
- NSW should seek agreement at a national level for the adoption of EPR. This would allow a more effective model of EPR to be developed for NSW by addressing constitutional and cross-border issues.
- Legal impediments to EPR, including mutual obligation laws, should be fully investigated.
- Product-specific EPR programs should be developed that incorporate mandatory performance targets.
- Industry should be allowed the opportunity to determine how it will meet the performance targets specified by product-specific EPR programs, e.g. via the establishment of voluntary schemes, with an understanding that mandatory schemes will be implemented if the voluntary schemes fail to achieve the performance targets.

Products should be selected for development of an EPR program based on analysis similar to that conducted for beverage containers in the Independent Review of Container Deposit Legislation in NSW. This would include, at a minimum, a comprehensive analysis of the total costs and benefits to society, including externalities, and the use of representative and deliberative processes of public participation.

1 Introduction

Extended producer responsibility (EPR) is a concept that is shaping many international policies. It provides a preventative approach to the problem of waste and shows positive results internationally. EPR's acceptance and application is broadening and it is appropriate that the NSW Minister for the Environment has commissioned an investigation at this time.

Under an EPR scheme a producer's physical and/or financial responsibility is extended to the whole life cycle of a product including the post-consumer stage. The two main features of EPR are:

- the full or partial shifting upstream of responsibility from municipalities to the producer; and
- to provide incentives for producers to take into account environmental considerations in the design of products (OECD, 2000).

Volume I provides a detailed briefing on the principles of EPR, and an overview of current international 'best practice' in its application and analysis of how these principles might be incorporated into waste policy in NSW.

The EPR Review complements and expands upon the Independent Review of Container Deposit Legislation (CDL) in NSW, also completed by the Institute for Sustainable Futures. This document provides a conceptual framework and context for the analysis of CDL comparing it to other current and future EPR policy mechanisms.

1.1 Aim and Scope of the Report

This volume provides an independent assessment of EPR and related principles and their impact on the NSW Government and other stakeholders (such as industry, non-government organisations, local government, and citizens/consumers). This review should be supplemented by an analysis relating EPR to specific product systems. As the CDL Review shows, much more detailed analysis of the industry sector and environmental, economic and social effects of new legislation needs to be undertaken in order to successfully implement a mandatory EPR scheme. However, EPR is as much a strategy and guiding policy framework for Governments as it is a prescription for specific products and legislative changes such as CDL.

This report focuses on the top level of consideration of EPR: its concepts, drivers, policies and issues of implementation, with an overview of what has happened internationally with EPR and how it might work in an Australian and NSW policy context.

It is intended that the overall outcome of this report is to provide advice to the NSW Government with regard to a framework for the implementation of EPR, and recommendations on how this could be achieved throughout NSW.

2 EPR Concept and Stakeholders

2.1 The Concept

Extended producer responsibility is a means of addressing the environmental impact of product systems by redefining the responsibilities of the actors involved in the product chain. The objectives of EPR programs include (OECD 1998d):

- waste prevention and reduction;
- product reuse;
- increased use of recycled materials in production;
- reduced natural resource consumption;
- internalisation of environmental costs in product prices; and
- energy recovery when incineration is considered appropriate.

The term EPR was first formally introduced by Thomas Lindhqvist in 1990 (Fishbein, 1998, Lindhqvist, 2000).

To transfer costs, EPR assigns responsibilities to actors in the product chain. The model of EPR proposed by Lindhqvist ascribes responsibility to participants and outlines briefly the areas for which they are responsible.

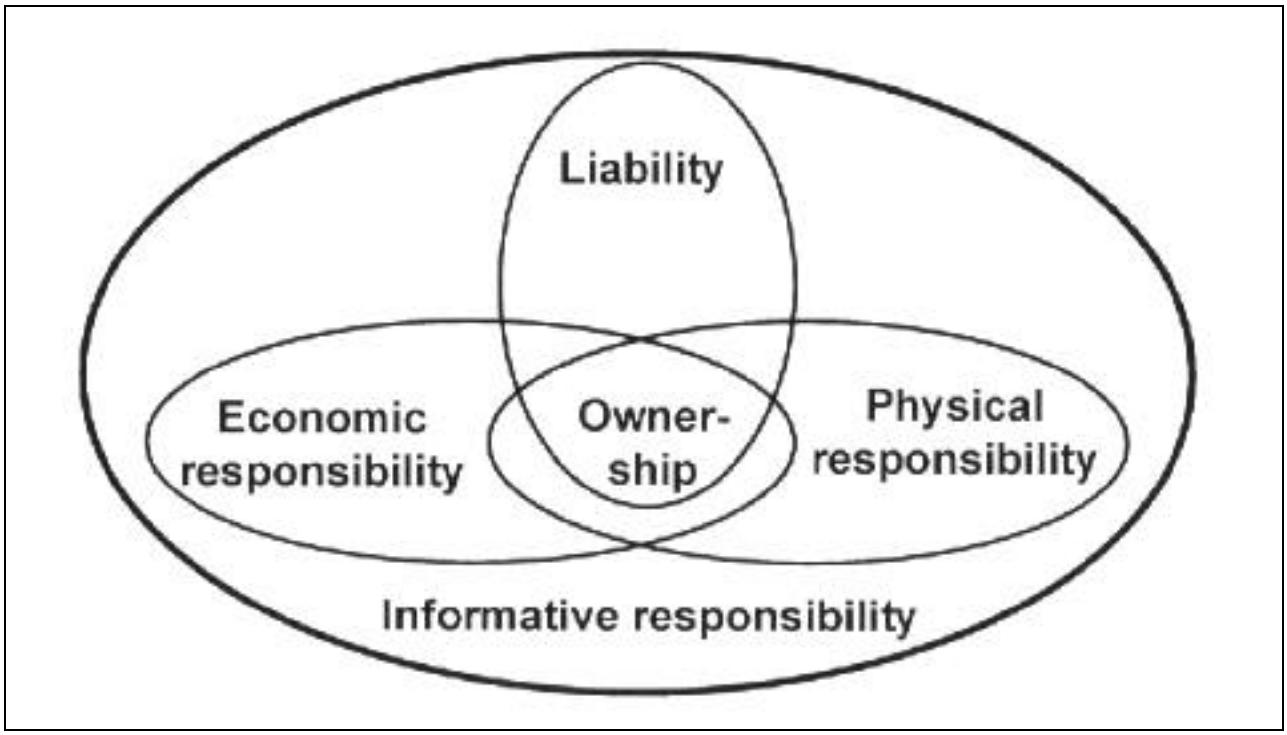

Figure 2-1: Lindhqvist's conceptual diagram representing EPR.

Source: Lindhqvist, T. (2000), Extended Producer Responsibility in Cleaner Production: Policy Principle to Promote Environmetal Improvements of Product Systems, Thesis (PhD), International Institute for Industrial Environmental Economics (IIIEE), Lund University: Lund.

Lindhqvist describes his model thus:

Liability refers to the responsibility for proven environmental damage caused by the product in question. The extent of the liability is determined by legislation and may embrace different parts of the life cycle, including use and final disposal.

Economic responsibility means the producer will cover all or part of the expenses, for example, of the collection, recycling or final disposal of products. Expenses could be paid directly or by a special fee.

Physical responsibility makes the producer responsible for the physical management of the products and/or their effects.

Ownership of a product may be retained by the producer throughout the product's life cycle, and therefore be linked to any environmental problems.

Informative responsibility requires the producer to supply information about the environmental properties of manufactured products. (Lindhqvist 2000; IIIEE, 2001)

By considering impacts both upstream and downstream of the producer, EPR differs from more traditional pollution prevention models. EPR incorporates impacts throughout the product's life cycle, as shown in *Figure 2-2*.

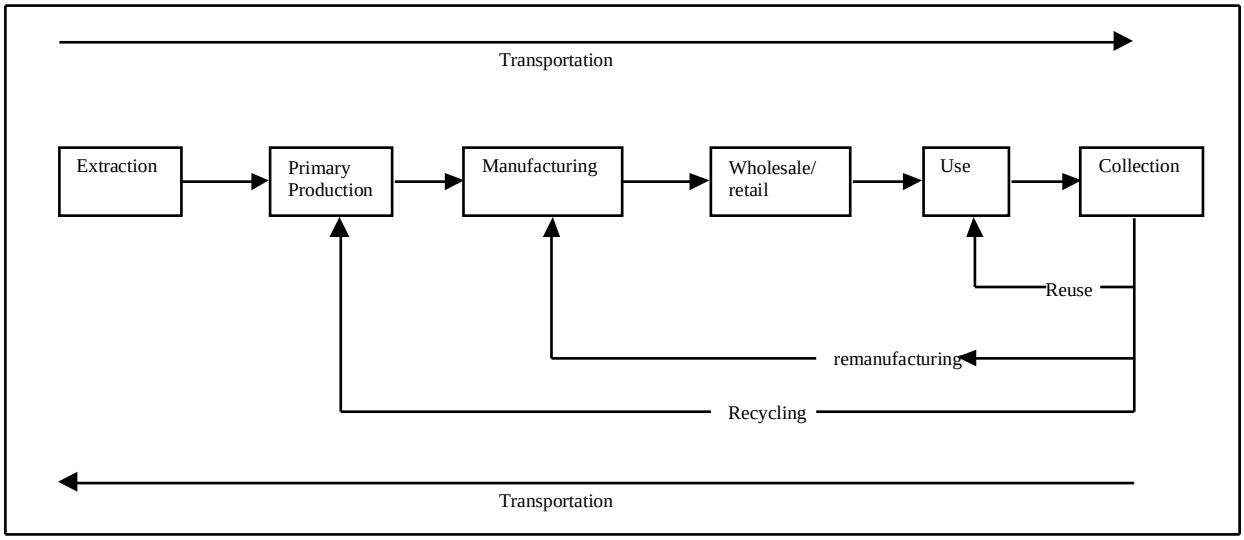

Figure 2-2: Schematic depiction of the product life cycle. EPR is a life cycle-based concept.

Source: Stoughton, M., Shapiro, K., Feng, L. and Reiskin, E. (1999), Making the Business Case for Extended Product Responsibility: A Snapshot of Leading Practices and Tools, Tellus Institute: Boston, 2.

2.1.1 EPR defined

The most widely accepted definition of EPR today is that provided by the OECD. EPR was adopted as a key strategy for waste minimisation and formally defined at the OECD International Waste Minimization Workshop in 1995 (Davis *et al*, 1997). It should be noted that in the US the application of EPR has focused more on *shared* rather than *producer* responsibility (as defined below). That is, where the OECD model places the responsibility directly on the producer, the US model emphasises the responsibility being shared among all the stakeholders (Hanisch, 2000; Fishbein, 1998).

BOX 1: Definitions

Extended Producer Responsibility (EPR): Transferring the costs of the environmentally significant post-consumer characteristics of products, such as waste volume, toxicity and recyclability, from local authorities to the producers. It is anticipated such a cost transfer will provide economic incentives for the producers to prevent waste generation, reduce usage of toxic materials, increase recycling and enhance markets for secondary materials (OECD, 1996).

Product Stewardship (or shared responsibility): All actors (designers, suppliers, manufacturers, distributors, retailers, consumers, recyclers and disposers) involved in producing, selling or using a product take responsibility for the full environmental and economic impacts of that product (ILSR, 2000).

For the purpose of this report, any discussion of EPR will refer to the OECD definition in *Box 1* above, and Product Stewardship (also known as Shared Responsibility) is conceptually viewed as a branch of EPR specifically redefined by the US. The term p*roduct stewardship* is used most widely by producers in the US. While the details vary, it usually involves some form of *voluntary* participation by the producer in the use or care of a product post purchase. In Canada, the term *product stewardship* is also commonly used. However, its definition in the Canadian context is different to that in the US It usually refers to EPR as defined in the OECD model[1].

2.2 Stakeholder Involvement

Any EPR system will usually involve a number of stakeholders, to varying degrees. These may include:

- Governments (local, regional, State, national, EC equivalent);
- designers/producers/manufacturers/suppliers;
- consumers;
- retailers;
- waste managers;
- recyclers;

[1] See *Section 4.2* for an example of a Canadian Product Stewardship Program.

- resellers; and
- environmental organisations.

Although responsibility rests with the producer, there are many ways stakeholders can participate in EPR and product stewardship programs to ensure their functionality and success. It is important that the roles and responsibilities of each stakeholder are unambiguously defined. There is, however, often dispute as to who is the actual producer (OECD, 2000). The following OECD table (*Table 2-1*) provides some indication of how the various stakeholders participate in the EPR process.

Stakeholder	Stakeholder involvement in the EPR process.
Supplier	Provide information to customers regarding proper downstream handling and disposal or recycling.
Producer	Can design products to perform their function with reduced environmental effects and to facilitate, as appropriate, end-of-life reuse, recycling or energy recovery; operate their facility in an environmentally sound manner. They can also work with upstream suppliers to identify opportunities for greater efficiency, improved product design, or partial assembly that reduces duplication or wasted resources later in the manufacturing process.
Transporter/ Shipper	Can co-operate in developing more efficient procedures for handling and shipping (containerisation innovations that reduce energy consumption).
Retailer	Can provide feedback to upstream actors and convey to users/consumers information from producers regarding proper use and appropriate end-of-life handling.
Users/ Consumers	Can educate themselves regarding the environmental performance of the products they purchase and how to handle and use products to improve environmental performance; provide feedback to producers on desired product attributes; use products properly; and participate in appropriate programs established for end-of-life products. Consumers participate also by return the actual products and/or to accept leasing type arrangements.
Governments	Can base their environmental requirements on sound science, preserving as much flexibility as possible for the private sector to develop appropriate methods of achieving environmental objectives, and eliminate or avoid creating legal and regulatory barriers to shared producer responsibility (SPR).

Table 2-1: Stakeholder involvement in the EPR process throughout the product's life cycle.

Source: Organisation for Economic Co-operation and Development (2000), ***Extended Producer Responsibility, A Guidance Manual for Governments,*** Group on Pollution Prevention and Control, Environmental Policy Committee: Paris, Annex 10, p137; and p60.

Table 2-2 summarises the ways in which various stakeholders can influence different EPR policy goals.

Stakeholder / Goal	Producer	Consumer	Government
Prevent waste generation	Reduce material use; design for durability	Give preference to low waste products	Full pricing for waste management on unit basis; Raw materials tax.
Reduce final disposal			
a) Encourage reuse	Design reusable packaging for products; Develop specifications for used parts	Prefer re-usables in the market place; Find new uses for products not designed for reusability.	Incentives for Deposit-Refund Schemes.
b) Encourage recycling	Design for recyclability (e.g. mark plastics, reduce number of materials used); Use recycled materials in production; promote reverse distribution schemes.	Demonstrate preference for products which are recyclable; Participate in separate collections.	Mandate recycling target rates and dates; Support R&D and/or commercialisation of new recovery technologies (Tax incentives, subsidies, direct Government research); Provide technical and/or financial assistance to local authorities; Preferential Purchase of products made with recycled materials; Establish eco-labels to inform consumers of product attributes.
c) Treat to reduce volume	Avoid use of inputs causing problems in incinerators.		Incineration Policy: waste to energy – recycling or not?
Internalise waste management cost	Product take-back		Advance Disposal Fees: Point of purchase, or entry to distribution system; Unit pricing for waste services.

Table 2-2: Examples of potential actions by different stakeholders driving issues.

Source: OECD (1996), ***Pollution Prevention and Control. Extended Producer Responsibility in the OECD Area Phase 1 Report. Legal and Administrative approaches in member countries and policy options for EPR programs, OECD: Paris,*** p.23.

Further potential impacts on industry groups under EPR programs are summarised in *Table 2-3.* The impacts on industry will vary depending on a number of factors, including:

- the country's existing political climate;
- the type of EPR program:
  - mandatory or voluntary;
  - take-back, servicing, deposit-refund or other system;
  - traditional EPR or shared responsibility model;
- level of responsibility (financial and/or physical);
- the type of product; and
- the industry group's position in the product chain.

Issue	Description	Impact on Industry
Internal organisational issues	This refers to changes internal to each company within the industry groups.	Those industry groups affected by the implementation of EPR may have to restructure management processes. For example, the inclusion of life cycle environmental impacts in the company's decision-making process. This may affect the designer, manufacturer and the packagers (Stoughton *et al*, 1999). In addition to organisational challenges, there may be technical ones, such as undertaking Life Cycle Assessments.
Co-operation along the product chain	There are many industry groups along the product chain, including those upstream of the consumption phase such as designers, importers, distributors, manufacturers, suppliers, retailers; and those in the post-consumer phase (waste collectors and recyclers).	There will need to be an increased co-operation and coordination with upstream and downstream actors in the product chain.
Servicing / leasing	Some EPR mechanisms involve the shift from selling a *product* to selling a *service*. An example of this is in the carpet industry (see *Section 5.3 Carpet*).	Industry groups making the transition to leasing products instead of selling products will need to make some fundamental changes to their company. This may include: ❑ Management of the product when it reaches the end of its life (this may include recycling); ❑ Redesign for more durable products or design for disassembly or recycling; ❑ Informing customers of the transition; ❑ Providing maintenance services of the product; ❑ Economic analyses to ensure economic viability. For example, costs of collection systems will need to be accounted for. ❑ Gaining market acceptance for serviced products over traditional products (or goods) (White, 1999).
Financial gains/losses	Some programs aim to ensure industry groups have increased financial input into the life cycle environment impacts of the products they produce. In some instances however, there are financial gains from participating in EPR programs.	Some financial gains can include (Stoughton, 1999): ❑ Market advantage through environmental leadership; ❑ Early action to adapt to regulation when State/national legislation is implemented; and ❑ Direct returns on investment from EPR programs.

Table 2-3: Other potential impacts on industry under EPR programs.

Whether a program is based on an OECD EPR model or a product stewardship model, there will need to be co-operation between the various actors of the product chain.

2.3 EPR Implementation Mechanisms and Strategies.

This section discusses EPR and voluntary and mandatory approaches to implementing EPR internationally. There is a distinct difference in the approaches taken in different regions, for example between Northern European EPR systems and US systems.

Implementation of an EPR program can involve a range of policy instruments. According to the OECD (2000) there are three basic categories of EPR policy instruments. These are:

1. take-back requirements;
2. economic instruments; and
3. performance standards.

It should be noted that an EPR program can involve a combination of the above instruments.

BOX 2:

Voluntary vs Mandatory Mechanisms

EPR policy mechanisms can also be categorised on a continuum from fully mandatory to fully voluntary. Mandatory mechanisms are more popular in Europe while programs involving voluntary mechanisms are more frequent in North America.

Mandatory mechanisms include legal requirements such as legislation, regulations or ordinances. Mandatory programs require a formal authority to provide sanctions and ensure compliance (OECD, 2000).

Voluntary mechanisms may include industry-based initiatives, Government-based, or multi-stakeholder initiatives. They can be agreements negotiated between polluters and other stakeholders or programs developed by a Government body in which individual firms are invited to participate (OECD, 2000).

Criticisms of Voluntary Mechanisms

Many entirely voluntary programs have been unable to achieve impact for many product systems. The OECD finds that such programs have been unable to "eliminate the governmental subsidy to the private sector for the disposal of packaging" (OECD, 1998a p.13).

Domestic voluntary approaches can be undermined by non-compliant importers. This is the problem of free riders, where those producers who do not comply with voluntary programs have a competitive advantage.

As a consequence of these problems, Governments in Germany and the Netherlands developed legislation to revise their packaging programs to become mandatory EPR programs. These changes were in line with the requirements for complying with the EU packaging waste directive (OECD 1998b, OECD 1998c).

Criticisms of Mandatory Mechanisms

The major criticism of mandatory EPR measures has been the perception that initial and overall costs are higher (OECD, 2000). Initially, if a suitable framework for EPR does not already exist, there is a need for the development of enabling legislation or regulation.

Once a mandatory system has been put in place there may also be a need for the State to undertake a formal role in overseeing the process and enforcing compliance. The costs of both implementing and overseeing a mandatory EPR program could be considerable and would therefore need to be evaluated (OECD, 2000).

The high cost of implementation in mandatory systems and the achievements of existing voluntary mechanisms, are used by industry to argue for voluntary mechanisms.

The OECD (2000) suggests that when designing EPR programs the focus should be on the goals, objectives and national (or State) priorities. Thus, both voluntary and mandatory approaches should be considered in deciding which approach will best meet these objectives.

2.3.1 Take-back requirements

Take-back requirements are considered by some as the most fundamental form of EPR where producers and/or retailers are required to take back the product or packaging after use. Take-back requirements are a clear example of EPR because the producer's responsibility extends into the post-consumer phase of the product's life.

Product take-back is applied to specific products, product categories or waste streams. The producer has the responsibility for meeting targets for reuse, recycling, and collection either by legislation or via voluntary agreements. Take-back systems, such as the container deposit system operating in South Australia, can be applied to whole types of products, such as beverage containers or electronic components. These systems encourage the consumer to take some responsibility for the waste generated through the consumption of the product (OECD, 2000; Institute for Local Self Reliance, 2000; Bohm, 1997).

2.3.2 Economic Instruments

Economic instruments have a dual purpose of raising funds for management and distorting the market in favour of improved environmental outcomes. They provide a direct financial incentive for actors to implement EPR and include the following.

Deposit-refund systems. These systems are a type of take-back system in which consumers are encouraged to participate by the inclusion of a deposit in the purchase price of a product. The deposit is either fully or partially refunded when the product is returned to a dealer or treatment facility. Most deposit-refund schemes have focussed on beverage containers. Despite their success, there has been little action towards other products.

***Aim*:** To encourage reuse, reduce material inputs and establish a reliable flow of materials for recycling and recovery. Experience shows that the larger the deposit the higher the recovery rate. (OECD,2000; Institute for Local Self Reliance, Online; Bohm, 1997).

There has often been a general reluctance by Governments to use economic instruments such as deposit-refund systems (for reasons such as lack of sufficient understanding of incentive systems, their perceived complexity, or they are considered too costly and administratively burdensome). In the past, regulation has been the dominant instrument used by policy makers for environmental, conservation and consumer issues (Bohm, 1997). *Table 2-4* provides examples of policy objectives that deposit-refund systems can help to achieve.

Environmental policy objectives	Conservation policy objectives	Consumer policy objectives	Other efficiency objectives
To prevent litter of containers, junked autos, tyres, appliances.	To encourage recycling of metals, glass, lube oil.	To protect guarantees and other contracts, such as: delivery contracts and guarantees on charter flights, construction work, repair services, consumer durables.	To encourage efficiency in waste management, for example, by separating chemicals and toxic substances that otherwise cause high treatment costs.
To prevent pollution by waste lube oil, mercury cells, PCB containers, nickel cadmium batteries, cooling units.		To ensure availability of service and spare parts.	To correct market failure in second-hand, reuse, and scrap markets arising from inefficient pricing of primary products, economies of scale, lagging adjustment of disposal behaviour.
To encourage restoration of production, storage, and dump sites after shut down.		To protect against unknown hazards of new products.	To encourage efficiency in Government by encouraging timely processing of applications and claims and by ensuring scheduled completion of projects or promised delivery of services.
		To protect against false sales claims.	

Table 2-4: Policy applications of deposit-refund systems. Examples are provided for environmental, conservation and consumer policy applications in addition to other efficiency objectives.

Sources: Bohm,P, (1997). ***The Economics of Environmental Protection.*** Edward Elgar Publishing Limited, Cheltenham: UK: p133.

Advance disposal fees (ADF). A system similar to deposit-refund systems. ADF is often used for long life products such as tyres or refrigerators. A fee is levied on certain products or product categories based on the estimated costs of collection and recycling. The fees may fluctuate with reduced costs of recycling or waste management through more efficient product design (OECD, 2000; Martin, 1997).

Aim: To acquire funds to take care of products at the end of their life by imposing a fee on certain environmentally hazardous products.

Material or product taxes. Taxes on either products or particular materials used. Materials may be taxed either for their polluting or hazardous nature. The tax needs to be set at a level to achieve desired targets put up by Government. Physical responsibility can be shared between the producers and the municipality, as is the case with the French and Japanese packaging laws. Revenue raised by taxes can be used to fund appropriate management of the post-consumer phase of the product's life cycle (OECD, 2000; Institute for Local Self Reliance, Online).

Aim: Source reduction; to reduce the use of virgin materials, or materials that are difficult to recycle, or which contain toxic properties, in favour of recycled or less toxic materials.

Upstream combination tax/subsidy. Upstream combination tax/subsidies represent a tax paid by producers to subsidise waste treatment. They are a combined tax on produced intermediate goods (e.g. aluminium or specific grade paper) and a subsidy to collectors of recyclables such as used beverage containers. The tax is levied by weight rather than unit of good because it seeks to reduce the amount of physical material going to disposal. A subsidy to finance waste management is then provided to waste management firms or local government. The producer responsibility may be financial and possibly physical, if they are involved in the waste management.

Aim: To encourage upstream producers to alter their material inputs and product design.

2.3.3 Performance Standards

Minimum recycled content requirement programs include those where a minimum amount of recycled content material (secondary material) per product may be set as a performance standard. Progressive standards create the opportunity for innovation, they are often used with paper products, glass containers and beverage containers.

2.3.4 Other Mechanisms

Eco-labelling describes programs in which eco-labels are placed on products and packaging to provide consumers with information about a product's environmental performance. Eco-labels may refer to environmental performance with respect to chemical content, energy efficiency, water conservation, recycled content, and recyclability. Many refer to a component defined by life cycle assessment (OECD, 2000; Institute for Local Self Reliance, Online).

Aim: Consumer education and market driven tool – creates competition.

Product service systems. Another measure is the leasing/servicing (product service system) approach. In the literature, there is some ambiguity surrounding the distinction between the terms leasing and servicing. The OECD defines leasing as the situation where the ownership of a product never terminates, while servicing is the conceptual shift from provision of a product, to the provision of a service.

Servicing is the notion that firms involved in product manufacturing shift towards service provision. The focus on consumption is not the goods per se, but the services that those goods deliver. A service firm still manufactures products, but is concerned with selling a business strategy or service to their customers, rather than a physical unit or "good". Products are redefined as "service delivery agents". The cost and profit structure is rebuilt on the basis of function (OECD, 2000; Lifset, 1998).

White *et al* (1999) describe this type of movement from the North American perspective. Describing the system as servicing they define it as “the emergence of product-based services which blur the distinction between manufacturing and traditional service sector activities” (1999 p2). Under this system property rights are “arranged into a spectrum” including leasing, pooling, sharing and take-back.

Aim: As a consequence of retaining ownership of a product, manufacturers are more inclined to reduce their use of virgin materials, increase product durability and reduce the amount of material that becomes post-consumer waste.

The concept of servicing indicates an interesting trend for the future. US policy makers were interested in servicing as a viable alternative to the mandatory EPR laws that have evolved in Europe. Recent studies however, suggest that the expected environmental gains from servicing do not necessarily occur.

The report by Inform (2000) concludes that a number of factors are necessary for the success of servicing as an environmental initiative. The lessor or leasing company must:

- be the manufacturer of the product or a captive leasing company;
- get the products back at the end of their useful lives;
- adhere to the waste management hierarchy; reuse before recycling, and provide a guarantee that the products will not be disposed of;
- make profound structural and organisational changes involving managers and product designers; and
- set guidelines for the amounts it will collect, reuse and recycle and publicly report on them.

Section 5.3 provides an example of a product service system for carpet.

2.3.5 Summary of EPR Strategies

This section summarises both European-style EPR strategies (*Table 2-5*) and US-style shared responsibility (product stewardship) strategies (*Table 2-6*).

Table 2-5 summarises and compares the various EPR strategies in terms of what each is designed to achieve, how it is implemented and an example of each strategy from existing EPR systems around the world. It should be noted that the column in *Table 2-5* entitled "*Designed to achieve*" identifies the primary purpose of the strategy. All strategies will have secondary and indirect effects, however, these are not necessarily detailed in this table.

EPR strategy	Designed to achieve	How is it implemented	Example
Deposit-refunds	Encourage reuse/recycling and cleaner products.	Offers monetary incentives for consumers to return the product or package. For example, a 10c deposit on beverage containers refunded when used beverage container is returned to a collection point. There may be an additional cost (2c for example) on the container to cover industry's handling costs. This cost is not refunded to the consumer.	South Australian Container Deposit Legislation.
Product Charges	Influence the choice of materials.	Levying an extra charge or tax on a particular product or range of products.	Eco-tax in Belgium placed on PVC to limit its use
Advance disposal fees	Provide funds for waste management of the product at the end of its life.	Producer pays up front fees for the disposal of its products at the end of their life.	Austrian fees on refrigerators and Swedish fees on automobiles.
Voluntary agreements	Varied aims including phasing out unwanted materials, encourage better design, more reuse or recycling.	Agreements are entered into between the Government and industry, with the proviso that should targets not be met, mandatory regulations will be introduced.	US electronics industry voluntary initiatives on computer recovery and recycling.
Kerbside collection	Encourages recycling/reuse rather than disposal	Requires suitable collection system at every home and business, plus a substantial collection network of trucks and infrastructure.	German *Duales System Deutschland* (DSD)for packaging

EPR strategy	Designed to achieve	How is it implemented	Example
Bring systems	Encourages recycling/reuse rather than disposal	Requires the consumer to bring the product or packaging to a centralised collection spot.	The Swedish system of packaging waste collection
Producer responsibility organisation (PRO)	Oversees an industry's EPR responsibilities.	Producers join, form or contribute to an PRO which is then charged with collecting, reusing, recycling or otherwise meeting the explicit goals of EPR	The Japanese PRO charged with organising EPR with regard to packaging.
Materials tax	Cleaner production and reduced inputs of targeted virgin materials which may be toxic or difficult to recycle in favour of recycled or less toxic materials.	Implemented by Government legislation, levied at a cost to reflect environmental costs of waste treatment of that material). Physical responsibility for the post consumer material should be allocated to either the producer (in a producer responsible model) or shared between industry and local government (in a shared responsibility model).	French and Japanese packaging laws.
Upstream combined tax/subsidy (UCTS)	Aims to reduce virgin material input, increase recycling and alter product design.	Implemented by Government legislation. This tax is paid by producers and used to subsidise waste treatment. The tax is levied by weight rather than per unit of a good and is used to subsidise waste management. The producer may also be allocated partial or full physical responsibility for the waste treatment.	
Product take-back	Reduce materials input, encourage cleaner production and encourage reuse/recycling.	Applied to specific products, product categories or waste streams. Take-back systems make the producer physically responsible for the product in its post-consumer phase.	The Swedish system of take-back for electronic and electrical equipment

Table 2-5: Strategies employed to extend producer responsibility under the European model of EPR

Sources: (OECD, 2000; Institute for Local Self Reliance, Online; Bohm, 1997).

The following *Table 2-6* summarises the main EPR strategies employed in the US under the shared responsibility model, sometimes referred to as extended p*roduct* responsibility.

US extended product responsibility strategy	Designed to achieve	How is it implemented	Example
Partnering agreements	Pollution prevention goals and measures	Agreements between Government and other stakeholders in the product chain.	US EPA's Green Lights program
Voluntary environmental information systems	Allow consumers to make their purchasing decisions based on environmental information.	Producers provide information on the environmental attributes of their products.	US EPA Energy Star program
Government procurement policies	Directs purchases made on behalf of Government to support those with recycled or other environmentally preferred materials.	Federal Government directive	US Federal Government program
Deposit-refund systems	Encourages the return of the product or packaging.	Purchaser is charged a deposit which is refunded when product is returned.	Implemented in ten US States and one local municipality for beverage containers.
Mandatory take-back	Ensures producers take back potentially problematic products	Legal requirement upon retailers to take back products.	Several US States have implemented this for spent batteries.
Product stewardship[2]	Help consumers deal with environmental and safety aspects of products	Voluntary measures undertaken by producers.	Chemical industry's Responsible Care program
Leasing	Encourages the producer to close material loops and extend product life.	Voluntary systems where the function of materials or products is leased to the user.	Interface carpet leasing plan.
Life cycle management programs including DfE and LCA	Improve product design and decrease life time impacts of products.	Voluntary management and auditing programs used by producers.	Hewlett-Packard's extended environmental management program.

Table 2-6: Strategies employed in the US to extend product responsibility under the favoured model of shared responsibility.

[2] Canadian use of the term 'product stewardship' often differs from the US definition. The key differences being that product stewardship programs in Canada can be mandatory programs much like those defined as EPR and the responsibility focused more on the producer as opposed to shared amongst all stakeholders.

2.4 Benefits of EPR

There are a number of benefits of the implementation of EPR. Box 3 lists the main benefits that were described in the OECD (2000) analysis of the benefits of a properly designed EPR system.

BOX 3:

Benefits of EPR

- Driving force for waste avoidance and associated pollution reduction throughout many sectors of the economy;
- Reducing the number of landfills and incinerators and their accompanying environmental impacts;
- Reducing the burden on municipalities for the physical and/or financial requirements of waste management;
- Fostering recycling and reuse of products or parts thereof;
- Improving the ease and timeliness of disassembling products for recycling or reuse;
- Reducing or eliminating potentially hazardous chemicals in products;
- Promoting cleaner production and products;
- Promoting more efficient use of natural resources;
- Improving relations between communities and firms;
- Encouraging more efficient and competitive manufacturing;
- Promoting more integrated management of the environment by placing an emphasis on the product's life cycle; and
- Improving materials management.

Source: Organisation for Economic Co-operation and Development (2000), ***Extended Producer Responsibility, A Guidance Manual for Governments,*** Group on Pollution Prevention and Control, Environmental Policy Committee: Paris, p 21.

2.5 Barriers to EPR

This section identifies a number of possible barriers to the successful implementation of EPR and some solutions are addressed. Barriers include:

- free riders;
- orphan and existing products;
- cross border issues and international trade;
- mutual recognition laws; and
- EPR in the form of State tax or excise.

Further implementation issue details associated with EPR and potential solutions are described in *Section 6*.

2.5.1 Free riders

Free riders are those individuals or groups (i.e. consumers, producers, importers, retailers, collectors and recyclers) who benefit from the use of an EPR system without contributing to a share of the costs. In reducing the free rider effect there is usually a trade off between the administrative costs involved and the effectiveness of the measures undertaken. The extent of free riding depends on the type of EPR system and the products involved. Increasing the number of producers involved in the production chain increases the possibility of free riding and the complexity of dealing with it. This is likely to occur for example in a take-back system for products with thousands of producers/importers. Product areas such as electronics will be easier to deal with, where the effect of free riders is less, given that it is a more concentrated and/or vertically integrated industry (OECD, 2000).

Box 4 provides examples of the incidence of free riders that may occur within a take-back/recycling scheme.

BOX 4:

Examples of Free Riding

- Consumers using a designated collection receptacle provided by the EPR program for products not included under the scheme;
- Producers/importers/fillers under-declaring the amount of products they put on the market;
- Producers/importers paying EPR fees in a low cost jurisdiction and selling their products in a higher-cost one; and
- Recyclers illegally disposing of materials they are paid to recycle.

Source: Organisation for Economic Co-operation and Development (2000), ***Extended Producer Responsibility, A Guidance Manual for Governments,*** Group on Pollution Prevention and Control, Environmental Policy Committee: Paris, p 86.

The problem of free riders has been addressed in different ways in existing EPR systems. These include:

- appropriate changes to incentive structures;
- effective reporting and monitoring systems;
- peer group pressure;
- enforcement; and
- public disclosure of those producers found to be cheating the system (OECD, 2000).

2.5.2 Orphaned and Existing Products

Orphaned and existing products provide a further example of potential barriers to the successful implementation of EPR programs. Products that are subject to EPR requirements, but whose producer no longer exists due to bankruptcy for example, are described as orphaned products. Products that were designed and introduced into the market before EPR requirements were put in place are described as existing products (OECD, 2000). The impact of these products that fall outside the EPR net depends on a number of issues, such as the:

- number of pre-existing products;
- life span of the product;
- cost of end-of-life management;
- number of stakeholders involved; and
- costs for these products relative to their age.

For fast moving existing consumer goods the impact is unlikely to be significant, whereas greater impact is likely from longer life products. The way orphan and existing products are addressed will depend on the product type and characteristics. Funding mechanisms to deal with orphaned and existing products include:

- advance disposal fees;
- new product fees paid at the time of purchase;
- the last owner pays;
- insurance; and
- phasing in of EPR gradually.

Any decision to include orphaned or existing products in an EPR system will depend on the objectives of the EPR system being put in place, and estimates of the relative scale of orphaned and existing products over time.

2.5.3 International Trade and Cross Border Issues

According to the OECD (2000), the two main components in relation to international trade and competition are firstly, the impact of EPR programs on product and recyclable materials markets, and secondly, the impact of existing trade and competition legislation for EPR programs.

In relation to the first component, it is seen as important for EPR programs not to indirectly restrict trade flows because trade is considered to provide greater consumer choice and greater economic growth. In addition to this, it can restrict importers of products or materials affected by the EPR policy. With respect to international trade, three main barriers can be identified as:

- discrimination between domestic and foreign products;
- technical barriers to trade; and
- the dumping of recyclable products on the world market.

In relation to the second component, the relevant international trade laws that could affect the implementation of EPR are the General Agreement on Trade and Tariffs (GATT), the World Trade Organisation (WTO) Technical Barriers to Trade Agreement, and the WTO Agreement on Subsidies and Countervailing Measures.

Although EPR programs may not result in immediate and obvious adverse impacts on trade, caution should be taken to ensure EPR programs do not unduly discriminate against imported products (OECD, 1998). Such programs should also respect existing international trade policies. To ensure these issues have been addressed, the OECD (2000) recommends the following points for consideration:

- importers should be consulted during the decision-making process in relation to proposed EPR programs;
- trade associations and WTO should be notified of the proposed programs;

- potential adverse disruptions to secondary material (recycled) markets should be anticipated and avoided or minimised;
- ensure no unnecessary barriers to trade are created by the implementation of the EPR program[3];
- ensure the EPR program is non-discriminatory in terms of foreign products. Possibly making allowances for developing country exporters;
- avoid the creation of secondary materials monopolies. In general, more competitive markets for collection and recycling of post-consumer product will result in lower costs;
- pricing should be fair and transparent. Unnecessarily high price increases on products or disposal services (above those that are justifiable by the EPR program) may be challenged.

Trade issues of concern relate not only to international trade. Within Australia, cross border issues may be relevant where one State has an EPR program not implemented in a neighbouring State. An example of such a cross border issue may be fraudulent redemptions if a deposit-refund system exists in only one or some States. Such fraudulent redemptions may add significant costs through loss of deposits in the system and by increasing operational costs for the retailers and distributors. This issue is discussed in more detail in *Volume II Section 4.8 Cross Border Issues* with reference to beverage containers. Options for controlling such fraudulent redemptions across State borders may include:

- initiatives such as labelling products sold in the EPR State;
- licensing of contractors and depot operators who are allowed to redeem used products, with extra scrutiny and compliance monitoring at depots near the State border;
- substantial fines for people caught deliberately redeeming out-of-State containers;
- setting an upper limit on numbers of products/person/day which can be redeemed; and
- the introduction of a comparable form of EPR system in neighbouring States.

Volume II, Section 4.2.2 discusses whether a deposit-refund system in one State would be considered a restriction on interstate trade and commerce.

Legislative cross border issues in NSW are discussed in *Section 2.5.4 Mutual Recognition Act*. International trade and cross border issues are also addressed in *Table 6-1* in *Section 6: Implementation Issues.*

2.5.4 Mutual Recognition Act

The Commonwealth's *Mutual Recognition Act 1992* was enacted to provide for the freedom of movement of goods and services in a national market (Mutual Recognition Act 1992). Each of the States and Territories has enacted mirror legislation. (The NSW Act is the Mutual Recognition (New South Wales) Act 1992). With respect to the application of EPR, sections 9 and 10 of the Act state that goods produced or imported into one State can be sold in another State without the need for compliance with requirements relating to sale such as:

- standards imposed by the State relating to their production, composition, quality or performance;
- standards with respect to the presentation of goods, such as labelling; and
- any other requirements that may prevent or restrict the sale of goods.

[3] The potential exists for the EPR program to be challenged under the WTO from parties discriminated against.

Permanent exemptions from the law are provided for under section 14. Exemptions that currently exist are listed in Schedule 2. They include, for example, the *Beverage Container Act*, 1975 of South Australia.

2.5.5 EPR as a State Tax or Excise

In NSW, no EPR initiative could be introduced by NSW legislation if it was an excise duty, because under the Commonwealth Constitution the Commonwealth has the exclusive power to impose excise duties. *Volume II, Section 4.2.1* discusses whether a deposit-refund system would be considered an excise. duty

3 Drivers for EPR

Extended producer responsibility has emerged over the past decade in response to a number of drivers. This section discusses the development of policies leading to EPR in the international arena, and describes the factors driving their development, and the subsequent shift from monitoring and reporting towards prevention.

3.1 The Problems

The product chain includes the extraction of resources, their use in the construction of products and their final disposal at the end of the product's life. Product chains are responsible for environmental impacts throughout their life cycle.

Problems include:

- resource depletion and the environmental costs of resource extraction;
- the pollution and other impacts created by the long-distance transport of resources;
- pollution created in the production process;
- the creation of problematic and toxic compounds;
- pollution created by carelessly discarded products and packaging;
- pollution created by the use of products;
- the environmental impact of accepted disposal methods;
- the consumption of large amounts of energy with its related problems; and
- the cost of disposal of products and packaging.

3.2 Traditional Solutions

Governments around the world have been responding to these problems with a range of initiatives, many of which have been instrumental in reducing the environmental impact of the product chain.

A major effort has been expended in reducing point of source pollution – that emitted by the smoking chimney or discharging pipe. Reductions have usually been achieved by the implementation of end-of-pipe solutions such as scrubbers and retention ponds.

End-of-pipe solutions have allowed products to be manufactured with far less environmental impact than was previously the case.

3.2.1 Upstream Impacts

Upstream impacts include resource extraction. While the demand for resources continues to rise, the impact of extraction must also increase. However, specific impacts have been reduced in some cases with strategies to curtail the point of source pollution of mining. These included better retention ponds and tailings dams. Additional improvements have been made by the environmental remediation of mine sites.

3.2.2 Downstream Impacts

Downstream impacts of the product chain occur during the use or disposal phase of a product's life cycle. Photocopiers, for instance, have a negative impact on the environment during the use phase, while the major impact of items such as batteries occurs at the end of their life.

Other strategies for coping with products in this phase of their life cycle include incineration. Although incineration has adverse environmental impacts such as air pollution, an advantage of incinerating solid waste is the potential for recovering energy and heat. Whilst such energy and heat recovery has not been practiced in the past, a more recent technology based on incineration is waste to energy incineration. An example of such an operation exists in the Illawarra Region with the Solid Waste Energy Recovery Facility (SWERF). The SWERF converts household waste into 'green' electricity (Wollongong City Council, 2001).

Recycling programs also reduce the impact of products and packaging but typically focus on minimising impacts stemming from the end of a product's life cycle.

A summary of waste treatment technologies is provided in *Table A-1* in *Appendix A.*

3.3 The Problems with These Approaches

While these strategies have been effective in achieving their limited goals, they are not without their own problems and limitations.

End-of-pipe solutions are designed to reduce point source pollution and consequently have an important part to play in pollution control. However, they are often expensive and the costs rise as the standards required are tightened. There is a limit to the costs that industry and the consumer are able to bear.

Landfill facilities also have problems. They are increasingly scarce. The options are generally further from the source of waste and therefore involve more costly transport. Landfill sites are themselves point sources of pollution, and all problems are magnified where rapid population growth is experienced.

The cost of landfill is typically borne by municipalities and ultimately the ratepayer in the municipal waste stream and those within the commercial and industrial waste streams. With rising costs Government is left with no alternative but to keep increasing rates for disposal.

Incineration presents similar problems. Sweden for example initiated a program of large-scale incineration of waste with energy recovery. Problems with this strategy quickly arose because nobody wanted an incinerator to be built near their home. The control of pollution at the stack itself suffered the same problems as any end-of-pipe strategy (Lindhqvist 2000, p23).

Furthermore, waste streams contaminated with toxic compounds such as heavy metals from batteries either cause pollution when incinerated, or require expensive sorting or dumping at landfill sites.

Other problems associated with current waste approaches include:

- the illegal dumping of general waste and items such as cars;
- the contamination of waste streams with problematic materials such as batteries and smoke detectors with radioactive components; and
- reduced recycling where these problems exist.

More problematic is that none of the traditional responses to the impacts of product chains address the root cause of the issue, which is the fact that most products are discarded and become waste. Additionally, they do not recognize that a product's main environmental impacts may actually be found earlier in its life cycle – for example in its production or use phase. EPR places responsibility onto the actors in the product chain who can most effectively minimize these impacts and prevent some of the waste from being produced to begin with.

3.4 The Role of EPR

Extended producer responsibility (EPR) is designed to confront the issues discussed above. The EPR concept did not emerge abruptly from the traditional approach to waste management, but was developed over time in response to two significant trends: the move towards preventative approaches and an increasing focus on products.

3.4.1 The Development of EPR

In the 1960s and 1970s, rising environmental awareness began to encompass energy consumption and the scarcity of raw materials. Consequently, a number of studies were carried out looking at such issues as the cumulative energy requirements for the production of chemical products, agricultural products and packaging materials.

In 1966, the Coca-Cola Company commissioned a study to find out which beverage container had the lowest consumption of natural resources. This type of study became known as a Resource and Environment Profile Analysis. A follow-up study conducted in 1974 is now often considered the progenitor of life cycle analysis studies (Weidema, 1997).

Similar studies continued into the 1980s both in the US and in Europe, and the techniques of measuring the externalities of products became more refined. The notion of externalities is central to the later development of extended producer responsibility.

Life Cycle Analysis and Life Cycle Assessment

The development of life cycle analysis continued throughout the 1980s with the rising pressure on landfill space, giving rise to many studies of packaging, its reuse and recycling. While environmental impact assessments focus on production facilities, waste minimisation focuses on processes or production lines and risk assessments focus on chemical hazards, life cycle assessment is designed to support product oriented policies (Weidema 1997).

Life cycle assessment (LCA) grew from life cycle analysis with the increasing need to determine the impact of the total product system. LCA does not concentrate on a product but on its production, use and end-of-life scenarios. It is designed to quantify the externalities of product systems.

In 1997, LCA was first included as part of the ISO 14000 family as *ISO 14040, Environmental management–Life cycle assessment–Principles and framework*. While this Standard did not describe details of the LCA technique it did discuss requirements for undertaking and reporting LCAs (Jensen, 2000). There has since been the development of further LCA ISO series which are summarised in *Table B-1* in *Appendix B*. The most recent Standards on LCA provide guidance, recommendations for undertaking LCAs and examples.

LCA has been the driving force during the 1990s of a number of international projects concerned with the life cycles of products. They include the product ecology project in Sweden, the eco-design project in the Netherlands (ECSC-EEC-EAEC, 2000), and the life cycle design project in the US (Weidema 1997 p12). Such an approach has also been adopted in the CDL Review which complements this EPR Review.

The development of life cycle assessment through these projects has provided proponents of EPR with a tool to analyse the impacts of product systems and inform producers of the consequences of their products.

Polluter Pays Principle

The OECD introduced in 1972 the notion of the polluter pays principle (PPP). The 1972 interpretation suggests that the polluter should bear the expenses of carrying out the pollution prevention and control measures decided by public authorities to ensure that the environment is in an acceptable state (Pearce and Turner 1990 p 175). Then in 1974, PPP was extended to suggest that a country could decide that a polluter should compensate the polluted for damage from residual pollution.

PPP formalises the expectation that polluters should carry out pollution prevention and control. In practice this has largely meant end-of-pipe solutions.

Cleaner Production

In the 1970s various organisations and Governments began to develop strategies to deal with environmental problems associated with manufacturing. Strategies were given names such as low-waste and non-waste technologies, cleaner technologies, waste minimisation and pollution prevention (Lindhqvist 2000 p15). All of them focused on the reasons for the generation of pollution.

Cleaner production emerged from these efforts. It is defined by the United Nations Environment Program as "the continuous application of an integrated preventive environmental strategy to processes, products and services to increase overall efficiency and reduce risks to humans and the environment" (UNEP 2001 p3). One of the major attractions of cleaner production is that its cost diminishes over time, whereas end-of-pipe and remedial solutions become ever more expensive. Throughout the 1980s and 1990s cleaner production spread into more countries, including some in Central Europe and the developing world. Programs looked at conserving energy, water, or materials, at reducing the use of toxic compounds and the production of wastes and pollution (UNEP 2001).

Importantly for EPR, cleaner production is not just about processes. As the definition above illustrates, it also is applicable to products.

Along with the increasing awareness of cleaner production came the need and desire for better product design. This need has been systematised since the early 1990s as design for the environment (DfE). A number of DfE projects have been undertaken, many of which tend to look at the strategies that may be applied to minimise impact. These include, for example, Fuji Xerox Australia's remanufacturing process, the Caroma dual flush toilet system, the Fisher & Paykel AAA water conservation rating dishwasher, and Reln Plastics' Eco-friendly worm farm. Many of these strategies relate directly to EPR, and are particularly important as they define the manner in which producers can alter products to minimise the impact of the whole product system.

3.4.2 Extended Producer Responsibility

EPR is a natural outgrowth of the programs discussed above. At the same time it contributes to the goals of each. EPR makes its contribution to ideas such as DfE and cleaner production primarily by clearly defining the responsibility of all the stakeholders in the product system. Once the producers and other stakeholders know what impacts they are responsible for they can readily see how this can work for them.

3.5 Drivers

From traditional approaches to the issues of waste and pollution, producers and Governments have, in many cases moved toward preventative programs and a product-focussed approach. In many European Union member countries this trend has lead to the development and implementation of EPR programs.

By changing the way producers address the environmental impact of their products, and by altering the conception of the product chain, preventative programs and a product-focussed approach have ultimately made producers responsible for their products.

While the move towards preventative measures and a more product-focussed approach have been the fundamental drivers of EPR, the improvement of the bottom line has been another key factor in shifting producers in this direction. From an industry perspective, reduced environmental impact is not the only goal of preventative practices and product improvement.

Many companies have reduced their costs and increased profits as a result of:

- reduced resource use;
- reduced energy use;
- reduced pollution control costs;
- reduced cost of raw materials;
- reduced handling costs (less toxic material);
- reduced liability for environmental and health impacts;
- reduced waste production/disposal; and
- better product design.

Reduced costs can be passed on to consumers who then benefit from lower prices.

White *et al* (1999 p 2) consider that the trend toward servicising has been driven "largely by business, not environmental considerations". It is representative of a major shift in how firms view competitiveness. For example, two major US firms, IBM and Xerox, stated that a service orientation was a "survival strategy" in markets being rapidly redefined by technological change (White *et al*, 1992, p 27).

3.5.1 Other issues driving EPR

The desire to achieve particular goals has motivated Governments to move towards EPR. Among the goals is the desire to:

- encourage more environmentally aware product design;
- signal to the consumer the real cost of products and their disposal;
- reduce the volume of waste and pollution; and
- provide an alternative way to fund waste treatment.

However, the approaches and motivation for progress towards EPR have varied between countries, organisations and individuals.

Lifset (1993, cited in Lindhqvist 2000) pointed to four motivations underlying EPR:

- to bring about specific results, especially to achieve high levels of reuse, recycling and related forms of recovery;
- to alter behaviour, particularly to influence materials use and product design decisions by producers;

- to tap the expertise of producers for activities that relate to their capabilities as designers, manufacturers, marketers and distributors; and
- to obtain financial resources to allow more ambitious environmental and, especially, waste management goals to be achieved than could be accomplished through public, taxed-based sources (cited in Lindhqvist 2000 p49).

For Lifset, then, drivers of EPR include financial pressures and the need to utilise the skills of the producers as a part of changing their behaviour and the products they make.

In Sweden, the Ecocycle Commission suggested that the chief driver of EPR should be to ensure that "marketed products make the least possible impact on the environment and use as few resources as possible both in the upstream and manufacturing stages" (Lindhqvist 2000 p51), 1996). The key objectives were for improved collection, reuse, recycling and final treatment, and that product change must be encouraged.

For the Dutch, the drivers of EPR have been described as a desire to internalise the costs of production and disposal which in turn should drive design for environment. It also is driven by "a general acceptance of the responsibility by producers" (Lindhqvist 2000 p50) and the desire to provide a link between waste policy and product policy (OECD, 1998b).

In less developed nations such as Poland and China, Lindhqvist finds that, while the opportunities for product improvement may be minimal, EPR can be attractive to Governments as a means of raising revenue for recycling or disposal of waste. The driver in these instances is clearly financial (2000 p103).

Financial considerations are also important to the OECD (2000). The report *Extended Producer Responsibility: A guidance manual for governments* states that the traditional focus on production processes "may no longer bring about the needed changes to protect human health and the environment" (OECD 2000 p21). The OECD Working Party found that the relative importance of post-consumer wastes was rising, and outstripping the supply of landfill sites or incinerators. Furthermore, they noted that across OECD countries the resistance to further landfilling and incineration was increasing.

The Working Party suggests that EPR will force producers to internalise a "substantial portion" of the environmental externalities from the final disposal of the product. With this in mind, says the OECD, "EPR can promote the common environmental goals shared by OECD Governments: namely, waste prevention and reduction, increased use of recycled materials in production, and increased resource efficiency" (OECD 2000 p21).

The OECD believes the presence of external costs is a major obstacle in achieving sustainable development. The importance of internalising costs is "a fundamental aspect of environmental economics". EPR could lead to a "substantial internalisation of social costs (externalities) for treatment and disposal" (OECD 2000 p10).

The Working Party lists four principal goals

of EPR. They are:

- source reduction (natural resource conservation/materials conservation).
- waste prevention.
- design of more environmentally compatible products.
- closure of materials loops to promote sustainable development.

3.6 Drivers for EPR in the US

While Europe has been the driving force behind the development and adoption of EPR, the US has also had to consider the issues. Though the problems of waste and pollution are similar on both sides of the Atlantic, the US have adopted a model of extended responsibility that differs substantially from that being applied across Europe (Davis et al, 1997; Hanisch, 2000; Fishbein, 1998).

3.6.1 Extended Product Responsibility

In the US, extended responsibility for products has taken shape as extended *product* responsibility. This is defined as:

> The principle that actors along the product chain share responsibility for the life cycle environmental impacts of the whole product system, including those from upstream, from the production, and from the use and disposal of the products (Davis et al 1997 p 1-1).

While at first glance this looks the same as the European notion of extended *producer* responsibility, in fact it is quite different. The European model (hereafter referred to as EPR) places responsibility squarely with the producer, with the explicit aim of encouraging them to improve the design of products. The US model (hereafter referred to as shared responsibility) spreads responsibility across all parties in the product chain (Hanisch, 2000; Fishbein, 1998).

3.6.2 Historical Context

Davis *et al* (1997 p2-1) trace the origins of shared responsibility in the US back to the energy crisis of the mid-1970s and the impetus this gave to programs such as mandatory energy efficiency labeling on appliances. In the 1980s chemical bans and "phase-outs" were a response to "hazardous waste problems".

These issues were followed in the 1990s by increasing concern about solid waste generation and disposal in the light of decreasing landfill options and mounting public disapproval of new landfill sites (Davis *et al* 1997 p2-1). Consequently, there was increased interest in reducing and managing the waste produced in the manufacturing of products.

Other pressures for some form of extended product responsibility came from:

- consumer demand for "green" products;
- State and Federal legislation of voluntary programs;
- European initiatives that directly affect US exporters; and
- business advantages (reduced costs and liabilities) (Davis *et al* 1997 p2-1).

In view of these pressures the President's Council on Sustainable Development (PCSD) recommended in 1996 the formation of a panel to facilitate the implementation of "voluntary multi-stakeholder models of shared product responsibility through demonstration projects" (Davis *et al* 1997 p2-2).

The PCSD went on to recommend that the Federal Government, private companies and individuals should "voluntarily adopt practices that have been successfully demonstrated to carry out EPR on a regional and national scale" (Davis *et al*, 1997, p.2-2).

4 International Experience of EPR

This section provides an overview of international experience with EPR to show that the approach to EPR in different areas has resulted from different directions and drivers.

4.1 International Developments in EPR

4.1.1 The European Experience

Germany

In 1986 the Federal Republic of Germany made a comprehensive attempt to implement policy instruments aimed at preventive measures concerning the waste of a broad spectrum of industry groups with the introduction of the "*Waste Avoidance, Recycling and Disposal Act* (Lindhqvist 2000, OECD, 1998c). The Act empowered the Government to issue ordinances in order to "prevent or minimise the amount of harmful substances in waste, or for their environmentally acceptable management" (Lindhqvist 2000 p32).

In 1991 the *German Packaging Ordinance* was adopted after industry had failed to respond to voluntary measures that had been introduced to encourage packaging reduction and recycling. This required producers to take back their packaging themselves or join the *Duales System Deutschland (DSD),* (Green Dot System). DSD licence the green dot label to producers for a fee. This allows the producers to print the green dot and their packaging, and the consumers then know that this item can use the DSD collection system. Each household is provided with a bin for packaging that is picked up for free by DSD. However, over the next few years the weak German economy and high unemployment prevented further progress towards EPR. Although there were associated high costs and start up problems, the German EPR concept spread quickly through other European countries (Hanisch, 2000; OECD, 1998c; Fishbein, 1998).

In 1994 the Government introduced the *Closed Substance Cycle and Waste Management Act*, which places responsibility for waste at the beginning of the production chain. The law came into force in 1996. The law stated that whoever produces, markets or consumes goods is responsible for the avoidance, recycling, reuse and environmentally sound waste disposal of these goods (Lindhqvist 2000; Fishbein, 1998).

Sweden

As early as the 1970s policy documents were, according to Lindhqvist (2000 p29), expressing the need for involving the manufacturer and product developer in finding solutions to the waste and recycling problems discussed in section 3.3 above.

In 1975 the Swedish Government presented the *Recycling and Waste Management Bill* which contained two principles for future policy (Lindhqvist 2000 p29):

- Waste is to be regarded as a resource which should and could be reclaimed, and
- The responsibility for waste generated during production of goods rests with the manufacturer, and that before a new product is manufactured it should be known how this waste would be treated, and how the product should be taken care of when discarded.

The Swedish Bill represents an early recognition of an extended role for the manufacturer. However, according to Lindhqvist, there was little existing legislation to force producers to do more than they had been doing for some time (2000 p30).

In 1988 Lindhqvist presented the Swedish Environment Protection Agency with a report in which he "introduced a rationale and foundation" for the concept of extended producer responsibility aimed at

demonstrating feasible approaches to implementing the producer responsibility expressed in the 1975 Waste Bill. The report concluded that "radical changes with far-reaching consequences were necessary" (Lindhqvist 2000 p35).

The Swedish Government acted on the report and the 1990 budget included a number of proposals designed to emphasise the responsibility of the producer.

Lindhqvist's 1990 report to the Environment Ministry, in which he formally introduced the concept of EPR, placed an emphasis on the influence it would have on the design of products.

In a 1992 report, in which he refined the definition of EPR, Lindhqvist described a model of EPR implementation, and outlined a number of goals that could be used to evaluate whether an EPR program was successful or not.

Following these reports, and having made a number of smaller steps towards a framework for greater producer responsibility, the Swedish Government in 1993 presented the *Ecocycle Bill*, a part of which was devoted to the introduction of EPR in Swedish law. The Bill defined the producer, stressed that the Government should provide a workable legal framework, noted the importance of product design and suggested producers had some physical and economic responsibility for their products (Lindhqvist 2000 p43).

Other European Nations

In Denmark, the Environment Protection Agency was asked in 1991 to look at product take-back as a means of instituting EPR. Their report was less than favourable. Then in 1992 the Danish Ministry of the Environment issued its own more positive action plan, suggesting that voluntary agreements were the basis of EPR systems (Lindhqvist 2000 p45).

The French had also been considering EPR, particularly in the light of concerns about the shortage of landfill sites. A 1991 report for the Environment Minister emphasised a sharing of responsibilities between manufacturers and local authorities. In 1992, the Minister published a decree forming the basis of the French system, which aims to recover 75 per cent of material and energy from packaging waste by the year 2002 (Lindhqvist 2000 p47).

In the Netherlands, there had been, in the 1980s, a growing awareness of the need for preventive approaches to solving the problem of waste. The Government began to formulate approaches in which "the designer and producer should be aware of the effects of their products at the disposal stage" (Lindhqvist 2000 p33). This trend was highlighted with the presentation in 1989 of the *National Environmental Policy Plan* (NEPP) which stated that the responsibility of producers and consumers for the materials in a product did not end when that product was passed on to another party. The NEPP also stated that information concerning the recovery, re-use or recycling of a product should be passed along with the product. The passing on of information and responsibility with the product were discussed in the Netherlands within a framework of integrated chain management (Lindhqvist 2000 p34).

The Dutch approached product related issues with a system of voluntary actions by stakeholders backed by the potential use for Government action, as occurred with the scheme on batteries in which a mandatory regulatory measure was introduced. The Government negotiated with selected manufacturers and importers to produce agreements such as the *Packaging Covenant* of 1991. The *Packaging Covenant* contains a general goal of eliminating packaging in waste destined for landfill by the year 2000. It also contained goals for source reduction, the removal of harmful materials from packaging, and reuse and recycling (Davis *et al* 1997 p 1-4). In 1997 a second covenant was put in place with mandatory requirements to reduce packaging waste. This was brought in to meet the requirements of the *Regulation*

on Packaging and Packaging Waste that was introduced in August 1997. A waste reduction monitoring standard has been agreed upon by both industry and Government that applies to approximately 90 per cent of all produced and imported packaging materials (Hanisch, 2000; Brattebø et al, 2000).

The European Union

With its member countries moving towards EPR, the European Union considered the issue throughout the 1990s. The *Directive on Packaging and Packaging Waste* of 1994 demanded of EU member nations minimum levels of recycling and recovery. Since then, recommendations have been made and the European Parliament has passed a Directive on end-of-life vehicles.

The EU prepared a proposal for a directive on Waste Electrical and Electronic Equipment that is expected to come into force in 2002. Similarly, the Swedish Government has developed a Directive on Waste from Electrical and electronic equipment (see *Appendix C, Section 1.5.2*).

Integrated Product Policy

Integrated Product Policy (IPP) is defined by the European Commission (1998) as a policy framework that aims to improve the environmental performance of products, including their whole life cycle. Two fundamental themes of IPP are that:

- it uses a life cycle approach to avoid the shifting of environmental problems between the different stages of a product's life cycle and;
- it aims to provide a policy framework where all actors are encouraged to work towards a continuous improvement of product systems and all stakeholders in the product chain are involved.

The significance of IPP is that it can be an opportunity for integrating environmental policy in other policy areas. The development of IPP requires:

- constructive co-operation between all relevant stakeholders;
- the broad recognition of products as central to environmental policy;
- the development of tools that provide an overview of the products and their environmental impacts; and
- fostering an environment where innovative products can occur in a sustainable economic context.

(European Commission, 1998).

IPP calls on public authorities to take a new role and for a change in the attitude of other stakeholders, including industry and consumers, environmental organisations and trade unions.

A Directive on IPP has not yet been established by the European Union, however, it is expected within the next few years. In February 2001, the European Commission adopted a Green Paper on IPP to stimulate discussion on the role of and possible measures initiated by European Union member nations (European Commission, 2001).

4.1.2 The US Experience

The US model of shared responsibility, like the European EPR, focusses on product systems – also called the product chain. It uses a type of life cycle analysis to address pollution prevention and resource and energy use in each stage of the product life cycle. Improvements are made through "changes in product design and process technology" (Davis *et al* 1997 p 1-1).

The US model differs from the European in that the responsibility is not confined to the producers, but shared among all actors in the product chain. "The greater the ability of the actor to influence the life cycle impacts of the product system, the greater the degree of responsibility for addressing those impacts should be" (Davis *et al*, 1997, p.1-1).

Attributes of the US extended product responsibility system

Davis *et al* (1997) describe three key attributes of the US EPR system:

- the shifting of responsibility to a life cycle stage or stages where responsibility currently does not exist or is not well defined;
- a product systems approach with a focus on creating feedback to designers to design cleaner products; and
- sharing of responsibility for the life cycle environmental impacts of the product system among links in the product chain in such a way that there is a well-defined locus of responsibility (Davis *et al* 1997 p1-1).

The President's Council on Sustainable Development concluded that "sharing responsibility for environmental effects would transform the marketplace into one driven by:

- more efficient use of resources;
- cleaner products and technologies;
- more efficient and more competitive manufacturing;
- safer storage, shipping and handling of materials;
- improved relations between communities and companies;
- improved recycling recovery; and
- responsible consumer choices." (Cited in Davis *et al p 1-8).*

While the Government in the US at the Federal and State level is thinking about issues of producer responsibility the emphasis is on voluntary programs for producers, and the laying of responsibility along the entire length of the product chain. The use of voluntary programs and an emphasis on extended *product* responsibility is likely to limit the outcomes of the programs when compared to, for example European mandatory programs or programs that include a combination of both voluntary and mandatory approaches.

Lifset has discussed the reasons for the lack of EPR initiatives in the US. They include:

- the absence in North America of the precautionary principle as a foundation for environmental policy. In the US, policy leans rather toward the analysis of costs and benefits;
- the mobilisation of opposition to EPR laws from groups including the materials, manufacturing, retail and distribution industries; and
- the conservative political climate, in which EPR is seen as burdensome by those involved with the business community (Lifset 1994 cited in Franklin 1997).

Together these influences have ensured that in the US, responsibility is voluntary and shared between numerous parties. This has implications for recovery rates under such systems. A brief discussion of recovery rates for voluntary programs in the US is provided in *Section 4.3.*

Examples of Product Stewardship in the US include the *Responsible Care* initiative undertaken by the US Chemical Manufacturers' Association[4], Monsanto's User Training Programs, and site audits carried out by DuPont. These initiatives concentrate on the environmental management systems and downstream environmental and safety aspects of various chemical products (Stoughton *et al* 1999 p3).

There has been some recent pressure to implement European-style EPR programs in the US, for example the Electronics *Take it Back!* Campaign in California. This campaign advocates transferring the costs of collecting, managing and disposing of electronics currently borne by the taxpayer through Government programs (usually at the local level) to the manufacturers and distributors (Californians Against Waste, Materials for the Future Foundation, Silicon Valley Toxics Coalition, The Next Generation, 2001). The supporters of *Take it Back!* believe voluntary product stewardship mechanisms in the US are too weak for effective recovery and recycling of electronics and that manufacturers and distributors (not consumers) should take financial and/or physical responsibility for their products.

4.1.3 The OECD

In 1994 the OECD initiated a project on EPR to be conducted in three phases. Phase One was a review and development of policy stage. The interim findings were presented in 1995 at a workshop in Washington at which EPR was adopted as "both a basic principle and a key strategy for waste minimisation" (OECD 2000 p3).

Phase Two saw the analysis of the efficiency and effectiveness of two EPR programs for packaging and the development of a framework report focusing on "policy and legal considerations relating to sharing of responsibility" (OECD 2000 p3).

During Phase Three, workshops were held to examine issues raised in phases one and two, after which a guidance manual for governments was produced in 2000. Phase Three concluded that "as a matter of general policy, governments are optimistic" about EPR and its potential to achieve a number of goals (OECD 2000 p18).

4.1.4 Canada

There are currently no Federal EPR programs in place in Canada, however, there are several industry run programs based on product stewardship approaches and provincial programs based on producer-oriented EPR approach (OEA, 2000; Bury 1999). In the voluntary product stewardship programs, responsibility is shared between industry, Governments, and consumers. An example of a provincial EPR program is British Columbia's Household Hazardous Waste Stewardship Program, which encourages the return of used motor oil, unwanted industrial and post-consumer paints, solvents, flammable liquids, domestic pesticides, gasoline, and pharmaceuticals (Lease, 2000). It should be noted here that Canada's use of the term 'product stewardship' is often not consistent with that of the US, as it is more an example of the European style EPR. Programs in other provinces in which the cost is transferred to the consumer include:

- a 50 cent per gallon "eco-fee" for each can of paint sold in British Columbia;
- a $4 charge per tyre sold in Alberta;
- the 2 cent recycling levy on beverages sold in Manitoba;
- a fee for each bag of garbage set out for collection in a growing number of Ontario municipalities; and
- a mandatory deposit on beverage containers in Quebec, Nova Scotia, Newfoundland, and New Brunswick (Stephenson, 1998).

[4] See: http://es.epa.gov/program/regional/trade/cma-rprt.html

According to Stephenson (1998), there is still interest in establishing more European style EPR programs where the recovery and recycling costs are not transferred to the consumer.

4.1.5 Japan

In April 2001, Japan implemented its *Household Electric Appliance Recycling Law*, a mandatory take-back mechanism which will ensure manufacturers recycle used appliances to avoid disposal to landfill. Those products included thus far are refrigerators, air conditioners, televisions and washing machines (CIVITAS2004, 2001).

A notable difference between European EPR legislation and that of Japan is that the new Japanese legislation will permit producers to pass the added EPR costs onto the consumer (end-user). It is estimated (Japan's Ministry of International Trade and Industry, MITI) that the fees incurred by the end user may be as follows (Fishbein, 1998):

- $37 per refrigerator;
- $30 per air conditioner;
- $22 per television; and
- $18 per washing machine.

4.2 Overview of International EPR Programs

There are numerous examples from around the world of the application of EPR. The most effective EPR programs have perhaps been implemented in Northern European countries such as Germany, Denmark and Sweden. The following table summarises some of the EPR systems currently in place in various countries around the world. It does not attempt to summarise all existing EPR programs, but indicates the types of systems that are in place and where they are occurring.

Country	EPR instrument	Description, year of implementation	Products	National, State or Local initiative
EUROPE				
EU	Directive	**1994: Packaging and Packaging Waste Directive.**	Packaging.	European member States of the EU
	Directive (take-back)	**2000: End-of-Life Vehicles Directive**. Automakers must pay for the reuse and recycling of cars at the end of their life.	Vehicles.	European member States of the EU
Germany	Ordinance	**1998: German Packaging Ordinance**.	Packaging.	National
Sweden	Ordinance	**1994: Producer Responsibility for Tyres Ordinance**. Requires national recycling rate of 80-90% of all scrap tyres. Operated by a non-profit PRO and funded ultimately by consumers.	Packaging, tyres, magazine papers, cars,	National
	Ordinance	Comes into force July 2001: **The Ordinance on Producer Responsibility**.	EEE (excluding refrigerators and freezers).	National
Belgium	Eco-tax	**1993:** Producers must pay the tax or achieve, in co-operation with the relevant industry chain, a specified recycling rate.	Batteries, disposable cameras, packaging, industrial products, beverage	National.

Country	EPR instrument	Description, year of implementation	Products	National, State or Local initiative
The Netherlands	Legislation	**1997: Packaging Covenant**.	All packaging on Dutch market.	National
	Levy	**1993:** Levy on new car sales finances ELV recycling (US EPA, 2000).	Vehicle components.	National
NORTH AMERICA				
US	Voluntary	Various industry initiatives.	Batteries; tyres; vehicles;	Industry or Local
	Voluntary	Host of industry initiatives (especially computers) for the product take-back and recycling of EEE components, reuse and improved design. Some participating companies are Xerox, Compaq computers and Sony electronics.	EEE components; circuit boards, monitors, batteries	Industry, State or industry-national
	Legislation	**Bottle bills.** Deposit-refund systems for beverage containers. 10 US States and one local municipality have implemented such systems.	Beverage containers.	State
	Legislation	**1995: Advance disposal fee**. Fees imposed on containers, with exemptions for companies which meet recycling targets.	Various containers (including food and non-food)	State
Canada	Voluntary	**1993**: Crop Protection Institute pesticide container management program. Collection and recycling of pesticide containers.	Pesticide containers.	Provincial
	Voluntary	Various industry or provincial initiatives.	Used oils, tyres, lead acid batteries, paints, pharmaceuticals.	Provincial
	Legislation	**Bottle bills.** Deposit-refund systems for beverage containers.	Beverage containers.	State
ASIA				
Japan	Legislation	**April 2001:Household Electric Appliance Recycling Law** – Manufacturers must recycle used appliances to avoid disposal to landfill.	Washing machines, televisions, refrigerators, air conditioners.	National
Taiwan	Regulation	**1998: Waste Motor Vehicles Recycle and Disposal Regulations**. Manufacturers are responsible for retrieving the ELV they originally produce. The system is facilitated by the Foundation of Recycle, Reuse and Recovery.	Vehicle components.	National
Korea	Collection Fee	**1995:Volume-based Collection Fee System**.	Domestic Wastes	National
AUSTRALIA	Legislation (deposit-refund)	**1975: S.A. Container Deposit Legislation.** A deposit –refund system requiring the return of used beverage container for recycling.	Selected beverage containers.	State
		2000: Development of a Product Stewardship Strategy for EEE	EEE	National

Table 4-1: Examples of EPR systems around the world.

4.3 Mandatory Versus Voluntary Programs: Production and Recovery Rates

This section examines some examples from around the world of achievements made in various EPR programs, in terms of changes in production or recovery. Data is provided for both mandatory and voluntary programs.

Tables 4.2 - 4.6 highlight the achievements of established EPR programs. A different table is provided for each system due to variance in data availability. *Table 4.2* shows how the total amount of packaging generated in the Netherlands decreased between 1991 and 1994 with the introduction of the Dutch Packaging Ordinance. It must be noted that this data is for the period before the mandatory requirements were put in place. Due to the lack of availability of data following the introduction of mandatory legislation this table provides details of an introductory period of voluntary EPR implementation.

Year	Plastics	Paper/cardboard	Glass	Ferrous metals	Aluminum
1991	645	1688	558	263	46
1992	647	1658	523	325	49
1993	538	1500	504	201	18
1994	613	1415	463	189	19
Goals 1994	***<645***	***<1688***	***<558***	***<263***	***<46***

Table 4-2: Total amount (1000 tonnes per annum) of packaging waste generated in the Netherlands 1991-1994.

Source: Organisation for Economic Co-operation and Development (1998b), ***Extended Producer Responsibility: Case Study on the Dutch Packaging Covenant,*** Group on Pollution Prevention and Control, Environment Policy Committee, OECD: Paris, p24.

Table 4-3 shows the collection, sorting and recycling quotas required in 1996 under the *German Packaging Ordinance*. On a national level all specified targets were achieved, although some states fell short of quotas by as much as 15 per cent. The Ordinance was introduced in 1991 and reaction in terms of waste reduction occurred early in the implementation phase. In the year 1992/1993, the reduction in circulation of packaging material was 500,000 tonnes. In 1997 it was recorded that since passage of the Ordinance, total packaging has reduced by a volume of 1 million tonnes. Reductions have been achieved by reducing the use of packaging and by the increasing acceptance of refillable packaging. (OECD 1998c). *Figure 4-1* graphically represents the reductions in packaging consumption that have been achieved since the introduction of the Ordinance.

	Plastics	Paper, cardboard & cartons	Glass	Steel	Tin plate	Aluminium	Compounded materials
Collection quotas	80%	94%	85%	82%	82%	95%	84%
Sorting quotas	88%	98%	100%	99%	99%	88%	96%
Recycling quotas	68%	92%	85%	81%	81%	81%	79%

Table 4-3: Percentage quotas achieved in 1996 for collection, sorting and recycling of materials under the German Packaging Ordinance.

Source: Organisation for Economic Co-operation and Development (1998c), ***Extended Producer Responsibility, Phase 2: Case Study on the German Packaging Ordinance***, Group on Pollution Prevention and Control, Environmental Policy Committee: Paris, p27.

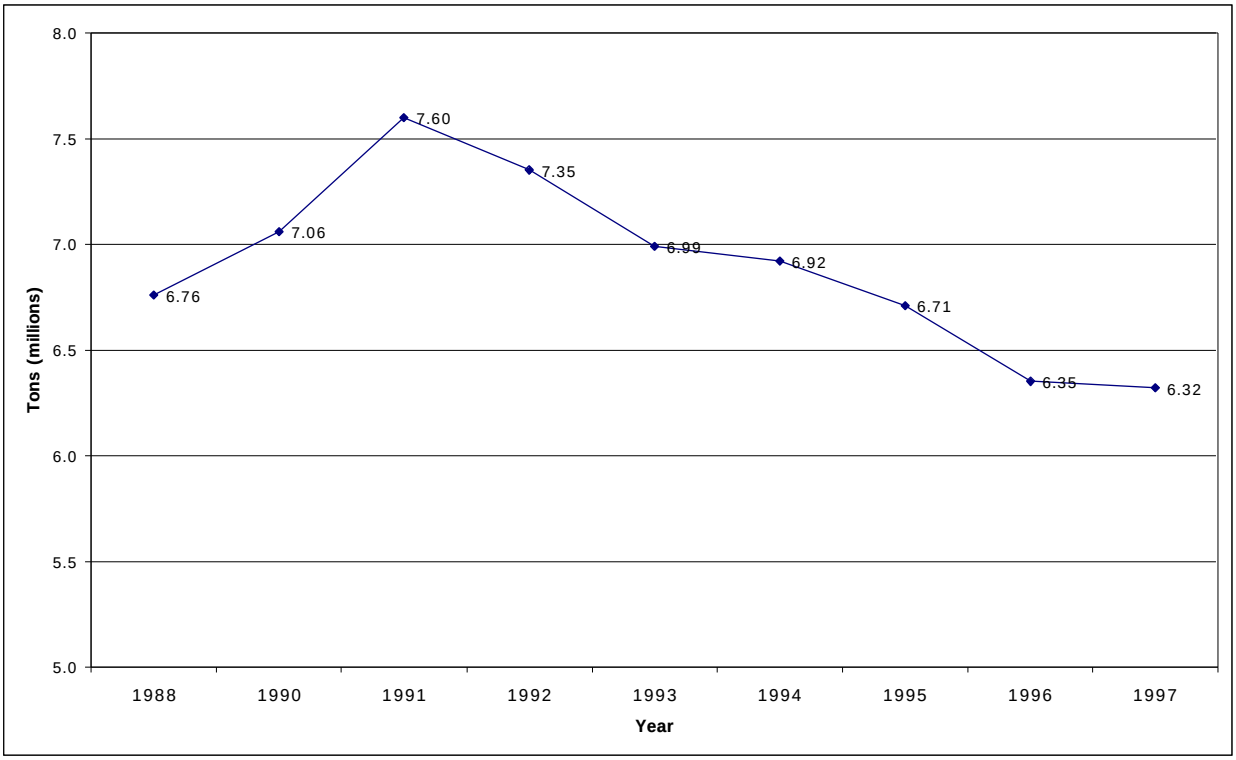

Figure 4-1: Packaging consumption in Germany, 1998 – 1997.

Source: Organisation for Economic Co-operation and Development (2000), ***Extended Producer Responsibility, A Guidance Manual for Governments,*** Group on Pollution Prevention and Control, Environmental Policy Committee: Paris, p28.

A number of regulations exist in Taiwan under the producer responsible recycling system (PRRS) for the recovery of materials, ranging from scrap tyres to batteries containing mercury. Table 4-4 shows the recycling goals that were initiated under the regulations, and whether these goals were achieved.

Item	Date of item designated	Date of regulation issued	Period ended	Official Recycling goal (%)	Achieved recycling rate (%)
Scrap Tyre	1989.6.24	1989.9.20 1994.6.15	September 1991	50	51
			September 1992	70	70
			September 1993	80	82
			September 1994	85	94
			December 1994	85	92
			December 1995	85	105.64
			December 1996	90	
Spent mercury cell battery	1990.5.21	1990.8.31	December 1991	5	5.5
			December 1992	30	33
			December 1993	40	47
			December 1994	50	52.5
			December 1995	55	56
			December 1996	65	
Agriculture chemicals waste containers	1989.10.18	1990.9.21 1994.7.29	March 1992	20	21
			March 1993	55	55
			March 1994	60	60
			March 1995	65	69
			December 1995	65	71
			December 1996	65	
Spent lead battery	1990.4.24	1990.9.21	June 1992	30	35
			June 1993	50	51
			June 1994	60	62
			December 1994	60	61
			December 1995	70	70
			December 1996	75	
Environmental chemical waste container	1989.8.8	1990.8.20 1994.7.29	June 1992	50	30
			June 1993	60	69
			June 1994	70	78
			December 1994	70	81
			December 1995	75	87
			December 1996	75	

Table 4-4: results of a producer responsible recycling system implemented for various designated products in Taiwan.

Source: C-H. Lee et al (1998), ***Development and implementation of producer responsibility recycling system***, Resources, Conservation and Recycling, 24, p121-135, p128.

As shown in *Table 4-4*, all of the recycling targets specified under the PRRS have been reached.

An example of a provincial mandatory EPR program is British Columbia's 1992 Post-Consumer Paint Stewardship Program Regulation[5]. According to the British Columbia Ministry of Environment, Land and Parks (MELP), the program diverted 80 per cent of the annual 50 million litres of lubricating waste oil in 2000 (Lease, 2000).

Table 4-5 details some recovery rates of a voluntary EPR system on NiCd batteries in the US. It should be noted that the battery recovery program was introduced in 1995 and the data for 1996 and 2001 are target recovery rates. Description of the actual EPR system can be found in *Appendix C*. According to the

[5] It should be noted that although B.C. refers to such programs as 'stewardship programs', they are still mandatory and focus on producer responsibility, unlike the US definition of 'product stewardship' which usually implies stakeholder responsibility often with a voluntary approach.

Rechargeable Battery Recycling Corporation (RBRC), 15 per cent of discarded NiCd batteries were recovered in 1995 throughout the US. The RBRC had a target of recovering 70 per cent by 2001.

Year	Sales	Discards	Recycled[6]	Rate
1993	30,027	14,221	284	2%
1994	31,865	15,760	630	4%
1995	33,757	17,921	2,703	15%
1996*	35,710	20,523	5,131	25%
2001*	46,540	37,522	26,265	70%

* projected figures

Table 4.5: NiCd recycling rates in the US (thousands of pounds of batteries).

Source: Fishbein, B (2001), Industry Program to collect Nickel-cadmium (NiCd) batteries, INFORM, [Online], Available: http://www.informinc.org/battery.html [14/6/01]

Mandatory laws on batteries in Europe require recovery rates as high as 90 per cent (such as in the Netherlands). However, no country (in Europe or elsewhere) with mandatory EPR mechanisms on batteries has achieved more than 60 per cent recovery rates, according to the Battery Recovery Laws Worldwide report published in 1999 (Raymond Communications, 1999).

Electrical and electronic equipment has been subject to EPR programs around the world. However, those in Europe are based largely on mandatory approaches whereas those in the US are based on voluntary approaches. The following table details some recovery rates that have been achieved by individual electronics companies in the US.

Company	% reused	Units/annum	Tonnes/annum
Computer Reclamation	90%	4800	60
Computers 4 Kids	70%	2200	22
Detwiler Computers	70%	15,000	188
DRAGNet	60%	6800	85
East West Foundation	90%	7000	88
Goodwill Computer Ctr.	60%	7500-12,000	94-150

Table 4-6: US Electronic industry recovery rates for voluntary product stewardship initiatives.

Source: Biddle, D. (2000), ***End-of-life Computer and Electronics Recovery. Policy Options for the Mid-Atlantic States***, Centre for Solid Waste Research: Philadelphia.

It should be noted that in comparing recovery rates for voluntary and mandatory EPR programs, it is necessary to compare the recovery rates of the EPR products from the national (or State) waste stream. In

[6] It should be noted that the data provided in *Table 4.5* are only for batteries processed through the RBRC program and thus do not include batteries exported for recycling or those disposed of in hazardous waste landfills.

this case, the recovery rate for computers in the US is 10 per cent (Platt and Hyde, 1997). This average is significantly lower than the individual company recovery rates presented in the above table.

This example illustrates that while an individual voluntary EPR program may be perceived as successful (in terms of recovery rates achieved), the overall national or State recovery rate may still be low or insignificant.

5 Product Case Studies

This section highlights examples of EPR programs from around the world applying to particular product systems. As discussed in *Section 3*, there are many types of EPR policy tools, ranging from take-back to servicing. EPR programs can also be classified as mandatory, such as national ordinances in Europe, or voluntary mechanisms such as many industry initiatives in North America. An example of each is provided within each product case study.

EPR programs can be applied to a range of products from simple items such as household containers to more complex products such as electronic goods and vehicles. For the purpose of this report, products have been identified on a spectrum from 'simple' to 'complex' based on the complexity of involving the product in an EPR system (See Figure 5-1 below). This includes the level of intricacy of the following components of introducing an EPR program:

- number of materials/components of the product requiring recovery;
- complexity of recycling/recovery;
- complexity of redesign;
- complexity of supporting infrastructure; or
- other components of the production system, such as alterations to marketing of the product.

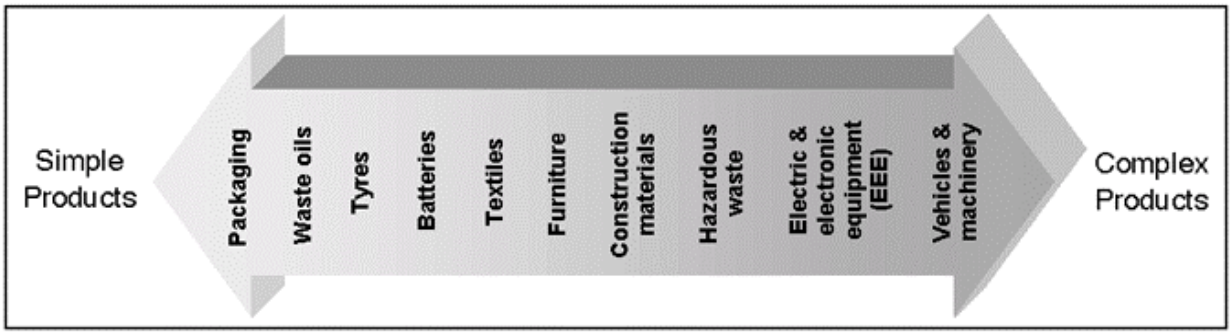

Figure 5-1: Spectrum of products appropriate for inclusion in EPR programs and their relative level of complexity.

There are numerous examples from around the world of the application of EPR to such consumer products. The most common product categories addressed in EPR programs are packaging, electrical/electronic goods, automobiles, wastepaper, and motor oils (OECD, 1996).

EPR is a highly flexible framework and can be applied strategically to address a wide range of environmental impacts.. For example, the inclusion of household containers may see the main environmental benefit as reducing the environmental impact of virgin material production, where as for batteries the main environmental benefit would result from preventing the environmentally hazardous materials (such as cadmium) in the used batteries from entering the environment.

Table 5-1 below identifies the stages at which the environmental impacts occur for a range of products. This information is based on qualitative description from the research of particular products as case studies. Some of these case studies are detailed below with further descriptions in the *Appendix*. Relevant references are cited within the case studies.

Life Cycle Phase / Product	Raw material extraction		Transportation	Primary production & Manufacture phase					Transportation	Use/ operation maintenance		Transportation	Disposal	
	Non-renewable resources	Energy usage		Energy usage	Water consumption	Greenhouse gas emissions	Other emissions	Production wastes		Energy usage	Emissions[7]		Hazardous Waste	Waste to landfill
Primary packaging	●	●	●			●								●
Tyres	●	●		●		●	●					●	●	●
Waste oils	●	●											●	
Batteries	●	●											●	●
Electric and electronic equipment	●	●											●	●
Textiles & carpet	●	●	●	●				●	●		●	●		●
Construction and building materials	●	●		●								●		●
Hazardous wastes											●	●	●	

Table 5-1: Environmental benefits resulting from EPR programs involving different products based on international experience. The various benefits along the life cycle of each product are indicated.

The case studies below introduce and describe EPR programs from around the world for the following products:

- tyres;
- batteries;
- carpet;
- vehicles;
- electric and electronic equipment; and
- refrigerators.

It should be noted that these specific products are not identified as being the most appropriate or common for inclusion in EPR programs, they are simply examples from around the world of what can be included in such programs. It is also important to recognise that the environmental significance of a product may be different in different regions.

[7] Other environmentally significant emissions may include volatile organic compounds (VOCs) or particulates of diameter less than 10µm (PM10).

5.1 Tyres

5.1.1 Description

The abundance of end-of-life tyres is an increasing environmental problem. According to the US EPA, in the US alone in 1998 there were approximately 270 million scrap tyres (weighing 3.4 million tonnes). The number of scrap tyres is increasing with the increase usage of vehicles, although over the past 20 years technology has doubled the lifespan of the average tyre thereby acting to reduce the rate of discarding tyres (Goodyear, 2001).

5.1.2 Environmental Impacts

While the consumption of virgin materials in the production of tyres is an issue, the environmental impact of tyres occurs predominantly at the end of their life cycle. End-of-life tyres can become environmentally hazardous when they are illegally stockpiled or dumped, posing the following risks (US EPA, Online):

- they can become a breeding ground for vermin;
- they pose a fire hazard;
- when ignited are difficult to extinguish; and
- burning tyres release noxious gases and particulate matter to the environment.

In order to minimise the risks of such environmental hazards, EPR programs for end-of-life tyres may include initiatives such as:

- restricting land disposal of tyres (including disposal fees);
- setting up tyre recycling programs;
- developing markets for scrap tyres;
- quotas for a minimum percentage of recycled content in new tyres;
- retreading scrap tyres; and
- designing tyres for increased durability, prolonging the useful life of a tyre.

5.1.3 Policy

Several countries have implemented EPR programs for tyres. Some are voluntary programs initiated by members of the tyre industry (such as Goodyear) while others are national legislation (such as Sweden's Producer Responsibility for Tyres Ordinance). Descriptions of these case studies are provided in *Appendix C*.

5.2 Batteries

5.2.1 Description

With the dramatic increase of products that require their use, batteries are becoming more prevalent. Products that use batteries include battery powered toys and tools, video cameras, cellular phones, portable computers, and small electrical appliances such as toothbrushes and shavers.

The development of battery recycling has resulted in the change of design of some products. Power tool manufacturers have had to redesign some of their products so that uniform-sized batteries are used and can be easily removed for recycling.

Some battery manufacturers are redesigning their products to reduce or eliminate the use of toxic constituents. Computer manufacturers are redesigning their products so that the use of hazardous batteries can be phased out (US EPA, Online).

5.2.2 Environmental Impacts

Nickel cadmium (NiCd) batteries are considered to be hazardous waste. Because they contain toxic constituents such as cadmium, they pose a potential threat to human health and the environment. The major environmental impact occurs in their disposal. When NiCd batteries enter the domestic waste stream and are disposed of to landfill or incinerated, the toxic components can be released into the environment (US EPA, Online; Fishbein, online). If these batteries are not recycled, then they need to be treated in the appropriate manner.

5.2.3 Policy

In the US, EPR policies for NiCd batteries are voluntary, such as the "Charge Up to Recycle" program which is funded by the Rechargeable Battery Recycling Corporation (RBPC). A detailed description of this program is provided in *Appendix C*.

5.3 Carpet

5.3.1 Description

The two basic markets for carpet are residential and commercial. A major difference between these markets is that residential carpet usually requires padding, contains a higher percentage of fibres in the carpet matrix and comes in broad rolls whereas commercial carpet often comes in tiles or sheets. The face fibre of carpet may vary between such materials as nylon, polypropylene, polyester, wool, cotton, and hemp (Midwestern Workgroup on Carpet Recycling, 2000).

5.3.2 Environmental Impacts

The environmental impacts of carpet occur at several stages of its life cycle due to:

- material use;
- production waste;
- indoor air pollution; and
- disposal to landfill.

In order to minimise such adverse environmental impacts, initiatives such as the following can be taken:

- refurbishing;
- leasing (servicing); and
- recycling.

The main environmental hazards are those at the disposal end of the life cycle. Due to the bulky nature of carpet and the mix of materials used, it is often difficult to recycle carpet or incinerate to capture energy. Currently, the majority of carpet is sent to landfill due to limitations in other disposal options. Refurbishment in conjunction with leasing is a more optimal solution, especially since carpet is durable and often replaced long before it reaches the end of its useful life (US EPA, Online). Recycling options may include

reprocessing the whole carpet fibres by shredding, pulverising and extruding into new products. This material is then often used for such products as parking barriers, geotextiles and automotive parts (Midwestern Workgroup on Carpet Recycling, 2000). Other recycling options include separating the face fibres from the backing and recycling the material into new carpet.

5.3.3 Policy

The most common EPR policy for carpet is leasing programs. An industry case study on Interface's carpet leasing program is provided in *Appendix C*. Such programs are considered voluntary measures and are initiated by industry.

5.4 Vehicles

5.4.1 Description

Vehicles tend toward the more complex end of the spectrum of products in terms of components requiring reuse, recycling or other initiatives to minimise environmental pressures. According to the US EPA (2000), the environmental life cycle impact of vehicles is potentially the greatest of any contemporary consumer product. EU Member States alone generate 8-9 million tonnes of end-of-life vehicle waste. In the US this figure is estimated at 10.5 million tonnes. Car scrap currently composes 10 per cent of the hazardous waste stream in the EU (Thorpe & Kruszewska, 1999). This was the impetus for the original EU Program Working Group on car scrap.

5.4.2 Environmental Impacts

Vehicles are considered for EPR programs because of the following:

- energy and material consumption during manufacture;
- energy consumption during usage phase of life;
- exhaust emissions (greenhouse gases and particulate matter); and
- difficult end-of-life waste disposal.

To minimise such environmental impacts, measures such as the following have been made (US EPA, Online; Thorpe & Kruszewska, 1999):

- emergence of electric and hybrid automobiles;
- improved fuel efficiency;
- vehicle recycling;
- cleaner manufacturing processes;
- better design for servicing (e.g.less frequent oil changes);
- re-manufacturing of parts;
- extending vehicle lifespan;
- increase use of car sharing;
- strengthen public transport (both local and long distance); and
- reduce the use of toxic substances in vehicle construction, fuels, and fluids.

According to the US EPA (Online), approximately 75 per cent of vehicles (by weight[8]) are currently being recycled in the US. The main components recycled include metal components such as the engine block, chassis, and radiator. Those least recycled include mixed plastics, fibres and foams. Thorpe & Kruszewska (1999) note that although recycling can achieve reduction in resource use, it is energy intensive due to transport of the scrap and the reprocessing procedure of metals. They argue a more resource efficient strategy would be to reuse car components by standardising the design of vehicle components.

5.4.3 Policy

Vehicles have been targeted for EPR programs in Europe and North America. In 2000, the European Commission introduced the Directive on End-of-Life Vehicles which ensures all member nations implement a uniform legislation on the reuse and recycling of car components. Further details are provided in *Appendix C*. Details of a voluntary industry initiative are also provided in this Appendix.

5.5 Electrical and Electronic Equipment

The electrical and electronic equipment (EEE) market is rapidly growing. The increase in waste electrical and electronic equipment is driven by continuous technological innovation and market penetration of new products.

The Discussion Paper on 'Developing a Product Stewardship Strategy for Electronic and Electrical Appliances in Australia' defines electrical products as all equipment that needs electricity to work, in addition to their components, sub-assemblies (such as shelves in refrigerators), and consumables such as printer toner cartridges (Environment Australia, 2001).

Below is a list of the categories of electrical and electronic equipment controlled by T*he Swedish Directive on Waste from Electrical and Electronic Equipment* (WEEE).

- household appliances, tools and garden equipment;
- IT and office equipment;
- telecommunication equipment;
- television, audio, and video equipment;
- cameras and photo equipment;
- clocks and watches;
- games and toys;
- lighting equipment;
- medical equipment; and
- laboratory equipment.

5.5.1 Description

Electronic products include items such as computers and keyboards. Many electronic products contain a variety of toxic, hazardous constituents such as lead, mercury and cadmium. Due to the rapid obsolescence of these products, discarded electronic equipment is one of the fastest growing hazardous waste streams. Waste from electrical and electronic products are of concern because:

[8] The percentage is significantly less by volume.

- some are large, such as fridges and photocopiers and don't degrade in landfill;
- many contain small amounts of hazardous waste; and
- they contain small amounts of valuable raw materials. A typical computer contains copper, iron, aluminium, bromine, lead, tin, nickel, zinc, silver and many other metals.

5.5.2 Environmental Impacts

The environmental impacts from electrical and electronic products arise:

- during the manufacturing process; the extraction of virgin materials and energy use for their production;
- from the energy necessary for their operation during their lifetime; and
- in their final disposal.

Because of the toxic components routinely used in electrical and electronic products, the waste is often considered hazardous and subject to State legislation regarding movement and disposal. The risks associated with landfilling include leaching and the evaporation of hazardous waste (Environment Australia, 2001; US EPA, Online).

5.5.3 Policy

The EEE category has only recently become the target of EPR programs. Case studies of such programs in Europe, North America and Australia are detailed in *Appendix C*.

5.6 Mobile phones

5.6.1 Description

Based on current sales, approximately two million mobile phones are becoming redundant in Australia each year. As with computers, the rapid obsolescence of these products results in a growing waste stream. The traditional approach of disposing of electronic products is no longer sustainable or acceptable to regulators, consumers, or responsible manufacturers.

5.6.2 Environmental Impacts

End-of-life environmental impacts from electronic products can be significant, especially with respect to the disposal of rechargeable nickel cadmium batteries.

Other environmental impacts include: the use of hazardous materials and additives such as brominated flame retardants and tin–lead solder in casings and components, and also the use of rare materials, the impacts of which are not known (The National Centre for Design at RMIT University, 1998).

5.6.3 Policy

An example of an EPR program involving mobile phone take-back is provided in *Appendix C*. A pilot program for recovery of mobile phone components was initiated in Europe (in Sweden and UK) and is currently being implemented as an industry initiative in Australia after successful trials.

5.7 Refrigerators

5.7.1 Description

Frigidaire is active in making its refrigerators more recyclable by improving disassembly, reducing parts and materials used, and using more easily recyclable materials. At present Frigidaire is focusing its efforts towards plastics recovery with other industry members and trade associations, rather than product take-back. Frigidaire aims to enhance the recyclability of existing products and to design for recylability of future products without sacrificing performance or increasing manufacturing costs.

The environmental record of Frigidaire's parent company, Electrolux, along with Federal and State legislative initiatives were major drivers behind Frigidaire's EPR activities, following a product "tear down" where two people disassembled a refrigerator using hand tools and a power saw. The goal of this exercise was to assess the recyclability of a refrigerator. From this exercise, Frigidaire decided to undertake (Davis et al, 1997):

- **Materials consolidation**: three plastics (from three different suppliers) used in the clear portions of the refrigerator were discarded in place of one new type of plastic.
- **Parts reduction**: Frigidaire found that a substantial reduction in the number of parts in the handle assembly could be accomplished without compromising performance or aesthetics. The parts reduction from 58 to 20 also substantially reduced the assembly labour, time, and space requirements (see Table 5-2 for savings)
- **Paint improvement**: Frigidaire replaced the existing high solids paint system with an organic powder system. Multiple benefits were achieved, including environmental benefits in the elimination of solvents, reduction in factory emissions, a better finish, and more corrosion protection.
- **Returnable Reusable Container (RRC) program**: In co-operation with suppliers and transporters the goal was to have 80 percent of internal packaging be returnable and reusable. Reusable polyethylene for pallets, dunnage and containers replaces wooden pallets, paper dunnage and corrugated cardboard.
- **Plastics marking**: the increased use of plastics in appliances complicates recycling. To make plastics more recognisable, separable, and recyclable, Frigidaire began labelling all plastic parts and packaging. An important consideration was to mark parts in an easily accessible location without hindering the performance and aesthetics of the part. The system developed by Frigidaire has become industry standard.

Table 5-2 shows a comparison between the original and the new refrigerator handling assembly.

Side-by-side refrigerator	Old	New	Difference
Number of parts	58	20	38
Labour (# of people)	17	4	13
Assembly time (min.)	8.1	1.9	6.2
Assembly space (sq. ft)	425	100	325

Table 5-2: Comparison of original versus new refrigerator handling assembly.

Source: Davis et al (1997), ***Extended Product Responsibility: A New Principle for Product-Oriented Pollution Prevention***, Office of Solid Waste, US EPA: USA, p4-5.

The next phase of Frigidaire's initiatives involves translating their product recyclability improvements into product recycling. As more plastics are used in appliance manufacture, Frigidaire is working to develop the plastics recycling infrastructure.

6 Implementation Issues

This section aims to examine potential implementation issues that could arise with the introduction of EPR. The success of any legislation or strategy very much depends on when and how it is implemented. It is also important to note that there is no single best system. The best system will always depend on national or regional issues such as existing polices or existing infrastructure which may affect the proposed system directly or indirectly. The issues faced in implementing EPR, based on literature and international experience are summarised in *Table 6-1*.

Implementation Issue	Description	Proposed solutions
The use of current infrastructure to collect used products	An EPR program will require to varying extents infrastructure to collect the product if it is to be returned for recycling or other management by the producer.	One solution is to utilise existing infrastructure, such as depots and other points of collection for materials/products already being collected.
The process of defining responsibilities between stakeholders	There is still often dispute as to who is the producer, and to what extent are other stakeholders responsible. In a Shared Responsibility model the financial and/or physical responsibility can be shared between all actors in the product chain, including industry, Government and consumers. If the EPR program is based on the Producer Responsibility model then all or a majority of the financial and/or physical responsibility will be borne by the producer.	The process of defining roles and responsibilities should involve stakeholders. Responsibilities can either be allocated by Government or agreed upon through stakeholder negotiations.
Administration of the system	This may include such tasks as: ❑ Enforcement of the legislation if the EPR policy is mandatory; ❑ Imposing sanctions or penalties if targets/quotas are not met; ❑ Management and distribution of handling fees (and unclaimed deposits if there is a deposit-refund system); ❑ Ensuring correct labelling of products participating in the EPR program; ❑ Managing auditing; and ❑ Licencing of collection centres.	The tasks may be the responsibility of either the Government or industry, depending on the type of system implemented. Under a mandatory system, the State or national Government will always be responsible for enforcement of the legislation, while the other tasks listed may be managed by a private industry body such as a PRO.
The setting of targets and performance requirements	Targets need to be clear and acceptable to all stakeholders.	Those industry groups affected by the setting of targets should be consulted in the decision-making process to ensure realistic target setting and performance requirements.
Information and education design	Any new program will require dissemination of appropriate information to educate those involved and raise awareness of the objectives of the program.	This task can be undertaken by the organisation administering other parts of the program (such as the PRO or government body).

Implementation Issue	Description	Proposed solutions
Cross border and international trade issues	National EPR programs will most likely have an impact on international trade as imported (and potentially exported) products would be included in the program. From a policy maker's perspective it may not be advantageous to create international trade barriers, therefore mechanisms to avoid these consequences should be sought. Also refer to *Volume II, Section 4.* State-wide EPR programs may also be affected by fraudulent redemptions if they are deposit-refund systems. Such fraudulent redemptions may add significant costs through loss of deposits in the system and by increasing operational costs for retailers and distributors.	Some systems require that importers of products assigned to an EPR program must participate in the system. In the EU, there is a move towards EPR Directives across the EU to harmonise EPR systems and reduce international trade barriers. Information about the proposed EPR policies should be notified to the WTO. Options for controlling fraudulent redemptions across State borders include: ❑ Labelling products sold in the EPR State; ❑ Licensing of contractors and depot operators who are allowed to redeem used products, with extra scrutiny and compliance monitoring at depots near the State border; ❑ Substantial fines for people caught deliberately redeeming out of State containers; ❑ Setting an upper bound on numbers of products/person/day which can be redeemed; or ❑ Introduction of a comparable form of deposit and refund system in neighbouring States.
Control of free riders	Free riders are those actors involved in a program who do not pay for the benefits they receive from the EPR system. They can be producers, consumers, recyclers, retailers, etc.	It is not usually worth the cost to eliminate all free riders from the system. There are several ways of dealing with free riders such as peer pressure, monitoring, sanctions and mandatory programs.
Orphan & existing products	**Orphaned** products refer to those products included in an EPR program where the producer has disappeared (e.g. due to bankruptcy); **existing** products include those products designed and/or introduced prior to the implementation of an EPR program.	Orphaned products become problematic when there is dispute as to who is responsible for them, whilst the problem of existing products depends on the life-span of such products & whether the EPR is designed to encourage future design improvements as opposed to end-of-life disposal issues. Allocation of responsibility to orphaned & existing products is required, which is more or less a political decision of designating responsibility in the case of orphaned products. If end-of-life management is an option, existing products can be addressed by such EPR tools as advance disposal fees[9].
Timing and phase-in	Timing of implementation of an EPR program may be important to all	To overcome this, phasing in the strategy is an option, beginning with

[9] See *Section 2.2* for a description of advance disposal fees.

Implementation Issue	Description	Proposed solutions
	actors, from consumers to producers. It will take time for actors to learn of their responsibilities, set up systems (physical and administrative), communicate information to the public, and adjust to new arrangements.	measures to promote markets and stimulate recycling capacity development, followed by recycling targets and dates. There should be ample time for producers (especially importers) to make a smooth transition to the new EPR system. Announcing a future date is an option when the EPR program targets redesign of products rather than disposal options for existing products. Caution should also be taken so that too much time is not taken thus losing momentum.
Compatibility with existing policies	Any new program should attempt to be compatible with existing programs and policies if they are to retain their effectiveness.	Review existing policies and ensure there will be no unintended significant disruptions.
The political acceptability of EPR to stakeholders	Any program which involves a number of stakeholders will provoke some opposition by those stakeholder groups adversely affected by the program, whilst other stakeholder groups may potentially gain from the program. It is important to consult stakeholders throughout the process of developing the EPR policy to gain an understanding of how each stakeholder group may be affected by the proposed EPR policy.	Consultation with stakeholders and interest groups can be achieved by various means such as informal conversations with well-known experts in a field; roundtable discussions and workshops, stakeholder submissions or formal public hearings. Citizens groups and local authorities should also be consulted to determine both their views on producer responsibilities and their own responsibilities. Representative and deliberative processes can be used to determine the attitudes and preferences of citizens as a balance to stakeholders with vested interests.[10]
Fragmentation	According to EUROPEN (1998) 'incremental' implementation of EPR to discrete parts of the waste stream may lead to a fragmentation of approaches to waste management. As specific responsibilities are increasingly defined for more and more products, (such as batteries, cameras etc) a multiplication of systems may result. This may lead to an economically and environmentally inefficient and unsustainable situation, contradicting the fundamental concept of an integrated waste management approach.	The EU is attempting to harmonise EPR programs across EU Community through its EPR Directives. This is one way of avoiding fragmentation. Alternatively, the EPR system could be designed with a long term strategy of gradually introducing new products into the system, ensuring the overall system will remain integrated and efficient.

[10] See *Volume III Section 5.1* for further discussion of the merits of this approach.

Implementation Issue	Description	Proposed solutions
Management of economic flows	Who should own and manage the money which funds the system?	The authority responsible for managing funds is most commonly an industry group (producer responsibility organisation, PRO) or Government body. However, it is important for an effective system that the authority setting targets is not also responsible for managing the funds.
Transparency	The implementation of any EPR system should be transparent.	Consultation and involvement of all stakeholder groups will increase transparency and involvement of those affected. Information dissemination and education will also act to increase transparency.
Flexibility	Any long-term program should be flexible so that it can adapt to changing situations (such as new technologies, developments in recycling and material markets).	The system should be designed to be flexible and adaptive, with forethought given to likely future changes.
Monitoring and auditing	Monitoring is essential for evaluating an EPR program against its goals and targets, providing a feedback loop.	An efficient auditing system should be set up. Such a system should monitor compliance and general performance of the EPR program. In a mandatory system this may be necessary and should ideally be undertaken by an independent third party. In a voluntary system it is not imperative to monitor and audit, however, it would be useful for both assessment of internal management in addition to assessing the effectiveness of such voluntary programs against one another or mandatory programs for similar products.
Competition	In theory, increase in competition in the collection, recovery and reuse markets will act to decrease costs and increase production.	Any EPR system should avoid the creation of monopolies through regulatory barriers to entering the post-consumer material markets.

Table 6-1: Potential implementation issues arising from the introduction of an EPR system.

Source: Organisation for Economic Co-operation and Development (2000), ***Extended Producer Responsibility, A Guidance Manual for Governments,*** Group on Pollution Prevention and Control, Environmental Policy Committee: Paris; OECD (1996), ***Extended Producer Responsibility in the OECD Area: Legal and Administrative Approaches in Member Countries and Policy Options for EPR Programmes***, OECD: Paris; EUROPEN, (1998), ***Producer Responsibility Defined: A Briefing paper***, EUROPEN: Brussels).

7 EPR and Current Government Initiatives

This section describes specific Commonwealth and State Government waste initiatives and the degree to which they embody the principles of EPR. Amendments to Commonwealth and State policy to further incorporate EPR are presented later in the report under *Section 9: Implementation of EPR in NSW* and these principles have been incorporated in the Waste Avoidance and Resource Recovery Act 2001.

7.1 National Initiatives

7.1.1 *The National Waste Minimisation and Recycling Strategy*

The *National Waste Minimisation and Recycling Strategy* (hereafter referred to as the Strategy*)* was introduced in 1992. The waste management hierarchy (i.e. avoid, reduce, reuse, recycle) is central to the Strategy. Box 5 lists the guiding principles.

BOX 5:

Guiding principles of the *National Waste Minimisation and Management Strategy*

- Waste management hierarchy;
- Life cycle approach;
- Precautionary approach;
- User pays principle;
- Polluter pays principle;
- Economic efficiency;
- Individual and corporate responsibilities;
- Education and awareness; and
- Clean production through appropriate technology and processes.

A number of drivers for the introduction of EPR were discussed in *Section 3.5* of this report. Although EPR is not an aim or objective of the *National Waste Minimisation and Recycling Strategy*, three of these drivers, the polluter pays principle, cleaner production and life cycle assessment are referred to in the Strategy. It states, for example, that the polluter pays principle "should be implemented…to ensure that the cost of containing or eliminating pollution is borne by those who generate or handle polluting or potentially polluting material" (Commonwealth Environment Protection Agency, 1992, p12).

7.1.2 *The National Packaging Covenant*

The National Packaging Covenant (the Covenant) is a self regulatory agreement developed following negotiations involving industry organisations, Commonwealth and State Governments and the Australian Local Government Association. The objectives of the Covenant are to establish:

- a framework based on the principle of shared responsibility for the effective life cycle management of packaging and paper products including their recovery and utilisation;

- a collaborative approach to ensure that the management of packaging and paper throughout its life cycle, and the implementation of collection systems including kerbside recycling systems schemes, produces real and sustainable environmental benefits in a cost effective way; and
- a forum for regular consultation and discussion of issues and problems affecting the recovery, utilisation, and disposal of used packaging and paper, including costs (ANZECC, 1999, p1).

The Covenant states that it is based on the principle of product stewardship, which includes an ethic of shared responsibility for the life cycle of products. It provides that this responsibility applies beyond producer responsibility to ensure that "all participants in the packaging chain – raw material suppliers, designers, packaging manufacturers, packaging users, retailers, consumers, all spheres of Government, collection agencies – accept responsibility…" (ANZECC 1999, p.3). This is similar to the US extended product responsibility concept, as discussed in *Section 4.1.2*.

Commitments of signatories under the Covenant include the:

- production of Action Plans for evaluating and improving environmental outcomes, as appropriate, in their production, usage, sale and/or reprocessing and recovery of packaging materials;
- adoption of appropriate waste management pricing policies and the provision of appropriate financial and other support to optimise kerbside recycling systems; and
- development of formal market trading structures that optimise the price for recycled materials.

The Covenant was not intended to impose binding legal or financial responsibility on the producers of packaging. The National Packaging Covenant website states that:

"The Covenant has a life span of five years. It is not prescriptive, does not tell companies how to make their packaging or what type of packaging to use; nor does it implement regulation requiring businesses to take back materials recovered from kerbside recycling collection programs" (Environment Australia Online www.environment.gov.au/epg/covenant/).

The National Packaging Covenant Council was established to administer and monitor the Covenant. It is comprised of twelve members: six ANZECC representatives, two local government representatives, and four industry representatives. The major program of the Council is aimed at improving kerbside recycling. The annual contribution by the packaging industry to the Council over a three year period is approximately $6m/a. The current annual net cost[11] to local government of the collection of recyclables in Australia is approximately $136-$158m/a (Nolan-ITU/SKM, 2001).

A recent report (Nolan-ITU/SKM, 2001) produced for the Council concluded that:

"Product stewardship and producer responsibility should be implemented through the Covenant schedules according to a well structured program in order to reduce material and energy consumption and waste production throughout the product life cycle while maintaining product quality." (Nolan-ITU/SKM, 2001, p. 91).

As at November 2001, there were around 180 industry signatories to the Covenant who have opted for its flexible options for action. Further information on the National Packaging Covenant can be found in *Volume II, Section 2.3.6.2*.

[11] The total collection and sorting cost minus the value of recyclate and the avoided landfill costs.

7.1.3 The National Environment Protection Measure

In 1999 a *National Environment Protection Measure* (NEPM) relating to used packaging materials was introduced by the National Environment Protection Council, a body of State and Commonwealth Environment Ministers established under the *National Environment Protection Council Act* 1994 (NEPC Act Cmwlth). The goal of this NEPM is to "reduce environmental degradation arising from the disposal of used packaging and conserve virgin materials by supporting and complementing the voluntary strategies in the National Packaging Covenant (NEPC, 1999b, p5). Those industries that are not signatories to the Covenant are bound by the requirements of the NEPM.

Clause 5(5) states that "as the Covenant includes a voluntary system of self regulation, the intent of Council is to ensure that industry signatories do not suffer any competitive disadvantage as a result of fulfilling their commitments under the Covenant" (NEPC, 1999b, p4).

The NEPM and the Covenant were accompanied by a regulatory impact statement as required under section 17 of the NEPC Act. The statement reviewed a number of possible alternative regulatory options including:

- fees on inputs to production (virgin raw material levies);
- fees on productive outputs (packaging levies);
- retailer levies at State level;
- waste disposal levy on householders;
- mandatory recycling targets;
- mandatory targets for re-use of recyclables;
- advance disposal fee;
- landfill levies;
- compulsory take-back and use option; and
- container deposit legislation.

The impact statement dismissed regulatory options that incorporated the imposition of mandatory targets and fees. It concluded "that fees and levies may be considered unconstitutional, anti-competitive, a tax on business… (and) targets are often seen as inequitable between materials, generate ongoing debate about the appropriate levels, require expensive data reporting and monitoring systems and would be impractical in terms of implementation and enforcement" (NEPC, 1999a, p15-16).

Clause 9 of the NEPM requires States to place obligations on the producers of packaging, who were not parties to the Covenant, to:

- put in place a system for the recovery of their used packaging material;
- arrange for the reuse, recycling or energy recovery of the packaging;
- demonstrate that all materials recovered have been recovered and utilised through reuse, use within Australia, or export as a secondary resource; and
- take reasonable steps to advise consumers how the packaging is to be recovered.

The NEPM also contains extensive data collection and reporting requirements. It requires producers to keep records and provide reports in relation to packaging production, recovery, and recycling.

It also requires local government to keep records and provide reports in relation to the operation of kerbside recycling programs. The information contained in these reports may be 'commercial in confidence' and cannot be publicly released unless certain conditions are met.

Given that the first reporting period under the NEPM is the financial year commencing 1 July 2000, it is too early to fully assess the effect of the NEPM and the Covenant.

The NSW Minister for the Environment has provided a report to the NEPC on the implementation of the NEPM in NSW. The Minister's report, which is included as an annexure to the NEPC Annual Report, described the operation of the NEPM as:

"an incentive for industries in the packaging chain to join the Covenant. It does this by imposing a relatively punitive 'take-back and utilise' obligation on brand owners (producers and importers) of packaged consumer goods and in-store packaging. Brand owners who join the Covenant can take advantage of its more flexible options for action." (National Environment Protection Council Service Corporation, 2001 p. 193).

Further additional information on the NEPM can be found in *Volume II, Section 2.3.6.4*.

7.2 NSW Initiatives

7.2.1 Protection of the Environment Operations Act 1997

The objects of the Protection of the Environment Operations Act (POEO Act), section 3 (d) include the requirement "to reduce risks to human health and prevent the degradation of the environment by the use of mechanisms that promote the following:

(i) pollution prevention and cleaner production; and

(ii) the reduction in the use of materials and the re-use or recycling of materials".

EPR is not only consistent with these goals, but its implementation could help achieve them.

There is scope for EPR principles to be incorporated in the environmental management requirements for waste generation, storage, transport, treatment and disposal which is a major focus of the POEO Act. However, the Act generally adopts a waste management or minimisation approach, rather than a waste avoidance approach.

One provision contained in the POEO Act that was designed to result in improved waste management and minimisation is the waste levy (section 88) which provides an economic incentive for waste minimisation.

The *Protection of the Environment Operations (General) Regulation* 1998 contains incentives for industry to improve waste management. The load based licensing scheme is intended to encourage polluters to reduce pollution. The objects of the scheme are to:

- provide incentives to reduce emissions of pollutants based on the polluter pays principle and to apply them within an equitable framework; and
- give industry incentives for ongoing improvements in environmental performance and the adoption of cleaner technologies.

Load based licensing and similar features of the POEO Act have similar objectives to and may be seen as a step towards EPR. However, these provisions of the POEO Act are targeted at the production phase of a product's life cycle and do not address impacts associated with use and disposal.

7.2.2 The Waste Minimisation and Management Act 1995

The *Waste Minimisation and Management Act* (WMMA) was the most significant component of the regulatory framework applying to the management of waste in NSW until the new Act..

Under section 3 (2) (c) one of the objectives of the WMMA was "to ensure that industry shares with the community the responsibility for minimising and managing waste". The WMMA therefore adopted a 'shared responsibility' approach, rather than full EPR. The main institutions created under the WMMA were the regional waste boards. The waste boards' general functions did not include EPR. However, it was open to the waste boards to include EPR in Regional Waste Plans. An example of a Regional Waste Plan which included EPR is discussed at *Section 7.2.4* below.

One of the issues addressed in the review is the existence of possible mechanisms (statutory or otherwise) for ensuring industries take appropriate responsibility for reducing waste in their sector. The amendments recommended in *Section 9* strengthen the commitment to EPR in NSW.

Under section 39 of the WMMA the Environment Protection Authority (EPA) had the power to enforce compliance with Industry Waste Reduction Plans (IWRPs). It is understood that no fines were issued under section 39, and no case law exists.

7.2.3 Industry Waste Reduction Plans

Industry waste reduction plans (IWRPs) were required under Part 4 of the WMMA. The aims of Part 4 of the WMMA include the need to:

- minimise the amount of waste being created;
- minimise the consumption of natural resources;
- ensure greater industry responsibility for waste reduction; and
- encourage an efficient and cost effective Approach to industry waste reduction (WMMA, 1997, s30a).

Section 31 of the WMMA describes the potential scope of an IWRP. This scope includes the provision for an IWRP to:

- set waste reduction targets;
- indicate the financial contribution of industry members;
- identify opportunities and action in product design, production, and packaging for reducing waste;
- implement methods for reducing, reusing, and recycling waste;
- identify information resources to inform consumers;
- specify a timeframe to implement targets;
- establish a public monitoring and reporting program;
- include performance indicators;
- require the provision of data to the EPA; and
- any other matters authorised by the regulations.

There were four IWRPs gazetted by the NSW Government. These were the *Dairy IWRP*, the *Tyre IWRP*, the *Beer and Soft Drink IWRP* and the *Used Packaging Materials IWRP*. Although the introduction of IWRPs was before the introduction of the National Packaging Covenant, the IWRPs were recognised as Action Plans under Schedule 1 of the Covenant.

Dairy Industry Waste Reduction Plan

The Dairy IWRP was the first plan to be made under the Act. Section 32 of the Act contained a special provision that applied to the dairy industry. It provided that the IWRP for the dairy industry must:

- set a target for the level of use of refillable milk bottles for the NSW milk market by the end of 1996; and
- include a comprehensive public education strategy to encourage the community to use and return refillable milk bottles (NSW EPA, 1998a)

Given that refillable packaging is considered a major aspect of EPR, the provisions under the IWRP could be seen as having allowed for the implementation of EPR in the packaging of dairy industry products. This interpretation is reinforced by clause 7(a) which provided that the guiding principles of the Dairy IWRP include the need "to ensure greater dairy industry responsibility for milk packaging waste and other waste associated with milk packaging".

Recent comprehensive LCA studies in Denmark (Danish Environmental Protection Agency, 1999) and Germany (Plinke et al, 2000) have demonstrated the environmental performance of refillables significantly outweighs single use container packaging for beverages

Tyre Industry Waste Reduction Plan

The guiding principles of the Tyre IWRP were set out in clause 7 of the Plan. The principles include EPR and specifically aim to:

- ensure greater industry responsibility for waste related to tyres; and
- reduce the amount of tyre waste being created in NSW.

The Plan also contained a major objective which was "to increase the diversion of tyre waste from landfill and other disposal methods (including unlawful disposal) through increased collection, retreading and recycling of waste associated with tyres." (NSW Environment Protection Authority, 1998b, p 6-7).

To enable measurement of the extent to which this objective was achieved through the operation of the Plan, detailed targets set out in the Plan were also adopted.

Beer And Soft Drink Industry Waste Reduction Plan

The Beer and Soft Drink IWRP applied to all beer and soft drink packaging waste. It listed a number of waste reduction and recovery targets, identified programs to achieve specific waste reduction targets, and included commitments for kerbside collection schemes for recyclable materials (NSW Environment Protection Authority, 1999). The development of targets for recovery for each material type under the IWRP is a similar process to that used in EPR systems internationally. Further additional information on the Beer and Soft Drink IWRP can be found in *Volume II, Section 2.3.6.3*.

Used Packaging Materials Industry Waste Reduction Plan

The Packaging IWRP was gazetted by the Minister in September 2000 as a mechanism for NSW to adopt the NEPM. One of the objectives of the IWRP, set out in clause 4.1, is to "ensure greater industry responsibility for consumer packaging waste and other waste associated with used consumer packaging in NSW."

The main obligation (under clause 8.1) is to systematically recover, reuse and recycle the used consumer packaging materials to which the Plan applies, in accordance with the targets set for each category of material. The following table shows materials to which the Plan applies and targets for the recovery, reuse, and recycling of each category of packaging material under the plan. The CDL Review has demonstrated that these targets should be increased significantly in order to reduce the environmental costs of virgin material production.

Material	Required recovery/ utilisation rate
HDPE	50 %
PET	50%
Glass	60%
Aluminium cans	65%
Steel cans	45%
Liquidpaperboard	45%
Paper/cardboard packaging	75%
Other materials	50%
Combination of materials	50%*

Table 6-1: Materials and targets for recovery under the *Used Packaging Materials IWRP*. Note (*) "or the highest rate applicable to any material in the combination, whichever is the highest rate".

Source: Environment Protection Authority NSW (2000), NSW ***Used Packaging Materials Industry Waste Reduction Plan,*** Environment Protection Authority NSW Waste Policy Section: Sydney. p. 12.

Further additional information on the Used Packaging Materials IWRP can be found in *Volume II, Section 2.3.6.4*.

7.2.4 Local and Regional Framework

The main institutions responsible for administration of waste policy and regulation in NSW were local government and the regional waste boards. The boards were required to produce regional waste plans that were binding on local councils within the region covered by the board.

Regional Waste Plans

Regional boards had discretion to include EPR in their plans although they did not have jurisdiction to require industry or councils to observe the principles of EPR. Due to the limited statutory powers of the waste boards to influence companies directly, their role was one of ensuring that the system for EPR be made as efficient and effective as possible – for example in encouraging integrated waste management collection depots and shared take-back infrastructure to help to minimize costs to the stakeholders of an EPR system.

Under s.19 (3) of the previous Waste Act the Minister could provide guidelines to assist waste boards in the preparation of Regional Waste Plans. The matters to be contained in such guidelines could have included priority waste minimisation and management options. This provision allowed the Minister to issue guidelines to advise waste boards in relation to the methods for including EPR in their waste reduction plans.

The Inner Sydney Waste Board, for example, covered seven inner city local government areas (City of Sydney, Ashfield, Auburn, Burwood, Canada Bay, Leichhardt and Strathfield). In 1998 it produced a waste plan that recognised EPR. The plan included an advocacy program and stated:

> "The Board considers it important to advocate increased industry waste reduction responsibility at all levels ranging across local, regional, State and national levels. It considers industry needs to take a whole of life cycle responsibility for its products and packaging of its products.
>
> The Board will promote increased producer responsibility… for the products of concern to the regional community including the system of plastic shopping bags supplied by the packaging industry and materials used by the construction industry.
>
> The Board is particularly concerned about suggestions made by the producers of many products that their packaging materials are recyclable but there are no systems in place by the industry to collect these packaging materials. Industry has a role in the costs and development of recycling collection systems which complement labelling and packaging requirements" (Inner Sydney Waste Board, 1998, p.63)

Two of the issues raised by the waste board are of particular continuing relevance to local government. These issues are construction industry waste and adequate industry contributions to the cost of recycling systems. There is some scope for local government to address these issues under existing legislation, although the major responsibility rests with the State Government.

Role of Local Government

Local government administers the development approvals process under the *Environmental Planning and Assessment Act* 1979. Building waste comprises a significant proportion of the waste stream.[12]

[12] For example in 1997, construction and demolition waste comprised 410,000 tonnes from a total of 690,000 tonnes disposed to landfill from the Inner Sydney Waste Region (Source: Inner Sydney Waste Board, 1998, *Regional Waste Plan*, p. 9)

The *Waste Not Model Development Control Plan* (DCP) was developed by the Sydney Regional Organisation of Councils (SROC, 1996). The purpose was to encourage councils to adopt DCPs aimed at minimising the amount of waste generated by the building industry during demolition and construction. It required the preparation of a Waste Management Plan to be submitted with development and building applications. Local government, however, does not have the power to refuse a development application on the grounds that it would create large amounts of waste.

Local councils could incorporate EPR for building products into development control plans (DCPs) or local approval policies. For example, a DCP could provide that approval will only be granted where the proponent can establish that a stipulated percentage of:

- new building materials used for the project are materials for which the producer has accepted responsibility;
- used or recycled materials are used in the project; and
- materials are capable of being reused or recycled at the conclusion of the life of the building.

The *Local Government Act* 1993 (*LGA*) includes the need to regard ecologically sustainable development (ESD) principles as a purpose of the Act. The Councils Charter (section 8) requires that its activities are consistent with and promote the principles of ESD and section 89 (2) states that applications must take into consideration the principles of ESD. Local government has also been required to absorb much of the cost of operating recycling and other material recovery programs. They do, however, have the power to introduce user pays to retrieve some of these costs. It must be noted that although these powers are available they are not widely used (SSROC, 1994).

There is no reference to EPR in the *Local Government Act*. However, the essence of EPR is that local government should bear less responsibility for managing the activities that create waste.

There is already a considerable burden placed on local government (and ratepayers) in relation to the financing of kerbside recycling. The imposition of additional financial or statutory responsibilities on local government to provide infrastructure for EPR, would be likely to result in the existing burden being increased rather than shifted to producers.

8 Conclusions

The shared responsibility model of managing the life cycle impacts of manufactured products in NSW does not adequately provide for:

- acceptable ESD outcomes; or
- minimisation of the total economic, environmental and social cost of a given level of consumer utility.

If these issues are to be addressed adequately, either Government (and tax payers) or industry (and consumers) will need to assume greater responsibility for reducing the environmental externalities of consumption of certain products. That is to say, NSW faces the option of either extending its model of shared responsibility or shifting towards extended producer responsibility (EPR).

This investigation has found that adopting EPR is preferable to an expansion of the shared responsibility model because:

- producers are in a position to alter product design and manufacture in a way that reduces the costs associated with management of the product at the end of its life. This means that producers are in a position to achieve desired environmental outcomes at a far lower total cost than Governments; and
- EPR places a greater part of the financial burden for a product's management on those who benefit from its production and consumption, that is, industry and consumers. EPR is therefore an example of the 'user pays' principle.

It is noted that even with a shift towards producer responsibility under an EPR model there remains a high level of Government responsibility in relation to the establishment and administration of EPR programs. EPR is therefore most effective when introduced on a product specific basis, beginning with the products for which the potential benefits on a whole of society basis are the greatest.

This investigation has also concluded that while there is a need to move beyond traditional command and control forms of regulation, there remains an important role for mandatory implementation of measures if EPR is to successfully operate. This will be facilitated through the use of appropriate economic instruments including deposit and refund systems for a range of products. Voluntary implementation of measures, in contrast can ultimately only be expected to be adopted where industry members perceive they will result in an economic benefit to themselves, either in the short run or the long run.

Establishing mandatory performance targets is a means to desired environmental outcomes, while allowing industry flexibility to achieve performance requirements at least cost. That being said, mandatory targets need to be supported by substantive enforcement mechanisms and compliance incentives. When mandatory targets alone are not able to produce the desired outcome, mechanisms for other mandatory schemes, such as deposits, advance disposal fees and take-back requirements need to be in place.

When developing an EPR scheme it is extremely important that it be based on an analysis of:

- the performance standard that is realistically achievable given both international best practice and local conditions;
- the total economic, environmental and social costs to society of various options; and
- representative and deliberative processes of public participation (see *Appendix D*).

This is particularly important in the case of mandatory schemes where there is a greater risk that an inefficient outcome will result, or an outcome that is unacceptable to the community.

9 Implementation of EPR in NSW

This section describes how EPR could be strategically used and implemented in NSW. It includes an outline of additional research that would need to be undertaken and a description of legislative and regulatory changes to achieve EPR objectives.

9.1 National Framework

The most effective way of implementing EPR would be through its adoption at a Commonwealth level, via the Council of Australian Governments (COAG) or the National Environment Protection Council (NEPC). The advantages of a national approach include:

- decreased cost to industry of a consistent approach (e.g. in terms of product labelling requirements);
- improved ease of administration regarding compliance with international agreements to which Australia is a signatory;
- increased environmental benefits through increasing the geographical scope of the scheme;
- resolution of cross-border issues;
- avoidance of problems with free riders within the system; and
- avoidance of possible barriers arising from mutual recognition law.

9.1.1 Adapting the Current Framework to EPR

A *National Environment Protection Measure (NEPM)*, could be developed by the National Environment Protection Council to provide a framework for the adoption of EPR in each State or Territory. Under section 14(1) (f) of the *National Environment Protection Council Act* 1994, the NEPC can introduce a NEPM that relates to the reuse and recycling of used materials. The measure would be required to be implemented by the laws and other arrangements considered necessary by the different States and Territories.

In NSW, this could have been achieved under section 37A of the WMMA, which provided for the development of Industry Waste Reduction Plans (IWRPs) by the EPA in order to implement a NEPM. Alternatively, and as consequently implemented, it could be achieved by changing the framework with new legislation as described in *Section 9.2.*

9.2 NSW Framework

EPR could be incorporated into NSW policy relatively easily. Indeed, it could have been argued that the provisions for IWRPs in the former Waste Act were a sufficient statutory mechanism for EPR and that the only real changes required were in relation to policy and implementation of the IWRP provisions. This conclusion recognises that to date cross-border and legal issues have been a significant limitation to more effective implementation of specific EPR-type programs via IWRPs.

9.3 Changing the Current Framework in NSW

It is clear that significant steps towards the implementation of EPR in NSW are possible without the need for regulatory changes. However, the type of actions recommended above would be more easily achieved if they were grounded within a more clearly EPR focussed policy and legislative framework. Inclusion of the following points within the new Waste Act for NSW supports the effective implementation of EPR in NSW.

- a formal definition of EPR as described by internationally accepted and working definitions;
- EPR as an object of the Act;

- detailed industry reporting requirements with appropriate enforcement mechanisms in place; and
- a tool similar to IWRPs that allows for specific product or industry based EPR initiatives.

In relation to these industry or product specific EPR initiatives (referred to as product plans), the Act should include provisions that:

- the objectives and targets within the plans are mandatory and will be determined based on an analysis of whole of society costs and benefits supplemented by a process of stakeholder consultation and processes of public participation that are representative and deliberative;
- the following *will* be introduced in accordance with the EPR objectives if industries fail to meet targets and objectives specified in the product plans:
  - restrictions on sale;
  - mandatory programs such as deposit schemes, advance disposal fees, or take-back requirements;
  - requirement for the provision of a performance bond to be forfeited in the event of non-compliance with targets and objectives specified in the plans.

It is recommended that the decision-making process for the selection of products for specific EPR initiatives follow a detailed analysis similar to that which was undertaken for beverage containers in the Independent Review of Container Deposit Legislation in NSW (*Volumes II & III* of this report). This process would need to be based on criteria that include:

- principles of ecologically sustainable development;
- life cycle implications of the product including alternative end-of-life pathways;
- an assessment of the total benefit to society of implementing the program (including economic, environmental and social impacts);
- an assessment of the distributional and stakeholder impacts of implementing the program;
- deliberative and representative processes of public participation;
- an assessment of the potential for alternative mechanisms to deliver equivalent benefits on a whole of society basis.

The above process highlights the importance of using analytical and participatory mechanisms in order to determine when it is necessary and appropriate to implement EPR measures and in what form.

10 References

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Appendix A: Waste Treatment Technologies

Technology	Main features	Input waste	Output product
Mechanical Separation Technologies			
Material Sorting	· Mature technologies; · Accept moderate variety of municipal and commercial dry recyclable materials; · Good resource conservation; · Main product is recyclate for further reprocessing; · Good benefit/cost position.	· Mixed dry recyclables (eg paper, glass, metals); · Industrial dry recyclables (eg. Paper, metals, timber, concrete).	· Reprocessable materials by type.
Waste Separation	· Mature, robust technologies; · Accept mixed residual waste as input; · Main products are specific separated resource streams for further processing; · Good benefit/cost design.	· Mixed residual waste.	· High calorific material (RDF) for thermal processes or reduced volume to landfill; · Inert materials; · Metals.
Thermal Technologies			
Incineration	· Mature, robust technologies; · Accept wide variety of input waste types; · Poor/moderate resource conservation; · Require considerable air emission control equipment; · Products are both energy and heat; · Poor benefit/cost position.	· Mixed residual waste; · High calorific specific wastes; · Specialised wastes (eg clinical or hazardous).	· Heat, Steam, Energy; · Waste destruction;
Waste Melting	· Commercial operating status for metal wastes, not yet commercial status for mixed residual waste; · Accept limited (but possibly expanding) variety of wastes; · Main products are heat and syngas used for energy production; · Poor to moerate benefit/cost position.	· Metal wastes; · Hazardous waste; · Mixed residual waste potential.	· Syngas/green energy; · Heat/energy; · Metal residue.

Technology	Main features	Input Waste	Output product
Landfill Technologies			
Conventional Wet Landfill	· Mature, robust technologies; · Accept wide variety of waste types; · Poor resource conservation; · Main product is methane, used for energy production; · Moderate benefit/cost position.	· Mixed residual waste.	· Methane/green energy.
Conventional Dry Landfill	· Mature, robust technologies; · Accept wide variety of waste types; · Poor resource conservation; · Moderate benefit/cost position.	· Mixed residual waste.	· Nil.
Bioreactor Landfill	· Robust technologies, at commercial status; · Accept wide variety of wastes; · Poor resource conservation; · Main product is methane, used for energy production; · Moderate benefit/cost position.	· Mixed residual waste.	· Methane/green energy.

Table I A-1: Alternative waste treatment technologies.

Source: State Government of New South Wales (2000), Report of the Alternative Waste Management Technologies and Practices Inquiry, Office of the Minister for the Environment: Sydney.

APPENDIX B: ISO Life Cycle Assessment standards

Table I B-1 details those standards in the ISO 14000 series involving Life Cycle Assessment.

ISO no.	Year	Title	Scope
ISO 14040	1997	Environmental Management - Life cycle assessment - Principles and framework	This International Standard specifies the general framework, principles and requirements for conducting and reporting life cycle assessment studies. This International Standard does not describe the life cycle assessment technique in detail.
ISO 14041	1998	Environmental management - Life cycle assessment - Goal and scope definition and inventory analysis	This International Standard in addition to ISO 14040 specifies the requirements and the procedures necessary for the compilation and preparation of the definition of goal and scope for a Life Cycle Assessment (LCA), and for performing, interpreting and reporting a Life Cycle Inventory analysis (LCI).
ISO 14042	2000	Environmental management - Life cycle assessment - Life cycle impact assessment	This International Standard describes and gives guidance on a general framework for the life cycle impact assessment (LCIA) phase of life cycle assessment (LCA), and the key features and inherent limitations of LCIA. It specifies requirements for conducting the LCIA phase and the relationship of LCIA to the LCA phases.
ISO 14043	2000	Environmental management - Life cycle assessment - Life cycle interpretation	This International Standard provides requirements and recommendations for conducting the life cycle interpretation phase in LCA or LCI studies. This International Standard does not describe specific methodologies for the life cycle interpretation phase of LCA and LCI studies.
ISO/WD TR 14047	1999	Environmental management - Life cycle assessment - Examples of application of ISO 14042	Not yet available.
ISO/CD TR 14048	1999	Environmental management - Life cycle assessment - Life cycle assessment data documentation format	This document provides information regarding the formatting of data to support life cycle assessment.

ISO no.	Year	Title	Scope
ISO/TR 14049	2000	Environmental management - Life cycle assessment - Examples of application of ISO 14041 to goal and scope definition and inventory analysis	This Technical Report provides examples about practices in carrying out a Life Cycle Inventory analysis (LCI) as a means of satisfying certain provisions of ISO 14041. These examples are only a sample of the possible cases satisfying the provisions of the standard. They should be read as offering a way or ways rather than the unique way of applying the standard. Also they reflect only certain portions of an LCI study. It should be noted that the examples presented in this Technical Report are not exclusive and that many other examples exist to illustrate the methodological issues described. The examples are only portions of a complete LCI study.

Table I B-1: ISO Life Cycle Assessment standards.

Source: Jensen, P. B (2000), ***Introduction to the ISO 14000 Family of Environmental Management Standards***, International Network for Environmental Management (INEM)
http://www.inem.org/htdocs/iso/iso14000_intro.html#Family

Appendix C: Product Case Studies

1.1 Tyres

1.1.1 Producer Responsibility for Tyres Ordinance - Sweden

In 1994 Sweden implemented The *Producer Responsibility for Tyres Ordinance* which was essentially a product charge on tyres to ensure the recovery of end-of-life tyres.

Year of implementation:	1994
Objectives:	Ensure the recovery of used tyres by reuse, recycling or use as an energy source.
Targets:	By 1998: Achieve 80% recovery rate;
Further Specifications:	Both importers and domestic tyre manufacturers must meet the objectives and targets. The following rates of recycling charges apply: · automobile: 12 SKR; 1.4 EUR; 2.3AUD per tyre · truck: 300 SKR; 35 EUR; 57.86AUD per tyre · tractor: 75 SKR; 8.7 EUR; 14,38AUD per tyre

In order to implement such an EPR program, a non-profit Producer Responsibility Organisation (PRO) was set up to take responsibility for the administration, collection and recycling of tyres (USEPA, 2000; Speck, 2000). The recovery rate of 80% which was laid down in the *Producer Responsibility for Tyres Ordinance* which came into force in 1994 has been met.

1.1.2 Goodyear

The recovery and reuse of scrap tyres by Goodyear is an example of a voluntary industry initiative of EPR. Over the past few decades the company has developed a range of programs for the reuse and recycling of scrap tyres, including tyres as a source of energy. Energy is currently the largest and fastest growing market for scrap tyres (Goodyear, 2001).

Other uses of scrap tyres by Goodyear include:

Ground rubber: Sports and playground surfaces, automotive floor mats, dock bumpers, railroad crossings.

Agriculture: Low speed, non-highway farm equipment, stock feeders, and cover weights.

Civil engineering: Whole tyres in artificial reefs, breakwaters and walls, shredded material as road fill, sub-grade, backfill, landfill leachate collection systems and cell daily cover, and septic systems leach fields.

Fabricated Products: Cut or stamped products from tyre carcasses such as mat components, dock bumpers, muffler hangers, snowblower blades, etc.

Size Reduced: Crumb rubber compound functioning as a filler-extender in moulded rubber or plastic products, in athletic and recreation applications, in friction materials, and in rubber modified asphalt pavement.

Miscellaneous: From the backyard swing to flower pots, race track crash barriers, boat dock bumpers, etc.

Export: Tyres with adequate tread and/or retreadable tyres for further use are regularly exported from the U.S. for agricultural use.

In addition to the reuse of tyres for other products and as an alternative fuel source, Goodyear has further objectives of source reduction via increasing durability of tyres. Current Goodyear radial tyres last twice as long as those of two decades ago. Finally, if scrap tyres are to be landfilled, they are first shredded, reducing both their volume and the risk of fire hazard[1].

1.2 Batteries

In the US, a voluntary program aimed at the recycling of nickel cadmium batteries exists. This program is known as the "Charge Up to Recycle" program and is funded by the Rechargeable Battery Recycling Corporation (RBPC). The RBRC anticipates that consumers will be willing to recycle batteries as they have been for items such as newspaper and bottles.

Funding and Incentive

The program is voluntary and at present operates at a loss. Twenty five percent of participants are free riders; their batteries are recycled but they do not pay license fees. Despite its financial inefficiency the program is funded by industry. Industry anticipates that unless batteries are voluntarily collected and recycled, they will either be banned completely or become very difficult to sell. Two states in the US, Minnesota and New Jersey, have already passed laws requiring collection and recycling of nickel cadmium batteries, while some European countries have mandated their collection and proposed a ban on them. The concern regarding nickel cadmium in Europe and the threat of a ban were strong incentives for industry to develop a recovery, recycling system.

In addition, the loss for industry under the voluntary system is much less than it was previously under the hazardous waste regulations for industry.

The program is funded by more than 200 companies worldwide that manufacture rechargeable products for sale in North America. The manufacturers pay a license fee for each cell within a battery or battery pack, which entitles them to display a RBPC seal on their products and packaging. The fees are set by RBRC and are dependent on the weight of the battery. The seal is an indication to the consumer that the battery can be recycled. When the nickel cadmium batteries no longer work, the consumer may return them to certain retailers, and once the retailers have collected a cardboard box full of batteries they send it prepaid to a recycling facility in Pennsylvania. The entire battery is then recycled, the cadmium is used to make new batteries and the other components are recycled into stainless steel.

Legislation

Recyclable battery legislation in states such as New Jersey and Minnesota were a driving force behind the program. In Minnesota and New Jersey there are provisions for the easy removal of recyclable batteries from products. Labelling for proper disposal, and their ban from the municipal waste stream

[1] The ability of tyres to burn is greatly reduced when they are shredded compared to whole tyres (Goodyear, 2001).

were also driving forces. Industry considered it more efficient to have a single national program than different programs in different states. The voluntary program enables industry to meet legislative requirements in some states and pre-empt anticipated legislation in others.

Because batteries are considered hazardous waste, unless the waste was generated by the residential sector, hazardous waste regulations applied for disposal. Industry argued that these expensive hazardous waste regulations made recycling difficult. To overcome this problem the US EPA introduced the *Universal Waste Rule* that removed some of the regulatory waste rules that applied to batteries, thermostats and pesticides. Under this rule, batteries that are recovered and properly managed, regardless of who generated the waste are exempt from some of the stringent hazardous waste provisions.

For the *Universal Waste Rule* to take effect, states were required to incorporate the legislation into their own regulations or policy. After five years of industry lobbying the provisions of the Universal Waste Rule were applicable nationwide with the passing of th*e Mercury Containing and Rechargeable Battery Management Act* in 1996. The earlier Federal legislation mandated industry take-back, for waste generated by this sector. The current law removes Federal barriers that work against a voluntary system, but it does not override the provisions introduced in New Jersey and Minnesota, in 1992 and 1990 respectively.

Responsibility

The program relies on consumer cooperation in placing NiCds in the proper bins at retailers or community collection sites. Extensive community education, easily accessible and identifiable drop-off locations and the commitment of individuals to manage waste batteries properly are required for the success of the program.

RPBC claims that 75 percent of NiCds batteries being sold are under license and bear the RBRC seal. Other studies estimate that there is only 50 percent participation by industry.

EPR policy objective

The policy is based on the assumption that consumers, whether they be manufacturers of products or individuals will prefer products with the seal. The RBRC anticipates that consumers will be willing to recycle batteries as they have been for items such as newspaper and bottles.

1.3 Carpet

1.3.1 Interface's carpet leasing program

Interface is one of the world's largest manufacturers of carpet. Interface runs a product stewardship Evergreen Lease Program. Interface has the objective of creating a sustainable carpet industry by attempting to close the loop on consumption and production processes in addition to reducing the life-cycle environmental impacts of the carpet.

The service provided includes underfoot warmth, comfort, noise control and aesthetics. Interface leases the carpet tiles via a monthly fee where by worn out tiles are continually replaced and the product always belongs to Interface. By providing a value-added carpet 'service' rather than selling the carpet product, Interface is then responsible for managing the disposal issues of the carpet rather than the consumer. To overcome such disposal issues as discussed in *Section 5.3* above, Interface undertakes a number of environmental initiatives. These include (Midwestern Workgroup on Carpet Recycling, 2000; Malin, 1999):

- recycling carpet backing into new backing and other materials;

- eliminating 1/4 of the nylon used in the carpet tiles;
- design of a compostable carpet and experimenting with biodegradable materials (such as hemp, sugar cane and corn) in order to ultimately develop a totally organic carpet;
- minimising transportation requirements (and thus energy) by creating a global network; and
- using renewable energy in its processes.

1.4 Vehicles

1.4.1 The EU Directive on End-of-Life Vehicles (ELV)

The *EU Directive on End-of-Life Vehicles* (ELV) introduced in 2000 will ensure all member nations have a uniform legislation on the reuse and recycling of vehicles at the end of their lives (European Community, 1995-2000).

Year of implementation:	Adopted in 2000
Objectives:	Prevention of waste from ELV; promotion of collection, reuse and recycling of vehicle components; and, increased environmental performance at all stages of life cycle of vehicle.
Targets:	· By 2006: 85% recovery/reuse rate and 80% recycling rate by weight of vehicle parts. · By 2015: 95% recovery/reuse rate and 85% recycling rate by weight of vehicle parts.
Further Specifications:	From January 2001, automakers are responsible for a substantial amount of the cost of take-back, reuse and recycling of vehicle components. They are held responsible for all cars put on the market after the 1st July 2002, and from 2007 they must take-back all ELV (regardless of when they were built). The automakers are held responsible for all or a significant part of the costs of implementing the measures. Free of charge to hand the car in. In Denmark, for example, money is raised by having a tax on car owners, as long as it isn't the last owner who pays for all of the costs. Vehicle materials must not contain lead, mercury, cadmium or hexavalent chromium.[2]

The type of EPR system is national legislation with take-back requirements. Member States are required to ensure the implementation of collection systems for ELV and waste components, ensuring they are then passed on to treatment facilities and unregistered (European Communities, 1995-2001). In accordance with the "free take-back" principle, the legislation should be such that the final holder of the ELV can dispose of it free of charge whilst the vehicle producers must bear the financial costs of such a take-back system.

[2] This will apply from 18 months after the Directive is published.

1.4.2 Ford Motor Company voluntary initiative

The Ford voluntary EPR initiative is an example of an industry-based voluntary agreement as opposed to government regulation.

Ford plants worldwide operate under guidelines set up by Ford to ensure increased recyclability of car parts. This is first achieved by better design for easier disassembly of the cars. Such design innovations include (US EPA, 2000):

- plastic soft-drink bottles are recycled into grille reinforcements;
- used computer housings and telephones are recycled into grilles;
- spent battery casings are recycled into splash shields;
- used carpet is recycled into air cleaner assemblies and engine fan modules;
- salvaged plastic bumpers are recycled into new bumper reinforcements; and
- used tyres are recycled into new tyres, brake pedals, or floor mats.

Ford also has specific EPR programs in various countries. For example, in Germany, Ford's Clean Safe Program encourages the owners of older, more polluting vehicles to forfeit and recycle such vehicles and purchase or lease a newer Ford vehicle. The dismantlers are Ford-certified to ensure the appropriate recyclable parts are actually recovered and recycled. To date over 300 000 vehicles have been recycled into 290 000 tonnes of metal. In addition to such a recovery and recycling program, a tree is planted with every forfeited old vehicle (Ford Motor Company, 2001).

In the US, Ford EPR initiatives include the purchasing of automotive recycling facilities to support the industry based on the collection and resale of recovered vehicle parts to various groups such as body shops, insurance companies, and retail customers.

In addition to the examples discussed above, other initiatives Ford is looking into include improvements to the manufacturing phase and other phases of the vehicle life cycle identified as environmentally significant. Ford's Wayne Stamping and Assembly Plants in Michigan are powered and heated by landfill gas which has been tapped. This reduces the standard practice of flaring the landfill gas to dispose of it and eliminates the use of coal-fire plants. In this way, air emissions are reduced (Ford Motor Company, 2001).

1.5 Electrical and Electronic Equipment

1.5.1 Mandatory: European Commission's Directive and Swedish government's directive on Waste from Electrical and Electronic Equipment

The European Commission is developing a Directive on Waste from Electrical and Electronic Equipment (WEEE). The objectives of the Directive are to:

- encourage reuse, recycling, and recovery of electronics
- minimise the risks and impacts on the environment associated with the treatment and disposal of WEEE.

Proposals to globalise take-back requirements by the European Commission have met with strong opposition from industry associations, especially those in North America. Since 1997, the original goals of the Directive for product recovery have gone through a number of drafts. Recent drafts are less inclined to define overt recovery quantities for specific materials, but still call for recycling and recovery rates of 70 percent for electronics. Recent drafts of the European Directive include provisions for:

- manufacturers to eliminate the use of toxic constituents such as lead, mercury, cadmium, hexavalent, chromium, PBB, and PBDEs by 2008, unless their use is unavoidable.
- governments to be responsible for the establishment of separate collection facilities for waste electrical equipment.
- producers to take either financial or physical responsibility for recycling, allowing consumers to return used equipment, free of charge.
- reuse or recycle programs, for waste electrical equipment with specific targets and funded by producers.

(US EPA, Extended Producer Responsibility: International Initiatives, 2001)

1.5.2 The Swedish Directive on Waste from Electrical and Electronic Equipment

Because of the significant environmental impacts of electrical and electronic products, countries such as Sweden have decided to develop their own instruments, rather than wait for the EC's Directive to come to fruition. The Swedish government was keen to involve producers and change waste management because of the increasing volumes, hazardous content, and recycling potential of these products.

The Swedish regulations came into force on July 1 2001. Under the Swedish Directive, consumers may return an old product whenever they purchase a new one of the same type, free of charge. In addition producers are required to:

- inform households and others about the take-back obligation;
- present a take-back plan to the municipalities and participate in discussions about the take-back plan, if the municipalities wish so;
- handle WEEE in an environmentally sound manner;
- inform treatment operators of the contents of the products;
- provide the Swedish EPA with the data needed to monitor the compliance of the ordinance.

(Swedish EPA, 2001)

The developments of the EC's directive are of interest to waste policy experts around the world, as they attempt to solve similar problems in their own countries (Biddle, 2000).

1.5.3 US; Voluntary and State Mandatory Mechanisms

In the US there is no national mandatory EPR legislation for electrical and electronic products. Some industries have developed their own voluntary take-back scheme for their products and some states such as Massachusettes have developed regulations concerning electrical and electronic waste. Below are examples of Cathode Ray Tube Management in some US states.

Mandatory: Massachusettes ban on Cathode Ray Tubes (CRTs)

In an attempt to preserve its landfill space and because of the significant risks involved, Massachusettes legislated a landfill disposal ban on cathode ray tubes (CRTs) found in televisions and computers. The ban is expected to encourage and reduce the costs of recycling, with landfill disposal no longer an option. To foster the program, Massachusettes will fund $400,000 for the municipal collection of discarded electronics, the creation of retail drop-off points, the involvement of moving companies in take-back systems and to host drop-off and curbside collection events (Ingethorn, 1998).

Voluntary

In the US the electrical and electronic industries are incorporating EPR with a range of voluntary initiatives. Initiatives include product design for recycling and disassembly, product take-back schemes and computer reuse programs for other, less advantaged users.

Product Design

Dell computers are manufacturing a line of computers that are completely recyclable. These computers comply with Germany's stringent standard for the Blue Angel environmental label, awarded to products that combine improved longevity of the system, components with a recyclable design and the opportunity to reuse and recycle used products or product components (US EPA, Online).

Product Take-back

In collaboration with the Minnesota Office of Environmental Assistance, and Waste Management Inc (WMI), Sony Electronics has established a product take-back scheme for Sony electronic products. Throughout Minnesota consumers can return all Sony electronics through the existing waste disposal structure, free of charge. WMI will process the electronics and where possible, sell the scrap as commodities. The glass will be sent to Pennsylvania for processing then sold back to Sony. The plastic will be disassembled, with the aim to market it as secondary material in the manufacture of new plastic products.

Under a five year agreement Sony will subsidise the program until it becomes cost-effective. Within a year Sony plans to extend the program to five more states and become nation wide within five years (US EPA, 2001).

1.5.4 Australia; Developing a Product Stewardship Strategy for Electrical and Electronic Appliances in Australia

In March 2001, the Commonwealth Government, in consultation with a working group of relevant stakeholders from the public and private sector, developed a discussion paper on 'Developing a Product Stewardship Strategy for Electrical and Electronic Appliances'. The working group comprised of Environment Australia, the Australian Electrical and Electronic Manufacturers' Association (AEEMA), the Consumer Electronics Suppliers Association (CESA) and state environmental protection agencies. The paper discussed approaches to implementing a *product stewardship* strategy and program framework in Australia.

The Discussion paper highlighted a number of problems that would arise if such a strategy were not implemented using a consistent national approach. Namely:

- the cross border movement of waste streams to cheaper, less stringent systems;
- inequitable distribution of financial burden for industries across states;

- diverging state requirements in the phase out of hazardous substances, which could have implications for trade in electrical and electronic equipment;
- the lack of a national approach could impede the generation of a critical mass required for establishing electrical and electronic waste facilities (Commonwealth of Australia, 2001).

In Australia, as in the US, there are no mandatory requirements for EPR, but a range of voluntary industry initiatives exist. Below is a list of the types of voluntary programs:

- Compaq computers

Funded by a grant from the EPA, Compaq computers and MRI will pilot a take-back and recycling scheme for all systems, types, and manufacturers of computers in the metropolitan Sydney region. A process for the recycling of computer monitors and the development of a second hand market for computers (by diverting goods for reuse) will also be developed.

- Fuji-Xerox;

The Fuji-Xerox re-manufacturing facility, established twenty years ago, produces approximately 65% of their total spare parts and consumable part requirements. Thousands of copiers are remanufactured and upgraded to provide a quality good at a discount rate. This process reduces landfill and saves energy.

- Whirpool Australia packaging collection

Upon request, packaging from in-home deliveries is collected and recycled. If disposal arrangements for an old appliance have not been made, Whirlpool will collect the product and ensure its proper recycling and disposal, if desired.

- Pilot disassembly plant for whitegoods

In 1998 a pilot project to determine the viability of a recycling facility for the end-of-life white goods was conducted. It was found that to cover the costs of recycling approximately 0.7% of the total sales of white goods would need to be processed, with further opportunities to increase the revenue from disassembled parts.

Refrigerants Reclaim Australia

Refrigerants Reclaim Australia (RRA) distributes the cost of reclaiming and safely destroying surplus ozone depleting refrigerants across industries that use them. RRA was formed to share the cost of EPR across industry. It is funded by a $1 levy, per kilo of refrigerants produced or imported. Ten wholesalers and eight importing companies are participants in the RRA.

The initiatives of multinational companies such as Xerox and Compaq in Australia relate to the development of similar, existing EPR initiatives overseas.

1.6 Mobile phones

1.6.1 European Mobile Phone Take-Back

The first mobile phone take-back project was conducted in Sweden and the UK, by the ECTEL working group (the European Trade Organisation for the Telecommunications and Professional Electronics Industry). The pilot projects were similar for both countries, with the objective of product recovery or 'reverse distribution' through phone retailers and network operators. The project was operated in co-operation with British Telecom and five different retail chains and networks in Sweden. It is useful for Australia to gain from the findings of the European projects.

The ECTEL identified key themes in need of further attention when wide scale product take-back schemes are implemented, they were:

- the importance of public awareness;
- only a small fraction reach landfill; many are stored, sold or given away;
- recycling infrastructure is underdeveloped. Few established waste management companies are interested in immature and financially uncertain markets; and
- the significant environmental impacts are in the collection, not the processing.

The project also identified important follow-up actions:

- Targets should relate to relevant issues such as recycling infrastructure and public awareness and not be based purely on sales;
- The definition of waste should be clarified, to minimise barriers in recycling activities and schemes; and
- A feedback mechanism is fundamental for take-back schemes, so as to encourage improved design for manufacturers.

1.6.2 Mobile Phone Recycling in Australia

In Australia the mobile phone industry set up a recycling program to ensure that the potentially toxic components in the batteries and accessories of mobile phones do not end up in landfill.

Following a successful NSW trial, where 100,000 batteries were collected over six months, the industry launched the national program in November 1999 (Planet Ark, no date).

The program is funded by a 40 cent levy on the sale of new mobile phone sets from participating mobile phone manufacturers and network carriers. The service operates free of charge to consumers. Currently, handsets and batteries are sent to a processing facility in France, however, a facility is about to be established in Australia.

Across Australia there are 890 collection points, being typically mobile phone retail operations. The next stage will involve municipal offices and strategically located recycling depots. By the end of June 2001 it is expected there will be a total of 2,500 collection points.

Appendix D: Techniques for Selecting Product Types and Implementation Methods.

A number of tools can be used when assessing which products would best be incorporated into an EPR system. These include, for example, life cycle assessment (LCA) and environmental evaluation techniques, which can be used to determine whether there is a net cost to society associated with the landfilling of goods that could be incorporated into an EPR system, relative to recovery and recycling of these products/materials. The LCA and environmental valuing undertaken with respect to used beverage containers in Volume II, Section 3, for example, has shown that the increased recovery of used beverage containers from 45 percent to over 90 percent also has net benefits to society. In addition to this, the participatory process that was undertaken indicated that the community was in favour of implementing container deposit legislation, that is, a take-back form of EPR. Details of the participatory process that was undertaken can be found in Volume III, Section 5.2. These processes provide examples of a means for determining, using analytical and participatory methods, whether to implement EPR in a specific situation.

Table D-1 highlights some of the criteria that would need to be considered and weighted prior to deciding which products to target for EPR programs in NSW. Each criteria would need to be considered for each product. This analysis would need to be undertaken irrespective of what form legislative or regulatory changes took.

Criteria	Discussion
Ease of implementation	This includes existing infrastructure and new supporting infrastructure required to implement an EPR program. Products requiring limited new or modified infrastructure are easier and thus more attractive to include in an EPR program.
Public participation	Use of an Extended Public Participation process in the decision making process. The key characteristics of such a process include: · representativeness; · deliberativeness and interactiveness; · access to information; · participation in strategic and planning phases of policy development; and · influence on the decisions made.
Degree of environmental benefits	It is important to note that the environmental benefits of including a particular product in an EPR program may differ from country to country (or region to region). It is thus recommended that as part of the decision-making process on which products to include, an assessment of the degree of current (and future) environmental impact of certain products in NSW should be undertaken.
Volume, quantity or mass of the product required for collection and recovery.	An analysis of the relative and absolute composition of the product in the waste stream or other material flows[3] (such as production volumes) should also be undertaken on products beings considered for inclusion in an EPR program. This will aid the understanding of such factors as the current contribution of that product to the waste stream, the potential environmental benefits of diverting this product from landfill, or potential costs involved in recovering that product. The data on each product will vary from region to region and thus it is recommended that a study be undertaken on the NSW waste stream. It is logical that EPR systems targeting end-of life disposal of products (such as take-back or deposit-refund systems) be used for products with a significant proportion of the waste stream.
Residual value of the post-consumer (end-of-life) product	If the product being targeted in an EPR program has a positive residual value, it may be more likely to be included in an EPR program from an economic perspective (OECD, 2000). That is, it is more economically viable and easier to create a market for the end-of-life product if it has some economic value in its post consumer phase.

Table I D-1: Factors to consider for each product group in the decision-making process for an EPR program.

[3] Material flows have been defined as the mass or quantity of a material that passes through a given point in the system (per annum). For example, the mass of containers disposed to landfill each year.