Zero Waste SA

Review of Recycling Activity in South Australia
Stage 2 - Product Recovery and Analysis

October, 2004

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SECTION A - INTRODUCTION

Background

Zero Waste SA is committed to improve the sustainability of recycling practices and systems in South Australia. As part of this program, Zero Waste SA has engaged Nolan-ITU to review the current recycling activity in South Australia and identify future expansion priorities. The project is part funded by the National Packaging Covenant in the interests of improving kerbside recycling, and is supported by the South Australian Jurisdictional Recycling Group.

The review of recycling activity has been undertaken in the following two stages:

Stage 1: Identify the total tonnes of material collected and recycled each year in South Australia on a material by material basis.

Stage 2: Analyse products and their materials for 50 significant products including consumption levels, recovery activity and product specification disposal issues.

This report presents the outcomes of Stage 2.

Terms of Reference

The terms of reference for Stage 2 are as follows:

1. Identify 50 significant products in consultation with Zero Waste SA.
2. Estimate consumption levels for all products.
3. Estimate longevity of all products.
4. Assess trends that will influence waste disposal (eg expansion in mobile phone use and a delayed stockpiling of obsolete phones).
5. Determine recovery activity and provide a current recovery estimate for each product or product component.
6. Identify barriers for increased recycling and reuse for each product.
7. Identify opportunities for increased recycling and reuse.
8. Prioritise products for increasing recycling and reuse activity.

Estimates are to be based upon activity in 2003, or if not available, the most recent data.

Structure of the Report

The report is structured in the following sections:

A: Introduction

B: Appliances

C: Consumer Products

D: Electrical and Electronic Equipment

E: Packaging

F: Automotive

G: Building Materials

H: Prioritisation of Products for Recycling and Reuse

SECTION B - APPLIANCE PRODUCTS

Chapter 1 - Fixed Line Phones

Consumption

Telephone use per capita in Australia is higher than anywhere in the world. The number of fixed line connections (standard telephone services) in South Australia, both residential and commercial, is approximately 890 000. This equates to 0.58 connections per capita. The standard fixed line market is static at present. The average life of a fixed line handset is 5 years. Most handsets are owned by the householder or business. It is estimated that 59 tonnes of telephone handsets were sold into the South Australian market in 2003.

The units are generally made in Asia and imported by phone companies or sold through retail electrical outlets. There are companies that buy and sell used commercial phone network systems. No such second hand market exists for residential handsets. There are export markets for ex-rental handsets.

Key Materials

Telephone handsets are made predominately from plastics with components made from steel, aluminium and smaller quantities of other metals.

The outer casings of telephones are generally made from a tough durable plastic called ABS (Acrylonitrile Butadiene Styrene). This plastic is technically capable of being recycled and over 1 800 tonnes of ABS from various sources was recycled in Australia during 2003, with an overall recycling rate of 8.5%. It is not known how much of this recycled material is from fixed line handsets.

Cordless telephones have a battery that is usually Nickel Cadmium. Programs are established in Australia and overseas to capture and recycle these batteries. In a study for the NSW EPA in 2003, Nolan-ITU identified that 180 tonnes of NiCad batteries were in fixed phones across Australia. It is estimated that the quantity disposed of annually in South Australia is 13.5 tonnes.

Sales Trends

In 2003, 118 000 fixed line handsets were imported into South Australia. The number of fixed line connections remains static with all of the growth in telephony occurring in the mobile field. Some of these new handset sales will be the result of homes getting a second connection outlet. Overall an estimated 106 000 handsets are going out of use each year.

Sales are not just triggered by handset faults but also by consumers purchasing phones with additional features. For example, there is as strong market switch to cordless handsets. Other features sought include call identification, and units with answering machine capability. Current sales consist of; cordless phones – 80%, handset sales (standard phone) – 15%, and extension handset sales (base station + extra cordless units) – 5%.

Life Expectancy

The average life of a fixed line mobile telephone is 5 years. The price of handsets has dropped dramatically in recent years with basic handsets costing less than $20, and cordless models from $70. With the reduction of price has come a corresponding decrease in product quality. The price threshold is so low now that repair is often as expensive as replacement. This has led to a higher turnover of handsets than previously was the case.

Stockpiling, Landfill Disposal, Reuse, and Recycling

It is estimated that 106 000 handsets are disconnected across households and businesses each year. At an average weight of 0.5 kg, this equates to 53 tonnes annually. Some of these units will find their way to reuse opportunities through charities, and garage sales etc.

Some will be stockpiled within commercial storerooms or in household cupboards. This is due to the perception that the phone (which may be operational) still has a value. It is likely that the level of stockpiling is such that the number of handsets stored is as great as the number in use. There is no current pathway for the recovery and recycling of fixed line handsets.

There is currently no product stewardship commitment from manufactures, retailers or phone companies for the reuse and recycling of handsets at the end of life.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for fixed phone lines are:

- there are no co-ordinated efforts to recover fixed line handsets at this time;
- the handsets are reaching end-of-life while dispersed over more than one million locations across South Australia;
- the major material – ABS plastic is not of sufficiently high value to fully fund collection and dismantling;
- there is no co-ordinated effort and no current industry based product stewardship commitment to reducing fixed line handset waste levels;
- the life expectancy is reducing and more units are being sold into the market; and
- repair of handsets is now rarely cost competitive to purchasing a new handset.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling for fixed line lines may include:

- seeking manufacturer and retailer commitment to waste reduction;
- identifying overseas programs for recovery – collection methods, dismantling and reprocessing;
- encouraging higher quality handset production and sales in concert with phone companies, retailers and consumers;
- identifying the potential to extend mobile phone recovery programs to include fixed line phones; and
- identifying the practicability of including handsets in kerbside collection systems.

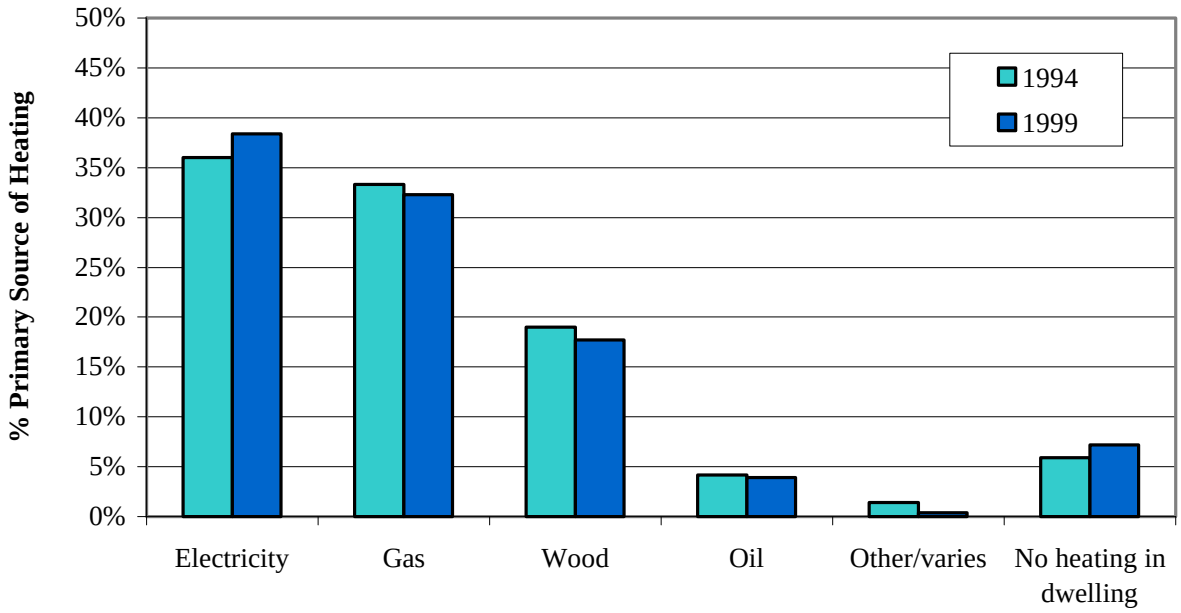
Chapter 2 - Heaters

Consumption

There is a broad range of heater types utilised in the South Australian residential market. These include electric and gas appliances together with wood fuel heaters. Within electric heaters there are five common forms of heater. The gas heater market is divided across three types – convection, space and radiant. Wood fuel heaters are either open fires or slow combustion types.

The following chart shows the different fuel sources used for domestic heating in SA during 1994 and 1999. The last five years would have seen an increase in mains gas and further decline in oil as a fuel source.

Figure 2.1: Primary Source of Energy for Room Heating in SA by Households



Source: ABS

Sales of heaters are split between growth sales and replacement sales. Industry data estimates the annual growth in the number of heaters in the market in 2003 at 55 000 units across the State. The annual replacement sales were 133 000 units. This results in total annual sales of 188 000 units. There is a variation in the weight of heaters but on average a weight of 20.8kg per unit is considered typical. This results in an estimated total weight of heaters sold in South Australia during 2003 of 3 900 tonnes.

Key Materials

Most heaters are predominantly steel in their outer casing and in their key components. For combustion heaters this is cast iron while for most electric and gas heaters the use of powder coated light gauge steel is common. There is also a proportion of glass in some heaters and plastic internal parts for some units. Plastic components used in the manufacture of electric heaters can contain high concentrations of fire retardants such as bromine, which may have implications for disposal via landfill or reprocessing.

Sales Trends

Across all categories of heaters, sales are estimated to be growing moderately at about 3% per year. The sales of heaters 10 years ago would have been at 70% of today's level.

Sales are partially linked to expansion in the housing industry through new housing and renovations and extensions.

Life Expectancy

The life expectancy of different heaters varies with most units having a life span of 10-15 years. Gas space heaters are expected to have a longer 20 year average life. Product failure is the most common reason for heaters being replaced. An estimated 70% of sales are for replacement heaters.

Stockpiling, Landfill Disposal, Reuse, and Recycling Recovery & Disposal

One of the key components of heaters is steel, and therefore there are good prospects to recycle end-of-life heaters. It is estimated that most units are sent to metal recyclers, such as Simsmetal or Smorgon Steel. Many units are disposed of by heating companies, some by consumers through self-haul to disposal sites and some via hard waste collections.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for heaters are:

- at housing demolition sites. While heaters and hot water services are often recycled, this practice is not universal and some heaters enter the waste stream by this source;
- as heaters are reduced in weight and steel components replaced by plastics, the value of each unit for scrap will diminish and with it the incentive to reuse and recycle; and
- many units are presented as part of kerbside hard waste collections. If not all of these collections involve recycling of metals, some heaters may enter the waste stream by this route.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling for heaters may include:

- expansion of metal recycling at all waste disposal facilities;
- metal recycling through all hard waste collections; and
- consideration to the restriction of unregulated disposal of heaters to landfill.

Chapter 3 - Hot Water Systems

Consumption

In 2003 a total of 56 700 hot water systems were sold in the South Australian market.

The market is split between electric storage units (46.9%), gas storage (24.6%) and gas instantaneous/continuous flow (28.5%). (Solar hot water systems utilise a gas storage booster unit.)

Water storage systems are larger units with an average weight of 80 kg. Instantaneous units are 30 kg in weight on average. This gives an average weight per unit of approximately 60 kg.

The total mass of hot water systems sold into the South Australia market during 2003 was 3 700 tonnes.

The total number of units in existence and use across the State is estimated at 480 000 units, which corresponds to over 30 000 tonnes of materials.

Key Materials

The key materials for hot water systems are:

- steel for casings; and
- steel, stainless steel, copper, with smaller quantities of brass fittings and insulation material, usually fibre glass for the core elements.

The dominant materials are ferrous and non-ferrous metals.

Sales Trends

The market for hot water units is closely linked to the growth in the building market. It is estimated that annual sales increased 1.5% in 2003. Over the longer term, annual sales have grown by 20% over the past ten years.

There is a shift in the market with a higher market share for instantaneous/continuous flow units in the past decade.

Major suppliers include Rheem, Vulcan, Dux Bosch, Rinnai, Aquaheat, Beasley and Aquamax. Approximately 60% of units are manufactured in Australia.

Life Expectancy

Most hot water units spend their total life servicing one household.

The average life expectancy has been estimated by industry sources as nine years. Life expectancy is higher for instantaneous units (15 years) and stainless steel units.

Units are replaced due to:

- product failure;
- need for increased capacity;
- demolition of building; or
- switch to different unit type.

Stockpiling, Landfill Disposal, Reuse, and Recycling Recovery and Disposal

The level of disposal of hot water systems has been estimated at 49 000 units/year. This is 10-15% below the current sales volume representing the growth in the market over the average nine year life span.

Based upon this, it is calculated that disposal is likely to increase by a further 15% over the next decade reflecting the current market size.

As most units contain a range of ferrous and non-ferrous metals, they are likely to be recycled.

This can occur through demolition contractors, plumbers, hard waste collections or diversion at disposal sites of self-hauled loads. No accurate picture of recycling and reuse levels is available. It is estimated that the quantity, by weight, that is recycled is approximately 60% of total disposal.

The insulation materials are not recovered when metals are recycled.

There is also a small level of second-hand sales of units.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling of hot water systems are:

- the lack of a well-understood disposal route. Many consumers would not know how to dispose of an obsolete unit; and
- the size of the unit also makes it difficult for householders to manage.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of hot water systems may include:

- encouraging the use of long-life units (gas instantaneous or stainless steel tanks);
- promoting the recyclability of units and encouraging their diversion at transfer stations and landfills; and
- investigating the potential recycling of insulation material.

Chapter 4 - Mobile Phones

Consumption

In 2003, there were an estimated 480 000 mobile phones sold in South Australia. Sales of mobile phones increased rapidly until 2000 when sales growth started to ease. The weight of mobile phones has dropped dramatically since their introduction to the market. Early model mobiles were large and bulky and weighed over 1 kg each. The size of the phone and the in-built battery have continued to come down with current mobile phones often now weighing less than 100 gms.

The key manufacturing countries for mobile phones in 2002 were South Korea (63%), China (12%) and Taiwan (6%).

The overall mass of phones going into the market in South Australia is estimated at 48 tonnes for 2003. The number of units now in use or stockpiled within the community is now estimated at over 150 tonnes.

Up to 1998, over 80% of mobile phones utilised nickel cadmium (NiCd) batteries as their main power supply. When the mobile phone sector changed from analogue to digital the use of NiCd batteries was discontinued.

The mobile phone was originally purchased almost exclusively by business users. This has extended dramatically into the household market with a large proportion of recent sales, particularly new sales, being made to those under 18 years old.

Key Materials

The types of plastics used in mobile phones are diverse. Current phones often use polymer blends such as PC/ABS in the casing to achieve the desired performance characteristics. While the composition of mobile phones varies significantly from model to model, an approximate average composition is:

- PC/ABS (29%);
- ceramics (16%);
- Cu and compounds (15%);
- silicon plastics (10%);
- epoxy (9%);
- other plastics (8%);
- iron (3%);
- PPS (2%);
- flame retardant (1%);
- nickel and compounds (1%);
- zinc and compounds (1%);

- silver and compounds (1%); and
- Al, Sn, Pb, Au, Pd, Mn, etc. (less than 1%)

Sales Trends

The mobile phone market is now a more mature market with a much reduced proportion of sales being to new customers. A recent trend has been to sell updated model phones to existing customers. This has emphasised new features including colour screens and video capability. The sales of new models will have been, in many cases, to replace a phone that is still functional. Many households now have a multiple number of phones. For some, the mobile phone has become the primary phone with no fixed line connection being utilised.

Annual sales growth averaged over 30% for much of the previous decade but had dropped to approximately 13% by 2003.

Most sales are through dedicated phone retail outlets. These are usually operated by, or aligned to a phone company. The AMTA (Australian Mobile Telecommunications Association) is the industry association that represents phone manufacturers (and retailers).

Life Expectancy

The average life of a mobile phone is now 2-3 years. This high turnover is in part fuelled by an aggressive marketing of new phones with new features. It also results from the linking of new handsets to contract periods. The life span of batteries is estimated at 1-2 years. On average, each phone will have one replacement battery in its life span. As with other electronic equipment, the cost of repair is high relative to the declining purchases costs and therefore there are less phones being repaired. The market value of 2-3 year old phones is minimal resulting in a very small second hand market.

Despite the low residual value of redundant phones, consumers still have a view that they are worth something and are not a 'waste' material. As a result of this and a very high turnover of phones, there are a large number of phones stockpiled around Australia. These stored phones are held in both business and households.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There are several forms of collection of mobile phones and their batteries. The AMTA has a program operating through some high volume retailers where spent phones and batteries can be deposited. This program yielded a relatively small number of units in SA last year. This indicates that many consumers are unaware of the program or are disposing of their phones through other means. There are businesses that purchase phones for sale overseas and it is acknowledged that many are being stockpiled.

The estimated stockpile size of mobile phones in SA is 170 tonnes. It is also estimated that in 2003, 58 tonnes had reached an end of life and hence was either stockpiled, recycled, or disposed of to landfill.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for mobile phones are:

- the short and declining life span of mobile phones;
- the low and declining level of phone repair;
- the low level of recycling through the existing point of sale service; and
- the reluctance of consumers to dispose of a unit perceived to have some residual value.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of mobile phones may include:

- work with AMTA to increase the profile coverage and recycling rate of the point of sale collection program;
- encourage consumers to consider purchase of second hand units;
- ensure phone company contracts are structured to allow retention of handsets or a trade-in system; and
- work with reprocessors to overcome collection, freighting or processing impediments.

Chapter 5 - Power Tools

Consumption

Last year South Australia sales of power tools exceeded 450 000 units. These were all imported from overseas. Power tools sales span both industrial and domestic markets. The growth in the domestic market has been strongest in the past 5 years. Power tools encompass all of the following:

- drills;
- saws;
- planes;
- grinders;
- sanders;
- powered garden tools;
- sanders and polishers; and
- routers.

The market includes a high and increasing proportion of cordless tools that come with a rechargeable battery pack.

Key Materials

Power tools are a combination of:

- steel;
- plastics; and
- other materials (within motors).

The average power tool weights around 2.4 kg. Based on annual sales this is a total mass of nearly 1 100 tonnes into the South Australian market. The plastics used in most power tool casings are PC/ABS and PC/PBT blends.

The plastic is of higher value due to its strength and impact resistance characteristics. There is no current collection of this material from post consumer sources. There is a well established network of scrap metal merchants that can (and do) accept power tools for recycling.

Sales Trends

The sales trend for power tools has been growth of approximately 15% per annum over recent years. In part this is due to a dramatic drop in the real cost of tools. Some tools are now available for less than $20 each. The stock of power tools in homes in part reflects the growing interest in home renovation fuelled by high media exposure and increasing property prices.

Life Expectancy

The average life of a power tool is reducing each year in both the industrial and domestic ends of the market.

Due to their constant use, power tools last only an average of 5 years in industrial applications. In domestic sales, the majority of sales are at the lower price and quality end of the market, so while they are generally used much less than industrial tools it is estimated that they also have an average life span of approximately 5 years. Cordless tools with battery packs have a shorter life expectancy than corded tools.

The battery pack is also a shorter life component with an average NiCd battery being replaced on average every 2 years. Nickel metal hydride batteries are increasing at the premium end of the market and these have a longer life expectancy. Lithium ion batteries are also now beginning to appear in the power tool market.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is a high degree of storage of power tools (working and end of life). It is estimated that with the current sales growth in tools, the estimated volume of tools stored in South Australia is 4 100 tonnes. The disposal of tools to waste is estimated at 520 tonnes/yr based on life expectancy and the growth trend in sales.

Some tools are recovered and dismantled for recovery of non-ferrous metals. The majority are expected to be disposed of to landfill. There is no current recycling of plastic components.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for power tools are:

- the low unit purchase cost for power tools is thought to be linked to a decline in product durability;
- the repair of power tools is now rare as labour costs and spare parts availability combine with low replacement cost to make repair unattractive;
- there is no product stewardship commitment from the tool or retail (hardware) sector to assist in waste reduction; and
- the cost of disassembly may work against cost effective recycling of power tools.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of power tools may include:

- encourage consumers to consider product durability in power tool purchases;
- work with the power tool industry to develop a strategy to increase the lifespan of power tools and to increase reuse and recycling levels; and
- identify plastic recycling outlets capable of receiving and processing the relevant plastic casing materials;

Chapter 6 - Small Appliances

Consumption

A total of 677 000 small appliances were purchased in South Australia in 2003. All of these appliances were imported into Australia, with most manufactured in China.

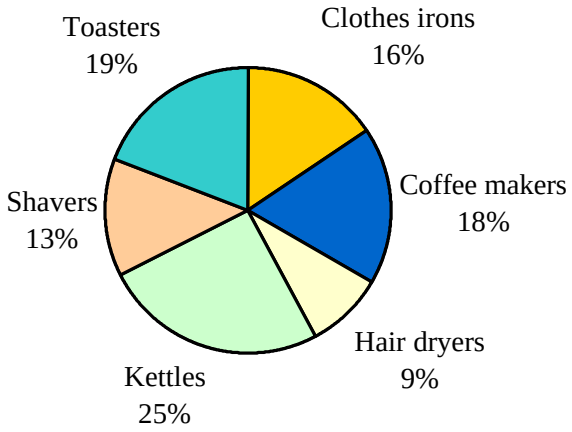
The range of small appliances extends to cover all of the following:

- kettles;
- toasters;
- irons;
- shavers/hair clippers;
- coffee makers; and
- hair dryers.

The largest volume units are kettles (165 000 units), shavers (138 000 units) and toasters (134 000 units). The size of these appliances is small compared to whitegoods and electronic equipment. It is estimated that the average weight is 1.5 kg.

A calculation using the average weight of small appliances and sales numbers would indicate annual sales in 2003 of over 1 300 tonnes for this sector.

Figure 6.1: Small Appliance Imports into SA by Total Unit Weight



Key Materials

The primary materials used in small appliances are:

- plastics; and
- steel.

Smaller quantities of other metals, such as copper, are also used in the manufacture of small appliances.

A wide range of plastics is used in small appliances. The most frequently used types are polyesters (PBT and PET), polyethylene, polypropylene, ABS, polycarbonate (PC), polyamides (nylons), polyphenylene oxide (PPO), PVC and phenol plastics (thermosets).

It is very common for different types of plastics to be used in any one appliance, with the choice of plastic being dependent upon the functional requirements.

Often the plastic components in small appliances contain brominated flame retardants. This depends on the location of the plastics in relation to the potentially hot electrical parts of the appliance and how high the temperature is at maximum load.

Sales Trends

The volume of sales in South Australia is increasing at a moderate rate. The influencing factors are the increase in the number of households combined with higher rates of ownership for some appliances such as coffee makers.

Size of appliances remains relatively constant. There is a trend towards households possessing multiples of some appliances – kettles, hair dryers etc.

Life Expectancy

The life expectancy of small appliances varies between appliances and brands. Life expectancy is linked to frequency of use with high frequency appliances such as kettles having shorter life spans than less frequent use product such as food processors.

There is a trend towards shorter life expectancy across all appliances. This is due to a market shift towards lower prices and lower quality appliances, this includes a shift to lighter and often less durable materials. Mechanisms are also less robust. The assembly of many appliances is also done in a manner that restricts the ability to remove, repair or replace faulty parts. The cost of labour has significantly reduced the cost advantage of repair over unit replacement.

In the past an hours labour may have equated to 20-25% of product replacement cost. Now it is common for an hour of labour to be over 100% of replacement cost. Cheap kettles, toasters and other appliances are now sold for less than $10 per unit. At this level, product quality is poor and the life expectancy of a ten dollar plastic kettle is likely to be a around 12 months compared to the 12 year average that would be applied to stainless kettles in the past.

A key feature of the market now is for appliances to be replaced prior to failure based on features or 'look'. While his phenomenon is not new, the emphasis on fashion as the key issue and product durability as a marginal issue is stronger now than ever.

The level of repair of small appliances is now lower and restricted to higher value food processors and stainless steel appliances. Some importers are now bringing products into the market without any spare parts available.

Products such electric toothbrushes are now a totally throw away product with no ability to repair. In addition to product failure there is also a range of appliances that fall quickly in and out of fashion and are likely to be stored and eventually disposed in large numbers. Examples of this are popcorn makers, ice cream makers and foot massagers.

Stockpiling, Landfill Disposal, Reuse, and Recycling

The increased use of plastics has reduced the overall weight of appliances disposed. The lower value of the material and the range of different plastics also make reuse and recycling less likely than for steel-based appliances. It is likely that a high proportion of steel toasters, irons and kettles are recycled through the scrap metal network that exists statewide. There is no widespread reuse and recycling system for small appliances and while some cascade through friends, holiday houses and charities, most will enter the household waste stream through kerbside garbage, self haul or hardwaste disposal. Some metals recycling will occur through hard waste and self haul routes. There are now strong restrictions on the sale of second-hand appliances through charities due to safety concerns.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for small appliances are:

- unregulated ability to dispose of appliances to landfill;
- gaps in the recovery of appliances, particularly in rural areas;
- reduced life expectancy of appliances;
- reduced appliance repair activity;
- reduced metal component of appliances;
- low recycling activity for plastics and glass components;
- no articulated product stewardship commitment from manufacturers and retailers;
- increased proportion of lower quality short life units in the market;
- restrictions on second-hand charity sales;
- no measurement of appliance reuse and recycling; and
- no clear reuse and recycling path outlined to consumers.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of small applicances may include:

- exploration the addition of appliances to kerbside recycling collections;
- requirement that appliances not be sent to landfill but rather sorted for maximum recovery;
- commitment sought by Government from manufacturers/retailers to develop recovery and waste reduction plans for appliances;
- exploration of the potential for plastics and glass recovery and recycling;
- encouragement of durability to be a key feature in product marketing and in consumer product selection;
- requirement for spare parts availability as condition of sales; and
- support for second hand market through advertising, charities and tip shops.

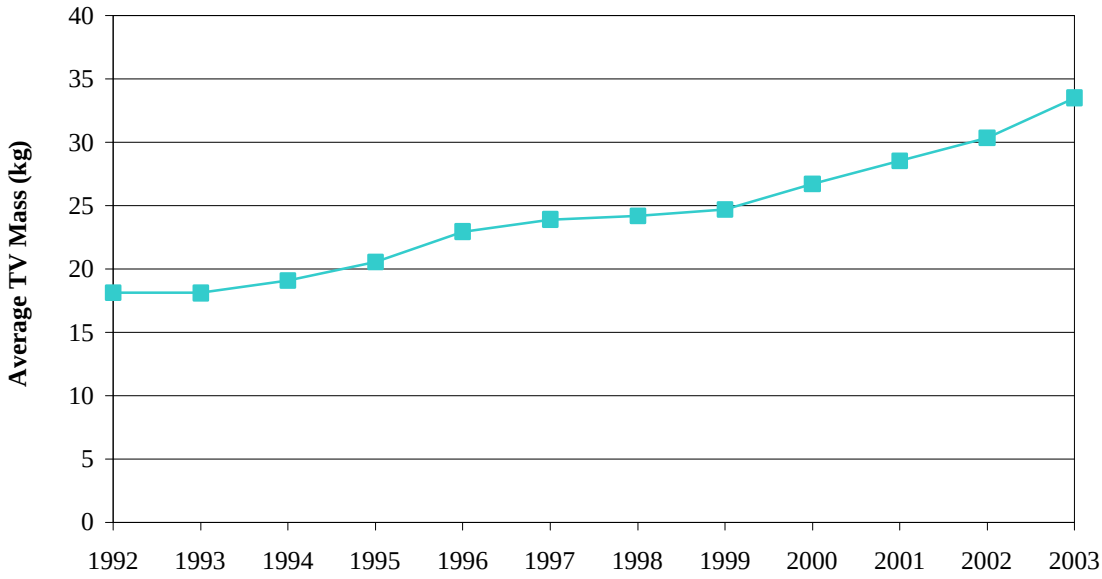
Chapter 7 - Televisions

Consumption

In 2003, the total sales of televisions into South Australia market was 235 000 units. All televisions sold in Australia are manufactured overseas. The key countries of manufacture are China, Malaysia, Indonesia and Thailand.

The average weight of a television sold into the market today is estimated at 33.5 kg. This results in a total mass of television sales of almost 8 000 tonnes/year. The average weight of televisions has almost doubled in weight over the last decade, driven by an increasing market share of large and wide screen televisions. This weight increase is presented in Figure 7.1 below.

Figure 7.1: Change in Average TV Weights from 1992 to 2003



Key Materials

Televisions that are sold today are manufactured from a mix of:

- plastics;
- glass; and
- steel.

Smaller quantities of other metals are also included. The most common plastics in television manufacture are high impact polystyrene (HIPS), ABS and polyphenylene oxide (PPO). There are problems with plastic casings for recyclers due to metallised coatings and other laminates, plastic metallic stickers and identification plates, blended polymers and the inclusion of brominated fire retardants.

Glass in the form of screens and picture tubes is also a problem for recycling. The rear glass in picture tubes contains lead, where as the remaining glass is free of lead, and can be recycled with other float (or window) glass.

Steel is easily recycled. The yoke of the tube and wire used throughout also contains copper. Circuit boards and other electronic scrap contains gold, silver and lead.

Inside picture tubes is screen lining that is phosphorous based and blended with rare earth elements.

Over the years TV casings have gone through the following stages:

- furniture cabinet;
- metal cabinet;
- particle board cabinet; and
- plastic cabinet.

Many TVs currently being disposed of have cabinets made of veneer covered particleboard or other timber.

Sales Trends

There is enormous size diversity in the television market. Some portable units weigh less than 1kg, while at the other end of the market, large windscreen units can be over 100 kg in weight. The number of units sold continues to increase and this increase has accelerated in recent years due to aggressive marketing and the introduction of new technologies/models (Table 7.1). These include widescreen, flatscreen, plasma, high definition and digital technologies.

In the past, new televisions were purchased a) when a new household was established or b) when the previous television failed. Now many televisions are purchased as additional units (2 or more per household) or when the current unit is still operational (but considered old technology).

Table 7.1: Distribution of demand for TVs

TV size (viewable screen)	Proportion of market (%)			
	1992	1996	2001	2003
Up to 34 cm	41.5	31.6	24.5	16.7
35-67 cm	48.6	48.0	42.1	38.6
68 cm and above	9.9	20.3	33.4	44.7

Life Expectancy

The life span of televisions is currently estimated at 10 years. The profile of televisions being disposed of now is different from those being sold today. The typical end of life television is manufactured in a particle board cabinet. The size of the television is also smaller with an average mass of 18 kg compared to new television sales of 33 kg.

The life span of the televisions being sold today is expected be to lower. This is due to changing technology, reduced product durability and reduced levels of TV repair.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is an estimated 40 000 tonnes of televisions in use in South Australia. The annual disposal of TVs based on life expectancy and sales trends over the past decade is 1 400 tonnes/yr. This is expected to climb significantly over the next few years due to sales growth, increased product size and reduced product durability. Currently there is a level of re-use of TVs through donations to charities and second-hand sales.

There is currently no recycling of televisions in South Australia. Although reprocessing facilities have been established in Melbourne that can dismantle and recycle the key components of televisions, the dismantling and recycling equipment is not being used. It is therefore assumed that all 1 400 tonnes are landfilled. The television industry is currently negotiating a product stewardship agreement with the EPHC Ministers to establish a product stewardship program.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for televisions are:

- the reducing life expectancy of TVs;
- the dramatic increase in TV numbers and size;
- the lack of a co-ordinated recovery route and recycling infrastructure; and
- the cost of disassembly relative to the value of the materials recovered and recycled.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of televisions may include:

- work with the TV industry group, The Consumers Electronic Suppliers Association (CESA), to ensure the proposed product take back scheme applies to South Australian;
- encourage consumers to consider product durability in purchasing decisions; and
- identify a market outlet for particle board.

Chapter 8 - White Goods

Consumption

South Australians purchased an estimated 93 000 large electrical appliances in 2003. These appliances are often referred to as whitegoods and cover the following:

- refrigerators;
- freezers;
- clothes washing machines;
- clothes dryers;
- dish washers;
- microwave ovens;
- cooktops;
- stoves; and
- ovens.

Some of these are made in Australia by Electrolux under the brand names Chef, Dishlex, Kelvinator, Simpson, Westinghouse and Electrolux. Approximately 20% of whitegoods sold are produced locally, with the remainder imported.

These appliances are large and this, combined with the high number of units sold makes them a significant user of resources.

Key Materials

The key materials in the manufacture of whitegoods are:

- steel;
- glass;
- plastics; and
- stainless steel.

In addition to these major materials are smaller quantities of aluminium, copper and other non-ferrous materials. Some washing machines also contain concrete ballast.

Refrigerators and freezers are one of the highest users of plastics within the whitegoods sector, and can be composed of up to 25% by weight of plastic. ABS or HIPS are used for the inner door and shelving, with clear covers generally an acrylic plastic or polycarbonate. Polyurethane foam is used for insulation purposes.

Within the other whitegoods, polypropylene is a commonly used plastic in clothes and dish washers.

Sales Trends

The number of units sold each year into the South Australian market is increasing at a moderate rate. This is due to the increased number of households, combined with higher rates of purchase for dishwashers and separate freezers. The size of units overall is increasing. Family household refrigerators are increasing in size; however, the larger proportion of smaller households (apartments with 2 or less people) has led to a significantly smaller refrigerator market.

Life Expectancy

The life of appliances varies between appliances and brands. Overall, the current age of a unit disposed of today is likely to be at least 10 years. In the majority of cases the reason for disposal is due to:

- failure of mechanical and non-mechanical parts;
- an 'out of date' look; and
- less features than current models.

The disposal in these cases can often be triggered by moving house or renovation of kitchens and laundries.

In addition to consumers choosing to replace appliances at a younger age, there is also an issue of reduced product life. This is a combination of two factors. Appliances are often being manufactured to meet a price imperative rather than a quality requirement. This results in less reliable mechanical operation and less durable construction. The second factor is the reduced practice of appliance repair caused by a shrinking availability of spare parts and the higher labour costs relative to replacement product cost. This can result in a spiralling reduction in life expectancy.

Product mechanical failure results in:

- cost of repair that is equivalent to the replacement of a product at bottom end of the range;
- purchase of lower quality bottom end appliance;
- shorter time before mechanical failure; and
- cost of repair even less attractive to replacement.

As a result, the sales pattern of 20 years ago involving repair and sale of second-hand appliances is being replaced by a more short term purchase and disposal model.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Most whitegood appliances still contain a significant proportion of steel and non-ferrous metals. As such, they are recovered for scrap metal in significant numbers. There is a network of scrap metal merchants across the state and in addition to this, the major scrap metals processors, Simsmetal and Smorgon Steel operate mobile crushers that collect appliances from regional sites such as landfills and transfer stations.

The plastic and glass components of whitegoods are rarely recovered and this is an area of concern as these materials make up an increasing proportion of the total appliance weight.

The total weight of whitegoods entering the waste stream is approximately 6 000 tonnes.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for white goods are:

- unregulated disposal of appliances to landfill;
- gaps in the recovery network for appliances, particularly in rural areas;
- reduced life expectancy of whitegoods;
- reduced whitegoods repair activity;
- reduced metal component of whitegoods;
- low collection and recovery activity for plastics and glass components;
- no articulated product stewardship commitment from manufacturers and retailers;
- increased proportion of lower quality short life units in the market;
- no measurement of appliance recovery; and
- no clear disposal for recovery path outlined to consumers.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of white goods may include:

- requirements that whitegoods are not sent to landfill but rather sorted for maximum recovery;
- commitment from manufacturers/retailers to government to develop reuse and recycling plans for whitegoods;
- explore potential for plastics and glass recycling;
- encourage durability to be a key feature in product marketing and in consumer product selection;
- requirement for spare parts availability as condition of sale; and
- support for second hand market through advertising, charities and tip shops.

SECTION C - CONSUMER PRODUCTS

Chapter 9 - Books

Consumption

In 2003 over 3.8 million books were sold in South Australia. This excludes textbooks, magazines and telephone directories. It is estimates that the average book weighs 400 grams. This gives a total mass of books sold of over 1 500 tonnes.

Key Materials

Most books are produced using a printing and writing grade paper stock. Covers are made from paper board with hardcover books utilising a heavier grade material.

Most hardcover books also have a cloth binding while paperbacks have an adhesive based spine.

Most covers are now coated with inks and varnishes.

Sales Trends

Sales of books continue to increase at a steady rate of 10-12% annually. This has been consistent over the past decade and therefore book sales have nearly trebled since 1993.

Life Expectancy

The life span of books varies greatly but most books are retained and stored. A small number of books are disposed of within the year of purchase.

The overall stock pile of books retained within households is growing steadily. It is estimated that annual disposal of books is 10% of sales levels after an average retention of 5 years.

Libraries are a key part of the book purchase and use picture. Some books retained in libraries are used for occasional reference. For popular fiction it is common for a book to be borrowed over 125 times before its eventual disposal or sale.

This re-use activity contributes substantially to containing consumption and disposal levels for books. There is a high level of second-hand sale or passing on of books.

Stockpiling, Landfill Disposal, Reuse, and Recycling

It is estimated that 200 000 books are either disposed of to landfill or recycled each year in South Australia.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for books are:

- low householder awareness that books can go into kerbside collections;
- inks and glues used in some books may cause concerns in some papermills;
- many consumers are unaware of their public library service and how to obtain books by this method; and
- there is commercial pressure for consumers to buy rather than borrow books.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of books may include:

- promote and encourage use of libraries as a form of waste reduction;
- educate consumers that books can be recycled through kerbside collections;
- encourage reuse of books through donations to charities; and
- ensure all public and academic libraries sell or recycle books deleted from circulation.

Chapter 10 - CD Media

Consumption

In 2003 an estimated 14.7 million of pre-recorded and blank CDs were sold into the South Australian market. The discs also include a protective case (or jewel case) an estimated 50% of the time. The average weight of a CD in a case with a printed booklet is approximately 100 grams, 15% of this weight is the disc (15 grams) and the remainder is the protective cover and booklet/insert (85 grams). This equates to a total mass of 860 tonnes of material going into the market. This market has been expanding since the late 1980's. Most CDs are held in increasing collections in both households and businesses.

There is now a growing release of this material into the waste stream due to technical failure or discs becoming outdated. This has been accelerated with the more widespread use of blank discs for storing data and other information.

There are three common pre-recorded applications. These are music, application software and games software.

The total music CD sales in South Australia for 2003 was estimated to be 4.6 million units.

The general software applications market for 2003 was estimated to be 134 000 units.

The games software market for 2003 was estimated to be 431 000 units.

This gives total estimated sales of pre-recorded CDs in South Australia of 5.2 million discs.

In addition to this it is estimated that blank CD sales of 9.5 million took place in 2003.

Key Materials

There are three primary materials in a CD. The first is the protective 'jewel' case, which is made from polystyrene and generally has a paper label and paper booklet insert. The discs themselves are made primarily from polycarbonate, a strong and durable plastic. CDs also have a reflective layer which in pre-recorded CDs is generally aluminium, and gold or silver for recordable CDs. This metallic layer is in turn coated with a lacquer layer to protect the reflective metal from damage, the lacquer layer is then often printed onto. Both polystyrene and polycarbonate is currently recycled in Australia from other applications.

Sales Trends

The sales of CDs have grown from zero just 20 years ago to the present sales of 14.7 million. The growth has varied for each application. Over the past ten years, the total pre-recorded CD market has doubled. This growth appears to be slowing slightly but the market is still likely to grow at a significant rate for the foreseeable future. Blank CD sales have grown even more rapidly from a more recent introduction into the market due to availability of CD burning hardware and software. Last year sales increased by 41%. This has been the pattern over the past decade with sales re-doubling every few years. It is not clear when this growth rate is likely to ease.

Life Expectancy

The CD is a durable item and it is clear that many discs purchased over 15 years ago remain in a usable state today. Most are used to store music that will remain in use for long periods. The use of CDs for recording data and games and software has a much shorter life expectancy. As discs are not generally re-recordable, they often become obsolete in a short time.

Pre-recorded CDs have a longer life span. The disc is designed to be functional over many years of repeated use if used and stored correctly. CDs containing software often have a shorter life expectancy.

Blank discs have a shorter lifespan again. Many are utilised to record data for a single use transfer to other equipment. A large amount are disposed of due to copying errors.

The dramatic growth in blank CDs, together with the shorter life expectancy, is likely to accelerate the volume of discs entering the waste stream.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There are a number of second-hand outlets for music CDs. These play an important role in waste reduction as they deal with the many discs that are unwanted but still functional.

There are recycling processors in other countries that can process 100% of the CD material. The polystyrene cases are granulated and used in CD case production or other applications such as timber substitutes.

The volume of CDs now appearing in the office waste stream is rapidly increasing. While still a relatively small item in the waste stream, CDs have the potential to become a more significant issue as broader use coincides with unloading of stockpiles into the waste stream.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for CDs are:

- CDs are dispersed throughout both household and business waste streams making collection efforts difficult;
- lack of an identified collection model;
- the value of the material recycled is low and insufficient to fully cover collection and reprocessing costs; and
- there is no apparent product stewardship commitment from CD manufacturers and retailers.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of CDs may include:

- recycling outlets for CDs and cases could be identified and the cost of collection and reprocessing established;
- product stewardship commitment from manufacturers and retailers to be sought, including the option of contributing to the cost of recovery; and
- encourage greater reliance on libraries rather than the 'own your own' system for CDs.

Chapter 11 - Clothing

Consumption

Each year a broad range of clothing is manufactured and imported into South Australia. It is estimated that, across all clothing categories, over 57 million items are purchased by South Australian consumers. In total value that equates to over $1 100 million of goods in retail sales.

The estimated quantity of clothing sold into the South Australian market in 2003 is 14 000 tonnes, excluding very light garments such as underwear, if an estimated average garment weight of 290 grams is assumed.

Key Materials

The current clothing market is a mix of goods made from the following:

- cotton;
- wool;
- polyester; and
- other polymer materials such as nylon.

A large number of garments are a blend of these materials with cotton/polyester mixes common.

Sales Trends

The volume of clothing sold is increasing at over 6% annually. Consumers are holding larger inventories of clothing each year. A further issue is that, on average, consumers are turning over these items more quickly than in the past.

Life Expectancy

There is a large disparity in product life across the clothing range. Some high quality garments in categories such as coats would be expected to be retained and used by one or more consumers over a 5-15 year period. At the other end of the spectrum there is a large volume of light and low quality garments in the shirt, nightwear and underwear sectors that are likely to be worn out within 12 months.

The overall purchasing trend is towards this shorter life end of the market.

Stockpiling, Landfill Disposal, Reuse, and Recycling

The amount of clothing held per consumer is thought to be increasing marginally. In addition, the population is also expanding. Taking these factors into account it is estimated that the disposal of clothing through reuse, recycling and landfilling equates to 90% of consumption or 12 600 tonnes.

There exists in South Australia a long standing and well developed reuse sector for clothing. This is centred on charity organisations and involves the reuse of clothing. All clothing donated to charities is sorted and graded. The garments of the highest quality and in the best condition are sold in the charity retail outlets. There is also a large range of clothing that is exported to developing countries by the charities and their agents.

Other garments, particularly cotton, are recycled into cleaning cloths for industrial use. Other clothing is exported as material scrap. There was, until recently, an Adelaide company that was utilising scrap textiles for the manufacture of felt and in fill padding in applications like car interior lining. This company has recently closed and it is not yet clear if the material they processed will be sent to interstate destinations or go to landfill.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for clothing are:

- the volume of donated goods to charities that are not suitable for either reuse or recycling. This material has to be sent to landfill at a cost to charitable organisations.
- a large volume of reasonable quality clothing is sent to landfill.
- charity organisations are excellent at collection and sale of used clothing but often lack the expertise and resources to market their outlets. This inhibits second-hand clothing sales.
- the growing switch from higher quality longer lasting clothing to shorter life garments is producing more discarded clothing, of which less can be reused or recycled.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of clothing may include:

- assist current charities in the collection and marketing of their operations to ensure a high level of reuse;
- work with clothing recyclers to identify and facilitate the recycling of clothing unsuitable for reuse or rags;
- encourage consumers to purchase longer lasting clothing; and
- provide clearer information to consumers on how and where to take used clothing for reuse and recycling.

Chapter 12 - DVD Media

Consumption

In 2003 an estimated 6.8 million DVDs were sold into the South Australian market. This includes sales of DVD movies and television programs of 2.95 million units, with the remainder being sales of music and blank DVDs. The total weight of DVDs sold into the market in 2003 was 680 tonnes.

Key Materials

DVD discs are made predominantly from a durable plastic – polycarbonate. There is also a layer of aluminium and varnish. The cover for the DVD is made from polypropylene and usually includes a paper insert. Polypropylene is used as it can incorporate a hinge. It is estimated that the material breakdown by mass for DVDs is:

- DVD disc – 15%
- DVD case – 75%
- DVD insert – 10%

Sales Trends

There were no DVDs sold prior to late 1997. From a base of just 0.86 million sales in 1999 sales have increased sharply up 240% in 2000, 265% in 2001, 113% in 2002 and a further 68% last year. While the sales rate increase is slowing, DVD sales are expected to continue to grow significantly over the next few years.

Life Expectancy

The DVD is a durable item, usually produced in a pre-recorded format with a purpose of retaining the discs for some years. The life expectancy of movie DVDs is at least 20 years. Music DVDs are expected to have a shorter life span reflecting the more rapidly changing music market. Blank DVDs are expected to have a shorter life-span again with many used in promotions and for short-term storage of data. The overall life expectancy of DVDs is estimated at 10 years.

Stockpiling, Landfill Disposal, Reuse, and Recycling

DVDs are a recently introduced product and are geared towards stockpiling rather than disposal in the year of manufacture and sale. Therefore while the stockpile of DVDs in homes and offices is expanding rapidly, the volume entering the waste stream in 2004 is minimal. Total disposal in 2003 is estimated to be 55 tonnes, including packaging.

There is no collection route for post-consumer DVDs. There is some ability to take back unsold or offspec discs and to recycle these. There are reprocessors in other countries where facilities can take and granulate the disc material for use in other applications. The polypropylene cover is readily recyclable in all states of Australia; however no recycling activity is known to be occurring at this point.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for DVD media are:

- the lack of an Australian reprocessor of polycarbonate discs is an impediment;
- the huge explosion of sales that has increased resource use fifty-fold in just 4 years; and
- the non-rewritable design of most DVDs meaning they are single use items.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of DVD media may include:

- raised awareness about the resource impact of the rapid sales explosion;
- increased awareness about the environmental benefit of disc rental through movie rental outlets and public libraries;
- identifying recycling outlets for discs and covers here and overseas; and
- seeking a product stewardship commitment from distributors and retailers.

Chapter 13 - Footwear

Consumption

There were 4.9 million pairs of footwear sold into the South Australian market in 2003. The majority of these were imported into Australia from China and a range of other countries.

There is a wide range of shoe sizes and types and therefore the weight of footwear varies enormously. On average it is estimated that a pair of shoes weighs 900 grams. The total weight of footwear sold in South Australia is therefore estimated at 4 400 tonnes/year.

Key Materials

Footwear is made from a range of composite materials.

These include leather, plastics, rubber and textiles. The major plastics used in footwear are PVC, ethylene vinyl acetate (EVA), and synthetic rubbers such as styrene butadiene styrene (SBS) and polyurethane. Synthetic textiles made from polyamides (nylons) and polyesters are also common.

Sales Trends

The market growth for footwear is very low. The sales growth for 2003 was estimated at 0.6% and the growth over the past decade has been just 5%. The sales growth reflects population growth with an average of four to five pairs of shoes purchased per capita each year.

Life Expectancy

The average life span of footwear varies due to issues of fashion, fit and wear. Many shoes are discarded as reaching end of life prior to wear or product failure.

The average life span of footwear is thought to be decreasing. This is partly due to the design and manufacture of shoes to meet a competitive cost structure. As a result of this cost pressure the durability of shoes has reduced. The repair of shoes is also no longer widespread as labour costs are now generally uncompetitive with replacement costs. Some consumers have no knowledge of repair or even care of footwear. There is anecdotal evidence that shoe replacement can even be triggered by a dirty appearance or failure of laces.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is some level of re-use where shoes are passed to charities for resale. The widespread dispersal of footwear in all South Australian households makes recovery difficult.

There is no Australian recovery of footwear for recycling.

There is some stockpiling effect with shoes. Some households would have over 30 pairs of shoes in use or in storage.

The key reasons for footwear disposal are:

- product failure/wear;
- fashion trends; and
- 'no longer fit'.

Most shoes are disposed of through the kerbside garbage service.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for footwear are:

- the widespread dispersal of footwear in all South Australian households making recovery difficult;
- the lack of any infrastructure to reprocess shoes including the dismantling of composite materials;
- the low value of the materials;
- the lack of any collection infrastructure for shoes; and
- the resistance of the community to re-use of shoes based on hygiene or footcare concerns.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of footwear may include:

- promotion of durability in footwear as a waste reduction measure;
- the encouragement of re-use of good condition clean footwear through charities; and
- the discouragement of unnecessary footwear purchases.

Chapter 14 - Gas Cylinders

Consumption

Gas cylinders come in two main forms:

- barbecue and camping gas bottles; and
- industrial gas bottles and rural LPG fuel bottles.

The number of gas cylinders produced in South Australia in 2003 was 30 800. The size of gas cylinders entering the market varies enormously from 1 kg through to automotive fuel tanks at about 80 kg.

The average weight of an outdoor use gas cylinder is 6 kg. The average weight of an industrial gas cylinder is 30 kg. Overall the average weight of all cylinders is 20 kg and therefore the total tonnes of new cylinders into the market is estimated at 600 tonnes.

The main manufacturer of gas bottles sold into South Australia is Primus.

Key Materials

Gas cylinders are usually manufactured from heavy plated steel. There is a small amount of brass used in fittings. Cylinders are painted with an oil based film.

Gas cylinders are also manufactured from aluminium and occasionally fibreglass. Aluminium cylinders are used in applications where light weight, compatibility with cylinder contents and good corrosion resistance is required.

Sales Trends

The volume of gas cylinders sold each year in South Australia continues to rise. The sales increase in 2003 was 6.5%. There is a growth in the number of outdoor gas barbecues in Australian households. The market is split between purchase related to new appliances and sales to replace cylinders damaged or out of their compliance period.

Life Expectancy

The average life expectancy of gas cylinders is 10 years. In order to have the cylinder filled beyond this period, the cylinder must be tested and restamped as compliant for a further 10 years if still serviceable; if not, they are disposed of (with some being recycled). The cost of this exercise is usually close to the cost of replacement. As a result, very few cylinders have a life span beyond the ten years. On the other hand, the cylinders are so robust in their manufacture that very few fail to achieve the ten year life span.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Being manufactured from steel and other metals, gas cylinders are able to be recycled. The high weight to size ratio makes them easy to handle and worthwhile collecting. However the cylinders are spread broadly cross the community, and gas cylinders cannot be recycled with steel packaging through kerbside recycling service. Steel packaging is compacted when sorted and there is a danger in having gas cylinders in this mix.

A significant number of cylinders are returned via transfer stations or direct to scrap metal merchants. Prior to being shredded at Simsmetal or Smorgon sites, cylinders need to be punctured and the gas released. This is done by removing fittings and drilling a hole in the base of the cylinder to allow gas to escape.

The industrial cylinders are more concentrated in a small number of industry sectors and are more regularly presented for exchange or refilling. The capture of these cylinders for disposal is therefore also easier to achieve.

The lack of a clear return route and a community concern about hazard leads to many gas cylinders being sent to landfill.

A growing trend in gas cylinder use is the cylinder change over scheme marketed as 'swap and go'. This enables consumers to exchange an empty cylinder for a refilled cylinder. Consumers never own the cylinder and responsibility for disposal at the end of the cylinders life lies with those operating the exchange system. It is likely that under this arrangement, a high proportion of cylinders will be sent for recycling.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for gas cylinders are:

- the requirement for gas cylinders to be punctured before reprocessing. The health and safety hazard at steel reprocessing facilities has resulted in gas cylinders being banned or discouraged from collection.
- the low level of understanding in the community about correct disposal. This leads many to 'hide' cylinders in their domestic garbage or hardwaste collection.
- the wide dispersal of cylinders across the state. The task of recovery is linked to providing a convenient collection or drop off route back to metal recyclers in a form that can be handled.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of gas cylinders may include:

- clear community education must be provided on how to dispose of gas cylinders correctly;
- work with Simsmetal and Smorgon Steel to ensure that they continue to receive gas cylinders in the right condition;
- work with 'swap and go' exchange scheme operators to ensure recycling at end of cylinder life; and
- develop a collection network built around transfer stations, gas cylinders point of sale outlets, CDL depots and scrap metal merchants. The collection of cylinders must be linked to the pre-drilling of cylinders prior to being presented for shredding.

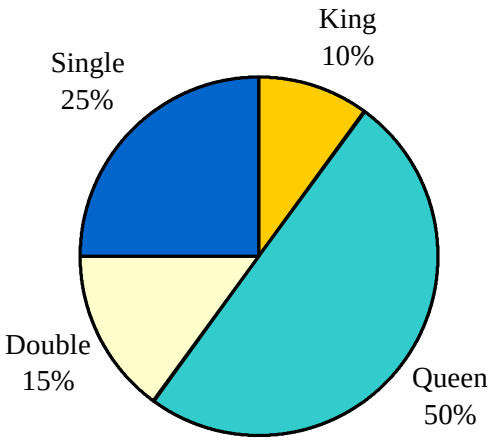
Chapter 15 - Mattresses

Consumption

In 2003 an estimated 107 000 mattresses were sold into the South Australian market.

The size of mattresses is split across four sizes as shown in the following chart.

Figure 15.1: Market Share of Mattress Sizes



With an average weight of 49 kg across the total market the total weight of mattresses sold was 5 200 tonnes.

Key Materials

Ninety percent of mattresses sold are inner spring. These are made using a combination of hardwood timber, steel springs and mesh, layers of flock and synthetic textiles. There is also a small volume of synthetic foam and latex rubber mattresses, and futon mattresses made from cotton, wool, latex and synthetics foams.

Sales Trends

The market growth in mattress sales has been 8–12% for the past five years. Prior to this annual sales increases averaged 3-4%. This has resulted in almost an 80% increase over the past decade.

Life Expectancy

The Australian Consumers Association has estimated the average life expectancy of an inner spring mattress at 10-13 years. Mattress industry sources state that there is a high retention of mattresses in storage at end of life.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is some informal re-use of mattresses. Due to health regulations there is now no sale of second-hand mattresses through charity outlets.

There is a small level of activity in dismantling mattresses for recovery of steel and timber.

The overwhelming majority of mattresses end up in landfills. There they cause difficulties as they can become entangled with compaction equipment. They also make the landfill base unstable and can be difficult to keep buried. The average cost of disposal of a mattress at landfill is approximately $25.

Many people seek to avoid this cost, or have no method of transporting mattresses, and therefore many are littered in and around urban areas.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for mattresses are:

- there are a proportion of mattresses that are structurally sound but not clean. There is no facility to enable cleaning that would satisfy health requirements and consumer concerns;
- there is no collection and dismantling operation for the recycling of mattresses; and
- the textiles used in mattresses are a mixture of materials, many bonded together making separation and recycling next to impossible.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of mattresses may include:

- facilitate the establishment of a mattress refurbishment facility in consultation with charitable organisations and the hotel industry;
- investigate the potential for dismantling and recycling of mattresses;
- foreshadow restrictions on the land-filling of mattresses when recycling facilities are in place; and
- encourage the purchase of higher quality mattresses with a longer life expectancy.

Chapter 16 - Newspapers

Consumption

In 2003, a total of 48 300 tonnes of newspapers were produced in South Australia. Of this 41 900 tonnes were sold to consumers with the remainder being returned unsold or publishers' waste.

South Australian consumption per capita of newsprint is 31.5 kg/year (population 1.53 million) which is less than the national average. This total newspaper consumption includes newspaper inserts such as magazines and TV guides, which are printed on newsprint or improved newsprint.

Key Materials

Newspapers are manufactured entirely from newsprint. 60% of the newsprint is produced in Australia, at either Albury (NSW) or Boyer (Tasmania) by Norske Skog. There is no newsprint manufacturer in South Australia. The imported newsprint, 40%, comes almost entirely from a Norske Skog mill in New Zealand. An estimated 30% of the fibre in Australian newsprint is from recycled sources.

Sales Trends

Newspaper sales in South Australia are generally increasing at a moderate rate. The sale of newspapers peaks during major events such as elections, wars, major sports events. The size of newspapers is linked to the health of the economy reflected in advertising levels.

Life Expectancy

Newspapers are a very short-life product. The time elapsed from production and sale to use and disposal is usually a day or so. There is a small delay in the recycling process during collection, sorting and reprocessing but it is common for fibre to go from production to production in less than a month.

There is a small amount of stockpiling of newspapers for historic reasons. The flow out of the stockpile is similar to the inward flow resulting in only a minimal annual increase in archiving of newspapers.

Stockpiling, Landfill Disposal, Reuse, and Recycling

An estimated 48 000 tonnes of newspapers are recycled and disposed of to landfill of each year in South Australia. This is comparable to annual sales.

A small amount of newspaper is re-used in both households and businesses for many uses such as for starting fires, cleaning up spills, as animal bedding, drop sheets and wrapping. This unavailable newspaper has been estimated at 6.8% of total sales or 2 500 tonnes/yr.

The recycling of old newspapers (ONP) is very high in Australia. The annual recycling rate in South Australia for 2003 was 65% or 31 400 tonnes; excluding publishers' waste, the post-consumer recycling rate was 58%.

In 2003 16 600 tonnes of newspaper was disposed of to landfill. Studies have shown that most of the remaining newspaper in the garbage stream is in household garbage bins. 90% of South Australians have access to kerbside recycling with only one or two population centres not having collections. Of the newspapers in the waste stream an estimated 80% are in household waste and the remaining 20% spread across commercial sites such as offices, airports, railway stations, hospitality sectors, retail outlets and libraries.

It is estimated that of the household material a further 5 or 6 000 tonnes could be recovered in the next few years with improvements to recycling and garbage collection systems, community education and improved sorting of recyclables. In addition a further 1 000 tonnes could be recovered from commercial sites with offices offering the biggest potential.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for newspaper are:

- the lack of newspaper recovery facilities at many commercial sites;
- the lack of kerbside recycling collections in some regional areas;
- no collection container for paper in many areas;
- the capacity of domestic garbage bins in many areas offering no waste reduction incentive; and
- the losses of newspaper in some recycling sorting facilities. This is due to sorting equipment configuration problems.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of newspaper may include:

- the expansion of commercial site paper recycling;
- inclusion of newspapers in all public place recycling systems;
- upgrading of kerbside recycling collections to all population centres with collection containers for paper; and
- upgrading of sorting facilities to more efficiently sort paper thereby reducing losses.

Chapter 17 - Phone Books

Consumption

Each year Sensis, a division of Telstra, distributes telephone directories to all households and businesses with a fixed line connection.

In South Australia most urban households receive a white pages directory and a business yellow pages directory. Some also receive a smaller regional directory. Outside Adelaide, these are amalgamated into one white/yellow directory.

In 2002 a total of 1.84 million directories were delivered in South Australia. The average weight of the book was 1.55 kg resulting in 2 850 tonnes of directories being used state-wide.

Books are manufactured in Melbourne and there is therefore no pre-consumer waste with unused books being returned for recycling.

Key Materials

Directories are produced from lightweight newsprint sheet of 36 grams/m^2 weight. The directory carries a heavy load of ink per page. It has a lightweight cardboard cover and the spine of the book is glued.

Sales Trends

The number of books produced and delivered is linked to population growth and the number of fixed line telephones. This number is relatively static with all major telephone market growth occurring in mobile phone connections.

Life Expectancy

Phone directories have a clear life-span of one year when all households are issued with a replacement book. There is sometimes a delay in the disposal of outdated directories but little or no stockpiling.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Directories are incorporated into the kerbside recycling collections of almost all councils. It is estimated that over 90% of South Australian households have access to directory recycling through this method. A high proportion of businesses have a paper recycling collection that allows directories to be added to printing and writing paper grades. In addition, sorted directories can be collected from large businesses through Visy Recycling or other collectors.

The published recycling rate for South Australia in 2003 was 46% or 1 304 tonnes. This is an underestimate due to:

a) no auditing of regional areas outside Adelaide, and

b) use of a direct count method which has been found to understate total directories recycled.

Sensis is currently reviewing its recycling rate audit procedures. It is likely that a higher proportion of household directories are recycled than business directories as the recycling collection coverage is more extensive.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for phone books are:

- a lack of recycling collections in some regional centres; and
- limited collection of directories from commercial sites.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of phone books may include:

- extended kerbside collections to significant population centres;
- co-ordinated directory collections from large commercial sites with Sensis and paper collection contractors; and
- extended kerbside collections to SMEs.

Chapter 18 - Toys

Consumption

The category of toys encompasses a broad range of children's products. These include stuffed toys, dolls, wheeled toys, gaming consoles, games and puzzles and building toys. Data was obtained for as many significant categories as possible. For some smaller categories, data was not available and therefore the overall consumption estimate will be an under-stating of the total toy consumption for 2003.

The estimated number of toys sold into the South Australian market in 2003 was 8.2 million units. This is dominated by stuffed toys which made up 6.7 million units. Also significant was 1.2 million dolls. By weight, large toys such as wheeled toys and dolls carriages and gaming consoles accounted for a combined 1 000 tonnes or 42% of total toys. The total estimated weight of toys into South Australia was 2 800 tonnes. The overall estimated average weight of toys was 300 grams.

Key Materials

There are no dominant materials in toy manufacture. There is a range of plastics with vinyl being a more common polymer used. There is also a wide range of textiles, particularly in stuffed toys. These are generally synthetic materials.

Paper and cardboard also feature prominently in games and puzzles. Steel is used much less frequently in toys than was previously the case.

Sales Trends

The overall market for toys has grown an average of 5% per annum over the past decade. There are fluctuations within the market with different toys achieving more dramatic annual sales increases or declines.

Life Expectancy

There are some toys that are more durable and are more likely to be retained over a number of years. An example of this is Lego building bricks and games such as monopoly and scrabble. There is, however, a growing trend towards cheaper short-life toys.

Overall, an average life expectancy of five years has been estimated. It is acknowledged that some toys have a life expectancy of less than a week while others can span generations.

Two factors contributing to reduced life span are the decline in product durability and the increased volume of electronic games with breakdown and technology changes leading to end of life.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Growth in stored toys is likely to be equivalent to 20% of total annual sales or 600 tonnes. It is acknowledged that many toys cascade through a number of owners before eventual disposal. This includes siblings, friends and charities. Many consumers do not consider taking toys to charitable organisation in the same manner as taking clothing.

With a total volume of sales of 2 800 tonnes, a life expectancy average of five years and sales growth averaging 5%, the total disposal of toys is estimated at 2 200 tonnes in 2003. There is a high level of stockpiling of toys in the community but eventually most material will be discarded.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for toys are:

- the reduction in product durability works against toy reuse;
- currently there are no established routes for toys to be recovered and recycled and therefore landfill disposal is expected to be the destination for over 90% of end-of-life toys.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of toys may include:

- promotion of product durability as a key purchase factor;
- restricting the import of sub-standard toys may need to be considered;
- investigate the incorporation of toys into either kerb-side collections or drop-off centres; and
- promote charities as a re-use outlet.

Chapter 19 - Video Cassettes

Consumption

The total sales of video cassettes in South Australia in 2003 was in excess of 2.7 million units. This is made up of both pre-recorded cassettes (mostly movies) and blank cassettes. This is more than one cassette per person and builds on continued sales over more than 20 years.

The average weight of a cassette is 300 gms. Pre recorded cassettes have a polypropylene cover which weights approximately 100 grams. Blank cassettes have a cardboard cover which weighs approximately 50 grams. This gives a total 2003 market quantity of 990 tonnes, made up of:

- cassettes 810 tonnes;
- polypropylene covers 90 tonnes; and
- cardboard covers 90 tonnes.

Key Materials

The majority of material weight of a cassette is plastic. This is in two forms. The housing of the cassette is made from high impact polystyrene (HIPS). The magnetic tape within the housing is primarily PET, but also contains materials such as carbon and a magnetic coating of varying composition. There is also lightweight steel framing within the cassette. The covers are made from polypropylene with a paper insert. Both the polypropylene cover and the polystyrene housing are technically recyclable.

Life Expectancy

Pre-recorded cassettes have a long life expectancy. Most of the cassettes have been purchased in the past ten years. Blank cassettes have a shorter lifespan as many cassettes are used repeatedly and wear out within a five year timeframe. Despite this, the majority of purchased blank tapes remain in households for a number of years.

The sales of cassettes are therefore at a level higher than disposal levels. Each year more cassettes are added to the stockpile held in homes. The stored quantity of cassettes (including covers) is estimated at 9 900 tonnes. There is likely to come a point in the future where the video cassette is replaced by recordable DVD technology. When this occurs there will be an increase in disposal of cassettes. In this case, a rapid flushing out of the stockpile could lead to cassettes becoming a significant waste item for a short period.

Sales Trends

Until 2002, the sales for video cassettes had grown each year. Since then sales have declined due to the impact of DVDs. This turnaround has been dramatic with pre-recorded sales down 35% in 2003. This trend is expected to continue for pre-recorded cassettes in coming years as most households now have access to DVD playback and a preference for that format. It is possible that the decline could be very dramatic. For blank cassettes, the decline has been less significant. Recordable DVDs are not widespread and therefore the video cassette remains the primary method of recording.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is no technical impediment to the recycling of the polypropylene, polystyrene or the cardboard component of video cassettes as there are recycling processors for these materials in South Australia. The main issue will be the costs associated with the collection and dismantling of video cassettes for reprocessing.

There is no co-ordinated collection and recycling system for cassettes in Australia. Therefore the current volume of cassettes disposed are almost all going to landfill.

Pre consumer waste cassettes (unsold) are often destroyed in a controlled method to prevent them coming on to the market without purchase.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for video cassettes are:

- the lightweight nature of the cassette means its material value is low;
- the cassettes are dispersed throughout the community (mainly households);
- no collection infrastructure to aggregate cassettes for disassembly/recycling; and
- there is no obvious product stewardship commitment from manufacturers, importers or retailers.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of video cassettes may include:

- identifying reprocessors willing to handle recovery and processing cassettes and cassette covers;
- exploring the most cost efficient and viable collection method for recovery significant quantities of cassettes from South Australian households; and
- undertaking a dialogue with industry stakeholders on their product stewardship responsibility in concert with other governments at the state and federal level.

SECTION D - ELECTRICAL & ELECTRONIC PRODUCTS

Chapter 20 - Computers

Consumption

In 2003 over 216 000 units were sold in South Australia, including computers that were assembled locally from imported parts. This figure includes 67 000 laptops.

Sales growth is in both the corporate and household markets. Some sales are new units replacing non-performing or out-dated computers. Other sales reflect an increased level of computer ownership. It is now not uncommon for households to have two or more computers.

There is a pattern of transferring computers between the corporate sector and households, thus the average age of computers in commercial applications is less than for household applications. It also means that while a computer may enter the market in a commercial setting, it may be disposed of at a household level.

The average weight of a computer (including the CPU box and monitor) is estimated at 20 kg. This includes lighter weight laptop units.

This equates to a total weight of computers into the market of 4 330 tonnes/year.

Key Materials

Computers are made from a combination of plastics, steel, non-ferrous metals and glass.

The plastic used in casings is usually ABS (including some SAN), and less commonly polyphenylene ether (PPO). These plastics often contain additives, including brominated flame retardants. These can be problematic in recycling as the reprocessing of the plastic can result in the release of the flame retardants in gaseous form.

There is a quantity of metal in both computer boxes and in monitors.

Sales Trends

Computer sales in Australia have increased by over 300% over ten years. At present the market growth is averaging 12% /year. It is thought that the expansion of the market is starting to reach saturation point. On the other hand, the replacement of units is continuing strongly and it is in this area that a new sale represents an addition to the stockpile or disposal of waste computers.

There is a larger sales growth in laptop computers than for desktop models.

Within the desktop market, there is a growing trend to LCD monitors and away from CRT screens. This is expected to accelerate in coming years as the price difference continues to narrow. Already large manufacturers such as Sony, Sharp Electronics, Matsushita and Hitachi have either stopped manufacturing small CRT models or discontinued CRT manufacture entirely.

Life Expectancy

The life of a computer may be in several stages. The use after purchase is the first stage. Often computers are then transferred to a second owner and location. This is often a transfer from commercial use to household use. Many computers are then stockpiled before disposal. This occurs in both corporate and household environments.

The key issues that result in an end of life computer are:

- availability of a newer model;
- insufficient hard-drive capacity or speed;
- software upgrades;
- leasing or depreciation issues;
- corporate replacement policies; and
- failure of a unit or component.

Unlike many other mechanical products, product failure is not the primary reason for end of life.

The average total life of a computer is assumed to be eight years. The typically consists of five years use by the initial owner, followed by three years of reuse elsewhere. This life span is reducing as the market for 'passed on' computers becomes more saturated and selective. The inability to upgrade components due to incompatibility is a barrier to waste reductions.

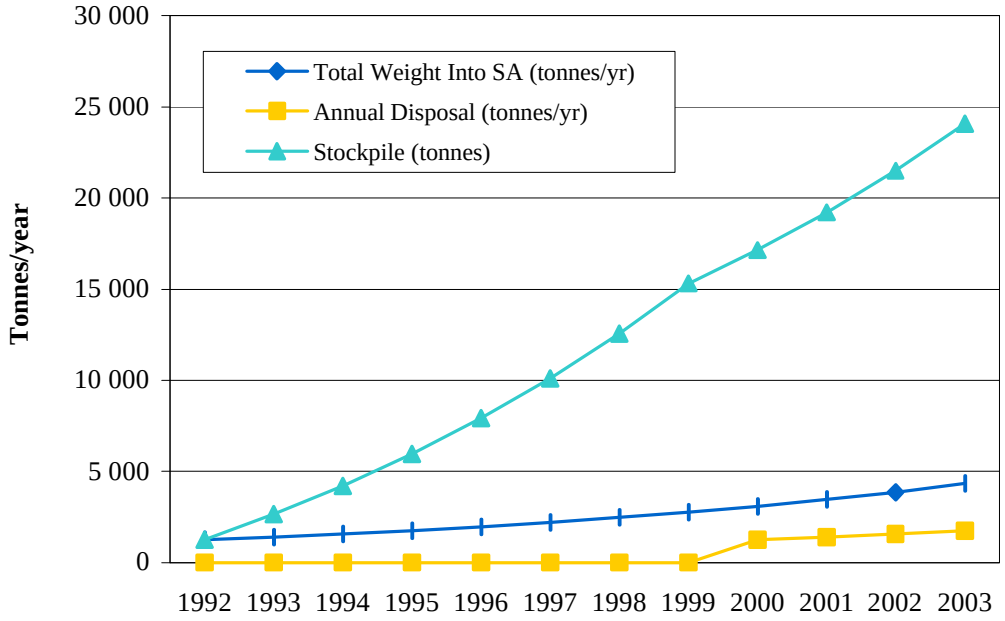
Stockpiling, Landfill Disposal, Reuse, and Recycling

The disposal of computers is influenced by the reality that many units at end of life are still functional (if obsolete). Many would have been purchased for over $2 000 and many owners view the obsolete unit as having some residual value rather than being waste. This has led to a large scale stockpiling of computers in the community.

The best estimate of the quantity (by weight) of stockpiled units is 24 000 tonnes in South Australia alone (Figure 20.1). This increased stockpile is estimated to have grown by up to 1 000% over the past ten years. It is likely that this pattern will not be sustained and this will result in a large 'flushing' of computers into the waste stream.

The current estimate of disposal is 1 750 tonnes/year or 87 400 units. This is the equivalent of 40% of new sales. Disposal is expected to double in 5 to 6 years.

Figure 20.1: Computer Purchasing, Disposal and Stockpiling in SA



Currently there are some programs to capture and recycle computers at their end of life. There is a significant market for second-hand units (computers less than 3 years old). There is also some dismantling of computers and export of these for re-use or recycling in overseas markets.

There is also a small amount of recycling of components in Australia.

HMR has established a monitor recycling operation in Melbourne and MRI is also active in recovery of metals and dismantling of CRT monitors.

This activity is growing but accounts for a small percentage of end-of-life units.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for computers are:

- the value of the materials is not equivalent to the cost of collecting and dismantling the units. This is particularly the case of old computers, monitors and peripherals such as keyboards.
- the lack of a market for plastics with flame retardant additives. Research from recovery programs overseas will be important here.

The computer industry is aware of the growing waste computer issue and has acknowledged a shared responsibility for finding a recovery solution.

The main manufacturers are members of the Australian Information Industry Association (AIIA) which represents approximately 60% of the Australian Information and Communication Technology (ICT) Industry. The AIIA is currently investigating the most cost efficient and effective form of supporting waste computer recovery. This may take the form of a funding contribution, which, when combined with the residual material value can cover the cost of collection and reprocessing.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of computers may include:

- slowing the rate of computer changeover through promotion of upgrade options;
- facilitating the degree of computer 're-use' in Australia;
- facilitating the exports of functional computers to markets where re-use is viable;
- working with AIIA and other states to develop a national recovery program;
- ensuring all government computers (including stockpiled computers) are sent for re-use or dismantling and recovery;
- restricting the disposal of computers to landfill in line with national recovery programs;
- supporting research into recycling of leaded glass in lead smelters at Port Pirie and flame retardant plastics elsewhere; and
- developing drop-off sites (possibly at CDL sites)

Chapter 21 - Fluorescent Tubes

Consumption

It is estimated that a total of 3.1 million fluorescent tubes are sold in South Australia annually.

A standard tube is 1.2 metres in length has a diameter of 4 centimetres, and weighs 250g. On this basis the annual 2003 sales is estimated to be 2 400 tonne.

Key Materials

The key material components of a fluorescent tube are:

- glass;
- steel; and
- mercury.

The quantity of mercury is generally 20 milligrams per tube. This is being reduced with advances in technology.

Life Expectancy

The life expectancy of a fluorescent tube is approximately three years.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is a small level of recovery and recycling of fluorescent tubes in Australia. The mercury is captured and recycled.

Although an estimated 6% of mercury can be released from broken tubes and could represent a health risk if inhaled as vapour, absorbed through the skin or ingested with food, the mercury combines with sulphides in landfills under anaerobic conditions and becomes immobilised.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for fluorescent tubes are:

- the small quantity;
- dispersal throughout households and businesses;
- no co-ordinated product stewardship arrangements; and
- the tubes are difficult to handle due to potential for breakage.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of fluorescent tubes may include:

- ban on direct landfill disposal;
- development of a return system through the development of product stewardship arrangements; and
- development of a reprocessing industry to recover the mercury and steel.

Chapter 22 - NiCd Batteries

Consumption

Nickel Cadmium (NiCd) batteries are used to provide a portable, long-life power supply at a relatively low cost. The battery is rechargeable, and is based on the reversible electrochemical reaction of cadmium and nickel in an alkaline potassium hydroxide electrolyte.

NiCad batteries are used both in consumer and industrial applications. Table 22.1 lists the major applications.

Table 22.1: Applications of NiCd batteries

Application
Mobile Phones
Cordless Phones
Desktop Computers
Laptop Computers
Cordless Drills
Shavers
Video Cameras
Emergency and Exit Lighting

Industrial recovery programs are well established. Upon the installation of the new battery, the old battery is usually removed and taken for reprocessing. Industrial NiCad batteries have a 95% recovery rate. SAFT, a major player in the Australian industrial battery market, recovers 100% of their batteries sold including emergency lighting.

As the dominant consumption of NiCd batteries is consumer batteries, accounting for 98% of the total NiCad battery consumption, and most industrial batteries are recovered through established recovery programs, the focus of the study is on consumer consumption, recovery and trends.

The market for NiCd batteries is split into two areas:

- Installed – NiCd batteries that come installed within an electric or electronic product.
- Uninstalled – NiCd batteries that are sold individually. The majority of these batteries are used to replace rechargeable batteries within appliances.

There is no manufacturing of consumer NiCd batteries in Australia. NiCd batteries are imported either as individual uninstalled batteries which are then sold to be used in appliances or installed within the appliance.

SAFT has recently established an industrial NiCd battery assembly plant in Seven Hills NSW. It is the only one of its kind in Australia.

This decline is despite the overall market for portable rechargeable batteries increasing by 14% per year over the last ten years.

A total of 8.5 million NiCad batteries were imported into Australia in 2002 from 37 countries. 3.9 million of these batteries were installed within an appliance. The remaining 4.6 million were imported uninstalled. Most NiCd batteries are currently imported from Asia, particularly Japan and China.

Key Materials

NiCd batteries are composed primarily of the following materials:

- cadmium;
- nickel;
- steel; and
- graphite.

The recoverable materials are cadmium and nickel-iron scrap. These materials generally account for 76 wt.% of the NiCd battery, with the plastic accounting for a further 4 wt.%.

Sales Trends

There are a number of substitutes available for NiCd batteries. There are primarily Nickel-Metal Hydride (NiMH) and Lithium-Ion (Li-Ion) batteries. Discussions with industry suggest that products coming from Europe generally have a Li-Ion or Ni-MH battery installed, while products coming from Asia generally contain a NiCd battery. Since being launched into the market in 1993 there has been a rapid increase in their use, particularly in the communications and office equipment sectors (laptops and mobile phones). These batteries are increasing in the consumer market because they are easy to charge on a trickle flow basis. Performance issues have been found with the NiCd batteries developing a memory due to consumers recharging them on a trickle flow.

The introduction of these different battery types has reduced the global share of NiCd in portable appliances (where a rechargeable battery is used) from 100% in 1992 to just 49% in 1999. There was also sharp decline in the sale of NiCd batteries in 2000 followed by a steady decline of 10% between 2000 and 2002.

According to MRI, who recover the mobile phones, NiCd batteries accounted for 53.60% of the total weight of batteries collected since the program commenced five years ago. From January – May 2003 47.53% of the batteries collected were still NiCd batteries.

Life Expectancy

The life of the mobile phone batteries is relatively short, lasting approximately 1-2 years before the battery needs to be disposed. The weight of the battery is approximately 25 grams.

The life of cordless phone batteries is approximately 12 months before the battery needs to be replaced. The weight of the battery is approximately 30 grams.

Stockpiling, Landfill Disposal, Reuse, and Recycling

The limited disposal value and quantities (by weight) of NiCd batteries from mobile phones is shown in Table 22.2. The total recycling of NiCd batteries from mobile phones over this period was approximately 2 tonnes.

Table 22.2: Estimated Disposal of NiCd from Mobile Phones

Calendar Yr	Number of Units	Tonnes Available
2000	125 955	4
2001	206 535	5
2002	41 484	1

There has been a lag time factored into the calculations of 1-3 years before all **cordless phone** batteries are disposed. There is no consumption data prior to 1998 and post 2002 therefore the estimated disposal numbers for 1999 and 2004, presented in table 22.3 are likely to be lower than actual.

Table 22.3: Estimated Disposal of NiCd from Cordless Phones

Calendar Yr	Number of Units	Tonnes Available
1999	64 717	1.9
2000	96 995	2.9
2001	100 717	3.0
2002	89 534	2.7
2003	79 673	2.4
2004	15 838	0.5

All **desktop computers** currently contain a small rechargeable battery to allow functions such as time and bios settings.

The sales of desktops computers grew in Australia between 1998 – 2000. The market has since fallen significantly as it now becomes saturated. Due to the life of computers it is anticipated that NiCad batteries will still be coming through in the waste stream for at least another 10 years.

Laptop computers require portable rechargeable batteries as an alternative power source. While laptops no longer use NiCd batteries, it is anticipated that like mobile phones, NiCd batteries will remain in the waste stream for sometime. Laptops contain two portable rechargeable battery sources. One acts as an alternative power source and the second smaller battery is located in the motherboard. It allows functions such as time and bios settings after shutdown. The number of laptop computers sold and the percentage of those using NiCd batteries is shown in Table 22.4.

Table 22.4: Trend in Imports

Calender Yr	Number of units	% Using NiCd
1998	223 576	30
1999	288 222	20
2000	403 113	0
2001	454 742	0
2002	600 277	0

Of the two batteries in laptops, the life of the battery within the motherboard is approximately 10 years. The life of the battery that acts as the main power source is approximately 3 years. The weight of the battery within the motherboard is approximately 5 grams. The weight of the battery that acts as the main power source is approximately 500 grams. The tonnes predicted are the tonnes available for disposal. There has been a lag time factored into the calculations of 5 years for the motherboard battery and 3 years for the power source. There is no consumption data prior to 1998 and post 2002 therefore the estimated disposal numbers for 2002 and 2003, presented in Table 22.5 are likely to be lower then actual. Due to the small size and weight of the motherboard battery these have not been included in the calculations.

Table 22.5: Estimated Disposal of NiCd Batteries from Laptops

Calendar Yr	Number of Main Power Source Batteries	Tonnes Available
2000	53 701	27
2001	52 827	26
2002	12 476	6
2003	5 764	3

Rechargeable battery powered drills are becoming increasingly popular. Due to their high current requirement, the drills generally use NiCd batteries. However there is a trend for European manufactured drills to use Li-Ion batteries for cordless drills, and for Asian source drills to use NiCd batteries. Industry sources believe that rechargeable portable batteries emerging as replacements for NiCd batteries do not have an available current capable of fulfilling the requirement of cordless drills at a sufficiently low cost. This ensures there will be a demand for NiCd batteries in this application for the foreseeable future. The market fraction of the low cost sector would account for over 70% of the total sales of cordless drills.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for NiCd batteries are:

- the spread of batteries across a broad range of appliances equipment;
- the disposal of batteries across all households and industries;

- the increased use in applications for which no recovery exists e.g. power tools;
- the lack of NiCd reprocessing facilities in Australia; and
- the lack of a product stewardship commitment from either battery of appliance manufacturers or importers.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of NiCd batteries may include:

- in co-operation with other states, seek a product stewardship commitment from the battery and appliance manufacturers and importers;
- encourage a manufacturer and consumer switch to other battery types – lithium or a nickel metal hydride; and
- establishment of battery return routes through product return route schemes.

Chapter 23 - Personal Batteries

Consumption

In 2003 an estimated 17.5 million single use personal batteries were sold in South Australia. This covers AAA, AA, B, C, 9V and D sized batteries. It excludes rechargeable batteries.

The average life of a battery is less than 3 months and therefore is assumed that the total consumption figure is reflected in a similar number of batteries disposed. The average battery is just 25 gms in weight. This results in a total quantity of batteries being disposed of around 440 tonnes in 2003.

Sales Trend

The trend in battery sales is upward reflecting the increased use of portable appliances and the proliferation of electronic equipment. The split in the battery market between lead acid and alkaline batteries is 30:70.

Key Materials

The key materials contained in batteries are paper, steel, non-ferrous metals and acid. The product is multi-layered meaning that each material is a contaminant of other materials. The total volume of each material is not significant when compared to other products. Previous generations of batteries have utilised mercury in their makeup. No current Australian batteries have any mercury included.

Life Expectancy

All batteries are considered to be short life and are therefore assumed to be into and out of the market in under a year.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Batteries are spread evenly across a broad range of sites and therefore disposal reflects this. Batteries are present in household garbage, commercial and industrial sites and also in street bins and the litter stream.

Due to their small size they are only a small proportion of total waste disposal.

The historic use of mercury in batteries led to a concern about leachate from batteries in landfill becoming an environmental problem. The elimination of this component reduces the environmental imperative for recovery and recycling.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for personal batteries are:

- the dispersed nature of battery disposal;
- the small size of batteries makes their recovery in significant volumes intensive; and
- the multi layered nature of batteries makes their recycling difficult.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of personal batteries may include:

- encourage a shift in the market to longer life alkaline batteries;
- encourage the replacement of single use batteries with rechargeable batteries where possible; and
- utilise other power sources such as AC power, solar panels and dynamo generators.

Chapter 24 - Printer & Computer Peripherals

Consumption

A rapidly expanding sector of business and consumer products is electronic peripherals. This grouping covers computer components such as DVD drives and keyboards, printers, scanners, photocopiers and fax machines. It also includes computer monitors and digital cameras.

These products are almost entirely imported into Australia and are in addition to sales of computers and CDs and DVDs. There is a diversity amongst these units including variations in sales volumes and mass.

Some products such as photocopiers, printers and monitors are large and weigh between 10 and 50 kg. Others such as a computer mouse weigh no more than 200 grams.

The total mass of products across this category is estimated to be 5 100 tonnes/yr. This is from an estimated total of 1.48 million units.

Key Materials

Most of the products in this category are housed in a casing of durable plastic. Most typically, this is ABS or PPS. Many of these plastics have flame-retardant additives and UV stabilizers. These can be problematic in recycling.

There is a proportion of steel in most peripherals except small items such as cameras, joysticks, and mice. The steel component in frames for photocopiers and printers can be significant.

Photocopiers, scanners and computer monitors feature glass screens. The rear section of monitor glass includes a high proportion of lead.

Almost all of these products feature small but valuable quantities of gold, silver and other metals.

Sales Trends

Almost all products within this category have shown significant sales increases over the past decade. For some products such as fax machines, keyboards and hard drives this is a more mature market trend. For others such as CD burners, computer monitors and digital still cameras, the sales growth has been very dramatic in the past few years.

It is expected that in the next five years sales increases for products will stabilise while new emerging peripherals will be a feature of the market.

Life Expectancy

Most products in this category have a life expectancy of about five years. Some items such as key-boards and mouse/trackballs would last on average half of this time.

The rapid expansion of technology has resulted in some hard drives, floppy drives becoming redundant in a rapid time frame. There is no discernible reduction in life expectancy linked to declining product quality.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is no co-ordinated recovery route for printer and computer peripherals. Due to their relatively small size and the high proportion of plastic material, most do not have a value sufficient to justify their collection, dismantling and reprocessing based on recovered material value.

Added to this is the perception amongst many consumers that at 'end of life', the product still retains a value and is not a waste. This leads to high levels of stockpiling products such as printers, cameras and scanners.

The low level of steel means most of these products are not being recovered through scrap metal routes. Most are ending up in landfill.

The rapid growth in this sector in the past five years and the impact of stockpiling means current disposal volumes are below current sales volumes. As material moves out of stockpiles this situation could change rapidly leading to a major increase in disposal volumes in the next five years.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for printers and computer peripherals are:

- low value of the main plastic materials;
- difficulty in recycling the plastic due to additives and diversity of polymers;
- small size of units leading to difficulty in efficient aggregation of significant volumes;
- lack of a product stewardship commitment from the information industry sector;
- perception that products still have a value at end of life leading to stockpiling;
- lack of reprocessing facilities for most components in Australia; and
- cost of labour for dismantling components.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of printers and computer peripherals may include:

- encouraging the establishment of a reprocessing facility in South Australia; and
- working with industry to develop a product stewardship commitment.

Chapter 25 - Smoke Detectors

Consumption

There are two types of smoke detectors; optical smoke detectors (OSDs) and ionization chamber smoke detectors (ICSDs). ICSDs contain a radioactive foil and are the normal household type in Australia. The major distributor of smoke detectors in South Australia is Clipsal Industries.

The current sales total of detectors in South Australia is 92 400. All of these units are imported into Australia. The key countries of origin are China and Mexico.

The average weight of a smoke detector (without the battery) is 100 gms. On this basis, the total mass of detectors introduced into the market in 2003 is around 10 tonnes.

Key Materials

Smoke detectors are a complex mix of materials. Some of these materials are benign while others are hazardous but exist in only minute amounts.

The construction of smoke detectors varies from manufacturer to manufacturer, however typically they have a main casing made from either HIPS or ABS, with a small circuit board contained inside the casing.

Inside the detector chamber, which is mounted on the circuit board, there is a holder to which a radioactive foil (Americium 241) is attached. The amount of radioactive material is very small and is generally not considered to present a hazard, either to individuals during use or if disposed of to landfill.

Sales Trends

There has been enormous growth in domestic smoke detector sales on the past decade, from virtually none to nearly 100 000 annually. The average yearly growth in the market has been approximately 30%. This sales increase has been triggered by the regulatory requirement for all houses to be equipped with detectors.

Life Expectancy

Smoke detectors are built to last for a long period. The regulations require that all detectors be replaced after 10 years. This requirement is not widely known in the community and there are likely to be many detectors in homes of a significant age. Many detectors are replaced prior to this ten year period due to failure, damage, and renovation. The average life expectancy is therefore estimated at 7-8 years.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is no reuse currently of smoke detectors in South Australia.

It has been estimated by industry sources that approximately 10% of all units currently sold are collected by industry and stockpiled. Nearly all of these units are returned by commercial operators such as electricians, only a very small percentage is returned by householders.

Confusion exists amongst consumers about the correct disposal of detectors. The existence of minute quantities of radioactive material has led to a ban being applied to detectors going to landfill. Despite this, most consumers send detectors to landfill via domestic garbage or hardwaste as they are unaware of an alternative disposal route.

There is currently a network of drop-off points through fire stations.

Material is currently stockpiled as there is no recovery or reprocessing available in Australia. Some detectors come back via household hazardous chemical collections.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for smoke detectors are:

- the lack of reprocessing facilities;
- the light weight of detectors and therefore the small volume of recoverable material;
- the lack of value of the plastic casing material;
- the dispersal of detectors in all households across the state;
- the perceived or real hazard from radioactive material; and
- poor communication between manufacturers/suppliers and government.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of smoke detectors may include:

- identify a practical and efficient collection and recycling / disposal system;
- identify reprocessing facility outlets for the plastic casing;
- resolve the issues in relation to hazard of radioactive material and clarify whether it is necessary to ban landfill disposal (note that most Australian States now allow disposal of smoke detectors to landfill);
- enhance communication between government and manufacturer/sales industry; and
- promote the preferred disposal method clearly to the community.

Chapter 26 - Video & Stereo Electronic Peripherals

Consumption

This category includes a range of electronic equipment including portable video cameras, DVD players, integrated stereos (with CD player), VCR players, speakers, tape decks and record players.

All of this equipment is manufactured overseas. Imported material into the South Australian market is estimated at 310 000 units. This is likely to be a conservative estimate as data for import of some electronic equipment, such as standalone CD players, is unavailable. There is diversity of size between products in this category and between models. An average weight for each unit has been obtained and overall the average weight per unit is 4.5 kg. This means that the 310 000 units have a total weight of 1 400 tonnes in 2003.

Key Materials

The major materials in this category are steel and plastics.

Larger units generally have a steel internal frame. Most units now have an outer protective casing of plastic. This is usually HIPS or PPO, but PMMA, PC and ABS are also common. Other mechanical components, such as switches and dials, can be any of a large number of polymer types.

The type of plastics can vary from brand to brand and within each unit different components are likely to be different polymers.

The electronics contained within the unit have a mixture of non-ferrous metals – copper, tin, lead and silver.

Sales Trends

This sector is growing at a rapid rate. This is a result of new equipment being available, new features and a growth in the number of households purchasing each piece of equipment. Overall industry sources estimate the market is growing at an annual rate of 12% across the product category. The sales trends of individual products can very enormously from this average figure. The impact of this is that the market has doubled in the past 6-7 years. It is difficult to project ahead but it is assumed that strong sales growth will continue as new technologies such as digital broadcasting are introduced.

Life Expectancy

The life span of video and stereo electronic peripherals can vary but is usually around a five-year duration. The life expectancy of equipment is influenced by the following factors:

- changing technology;
- product failure;
- new models with broader or more advanced features; and
- fashion or 'look' of equipment.

There is some repair activity for equipment such as digital cameras. This is declining as the cost of repair increases relative to the cost of replacement. There is also a lack of knowledge within the community on where to take equipment for repair.

As a result there is a large proportion of units stored or disposed that could be repaired if a repair path was communicated. It is possible that a number of consumers use a product technical problem as a trigger for updating equipment.

There is also a pattern of updating equipment and retaining the existing unit as a secondary unit. There is a large number of households that now have multiple video and stereo units within the home.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is no co-ordinated recovery of video and electronic peripherals. As is the case with computers, telephones and some electrical appliances, many consumers view redundant electronic equipment as a product with a residual value, rather than as a 'waste'. For this reason, many units are stored in houses or commercial sites rather than disposed to landfill.

Many households would therefore have a non-functioning, faulty or out-of-date VCR, CD, DVD or tape player.

For this reason the volume of sales into the South Australian market is not a good indicator of disposal to waste.

The best estimate, following industry consultation, is that the amount of stockpiled material is increasing in addition to the equipment in use. The volume disposed of in 2003 is thought to be less than a third of current sales volume and therefore disposal would total approximately 200 tonnes.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for video and stereo electronic peripherals are:

- the lack of high value materials that would make the collection, disassembling and reprocessing cost effective;
- the lack of a clear return route for householders - the equipment is not designated for collection through kerbside, point of sale or transfer station operations;
- the perception amongst consumers that the unused unit still retains a value and it must be worth something, leading to an expectation that they will get something at the point of disposal;
- the complex range of materials and composites and the cost and difficulty in recovering these;
- the dramatic increase in the number of units purchased by each South Australian household; and
- the reducing life expectancy of units due to technology change, product failure and reduced repair.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of video and stereo electronic peripherals may include:

- development of a product stewardship commitment from manufacturers, importers and retailers;
- development of a co-ordinated return route for equipment;
- communication of this return route to consumers;
- support for the establishment of recovery facilities for equipment including funding support to cover any shortfall between recovered value of materials and collection and sorting costs; and
- improved awareness amongst consumers about the role of repair in extending product life and details about repair outlets.

SECTION E - PACKAGING PRODUCTS

Chapter 27 - Beverage Packaging

Consumption

Beverages, such as soft drink, juice, milk, beer and wine are packaged in a wide range of materials. The total amount of beverage packaging in the South Australian market is estimated at 70 000 tonnes/year.

These packaging materials include glass, aluminium, steel, PET and HDPE plastics. The materials are outlined in detail below.

Key Materials

Glass

Glass is produced in clear, brown, green and blue and is used to package beer, wine, spirits and smaller quantities of fruit juice, soft drink and cordials.

The total consumption of glass packaging in South Australia is estimated at 52 000 tonnes/year. Beverage packaging accounts for 80 % of total glass packaging use.

Aluminium

Aluminium rigid can sheet is used to make beverage cans for beer, soft drink, and pre-mixed spirits. A tiny amount goes into cordial packaging. The total quantity of aluminium cans entering the South Australian market is estimated at 3 080 tonnes/year. 95% of aluminium can use is in beverage applications.

HDPE plastic

An estimated 3 050 tonnes of HDPE packaging is used in applications such as milk, juice, cordials and cold take-away beverages. 92% of HDPE use is in beverage applications.

PET plastic

PET plastic is used as a packaging material for the following beverages – soft drink, fruit juice, cordials, milk and cold take-away beverages. Smaller amounts go into pre-mixed spirits and milk modifiers. Over 95% of PET packaging goes into beverage applications.

PET is used predominantly in a clear form but some coloured material is used for soft drink. The total amount of PET beverage packaging is estimated at 6 450 tonnes in South Australia.

Polypropylene plastic

Polypropylene plastic is used as a beverage packaging material for cordials. In this sector, it has a minor market share compared to PET and HDPE. The total consumption for beverage applications in South Australia is estimated at 400 tonnes.

The use of polypropylene plastic is linked to its price, clarity and the ability to form a handle in the bottle. Beverage packaging accounts for only 10% of total polypropylene plastic packaging.

PVC plastic

PVC is a plastic that is used for packaging cordial. The total volume of PVC beverage packaging in South Australia is estimated at 330 tonnes/year. 80% of PVC packaging is in beverage applications. This represents only 5% of PVC use in all applications.

Polystyrene plastic

Polystyrene is used as a beverage packaging medium in two forms. As non-expanded polystyrene it is used for cold take-away drinks. This is a minor use totalling just 30 tonnes/year. Expanded polystyrene (or EPS) is used for both hot and cold takeaway beverages. The estimated consumption of EPS in beverage applications is 500 tonnes/year, which is 80% of total EPS use in packaging applications.

Steel

Steel can (tinplate can sheet) packaging is used for a range of beverages, including fruit juice, instant coffee and milk modifiers. These beverage applications consume an estimated 800 tonnes/year of tinplate steel. However, this is just 5% of total steel packaging use.

Liquid Paper Board

Liquid paperboard is a multi-layer material used for packaging milk, fruit juice, wine and cold take-away beverages. It comes in two types – either a pack made from a HDPE coated sbs pulp, or an aseptic pack made from a foil lined duplex pulp.

The total of liquid paperboard across both forms is 2 000 tonnes/year or 80-90% of total liquid paperboard packaging.

Cardboard – Boxboard and Corrugated

Boxboard is used as a primary packaging medium for tea bags and for some types of instant coffee. The total beverage packaging use is 170 tonnes/year.

Corrugated cardboard is primarily a tertiary packaging medium, but is also used in the packaging of wine in casks. A total of 970 tonnes/year is consumed in this application.

Paper

Coated paper is used for hot take-away beverages. The estimated total consumption of this material in South Australia in beverage applications is not known, but is thought to be small but increasing moderately due to higher take away sales of these beverages.

A small amount of kraft paper is also used in tea bags, an estimated total of 55 tonnes/year is consumed in this beverage application.

Sales Trends

The overall trend in beverage packaging is a moderate increase (Table 27.1). This is due to population increases, increased beverage consumption and a trend towards single serve packaging. The individual sales trends for each beverage material is outlined below.

Table 27.1: SA Beverage Packaging Consumption and Sales Trends Summary (2002 data)

Packaging Types	Consumption (tonnes)	Market Trend
Aluminium - rigid can sheet	3 080	Moderate increase
Cardboard - box board	170	Stable/moderate decrease
Cardboard - corrugated board	970	Moderate decrease
Glass - clear, brown, green, blue	52 000	Moderate increase
HDPE homopolymer - clear rigid	3 050	Moderate increase
HDPE homopolymer - coloured rigid		Stable
HDPE - multi-layer/barrier rigid		Moderate increase
LPB - foil lined (aseptic) duplex pulp	830	Moderate increase
LPB - sbs pulp	1 100	Moderate decrease
Paper - coated	N/A	Moderate increase
Paper - kraft	50	Moderate increase
PET - clear rigid	6 450	Significant increase
PET - coloured rigid		Significant increase
PP - clear rigid	400	Moderate decrease
Polystyrene - expanded (EPS)	500	Significant decrease
Polystyrene (PS)	30	Significant decrease
PVC - clear rigid	330	Stable
Steel - tinplate can sheet	800	Stable
Total	**69 760**	**Moderate increase**

Life Expectancy

All beverage packaging has a short life span with all packaging manufactured and used within the same year. There is no significant stockpiling of packaging material at any point in the manufacturing, consumption or disposal cycle.

The only long-term retention of packaging occurs through littering where a small amount of beverage packaging will be littered and not recovered in a short timeframe.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Recovery levels for beverage packaging are amongst the highest for any product.

While precise State recycling rates for beverage packaging are not available these are known to be much higher in South Australia than for other states. This is due to the container deposit on most forms of beverage packaging. This gives a dual return route for beverage packaging. Some material comes back for recycling through kerbside recycling collections. Other packaging is recovered through a depot network where deposits are redeemed. As a result, less beverage packaging is lost to the waste stream and levels of beverage related litter is also lower. The lower litter incidence is a combination of consumers holding onto their packaging rather than discarding it and also a higher level of activity for people picking up discarded bottles and cans. The level of recovery from non-household areas – hotels, restaurants, sporting venues - is also higher in South Australia.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for packaging are:

- a high proportion of beverage packaging is consumed away from home where collection and recycling is more difficult to manage;
- the incidence of glass breakage in mechanised recycling systems is often high and much of the broken material is not recovered.;
- the consumption of beverages in remote locations results in a need to freight material to Adelaide for recycling;
- there is a trend towards smaller single serve containers with a higher packaging to beverage ratio. These smaller sized containers are also recovered at lower rates than larger bottles; and
- there is a broad range of plastic materials used for beverage and only some of these have a clear and well co-ordinated recovery and recycling route.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of packaging may include:

- working with local government collection and sorting contractors, to ensure the increased recovery of all rigid plastics packaging;
- in co-operation with PACIA and plastics reprocessors, ensure a market destination exists for all collected rigid plastics;
- assist councils across the state to provide a reliable and convenient kerbside collection; and
- extend CDL to cover all beverage packaging.

Chapter 28 - Flexible Plastic Freight Packaging

Consumption

A significant volume of plastic packaging is used in freighting goods on pallets between manufacturing and wholesale/retail destinations.

This material is in two different forms:

- stretch wrap – elastic film that is wrapped around items to hold them together during transport; and
- shrink wrap – film that is heated to contract and hold items together during transport.

Both forms of flexible plastic wrap are made from Low Density Polyethylene (LDPE) film. A variation of this material used is called Linear Low Density Polyethylene (LLDPE).

This packaging film is the largest application for LDPE and LLDPE in Australia. The quantity of material consumed in the South Australian market is estimated at 11 000 tonnes/year.

As some goods are traded interstate or internationally, there is a flow of material from its point of use to its point of disposal. As a net importer of goods, South Australia is likely to have at least 11 000 tonnes available for disposal. In addition to stretch and shrink wrap, some large items are wrapped in polyethylene film for protection during freighting. Examples of this are mattresses, timber and furniture. Most of this film is not stretched or shrunk.

Key Materials

All flexible film wrap is LDPE or LLDPE. Most of this material is clear or opaque (natural) although there is some use of black or white film. Some film is written on and some have plastic paper or metallic labels adhered.

Sales Trends

There is a moderate but continuous increase in the volume of flexible film freight packaging in South Australia. Stretch film wrap is gaining market share over shrink wrap in most sectors. As a packaging medium rather than a product, sales of wrap will generally be linked to growth in sales of the product.

Life Expectancy

Almost all material is used to transport goods over a short period. Over 95% of film will have completed its product life within 12 months of use. There is some plastics held in warehousing applications over longer periods. As the growth in this material is modest and the product life span is generally less than 12 months, the disposed quantity is likely to be similar to the purchased quantity.

In many applications, the film is in use for only a matter of days or hours before being removed and disposed.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is no reuse of flexible film possible from either the shrink or stretch wrap forms.

The recycling of flexible plastic packaging is increasing at large retail and manufacturing outlets. In some cases waste generators are linking the collection of plastic film with the collection of packaging cardboard. It is estimated that 70% of freight packaging is currently recycled.

There are plastics recyclers who can accept and reprocess clean LDPE film if delivered to their recycling facilities. There is a gap in collection with neither waste generators nor plastics recyclers geared to collecting plastic film.

At most manufacturing or retail sites, plastic freight packaging is one of the largest components of the material sent to landfill (by volume).

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for flexible plastic freight packaging are:

- lack of collection infrastructure for freight packaging;
- low value of the material recovered relative to the cost of collection and reprocessing;
- low density of film makes efficient compaction and collection difficult; and
- some film contains sticky transit labels that are a problem in recycling.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of flexible plastic freight packaging may include:

- promoting recycling outlets to waste generating sites.
- encouraging plastics reprocessors to facilitate the compaction and collection of flexible plastics packaging.
- coordinating product stewardship commitment from PACIA and plastic manufacturers to facilitate the viable recovery and recycling of film.
- investigating the potential to reduce film use through the use of stillages, walled pallets and plastic strapping.

Chapter 29 - Food Packaging (excl beverage)

Consumption

South Australians consume a broad range of dairy products, bread, cereals, meats, small goods, take-away meals, fruit and vegetables, confectionery and many other categories. Across each of these there is a range of packaging forms and materials.

Table 29.1 below covers 37 of these materials and shows the products that are packaged in each material. It also gives an estimate of the volume of each material in food packaging applications in South Australia.

In total, the food packaging sector is estimated at just under 100 000 tonnes. This includes primary packaging and closures and outer packaging. It also includes take-away food packaging.

Table 29.1: SA Food Packaging Consumption and Sales Trends Summary (2002 data)

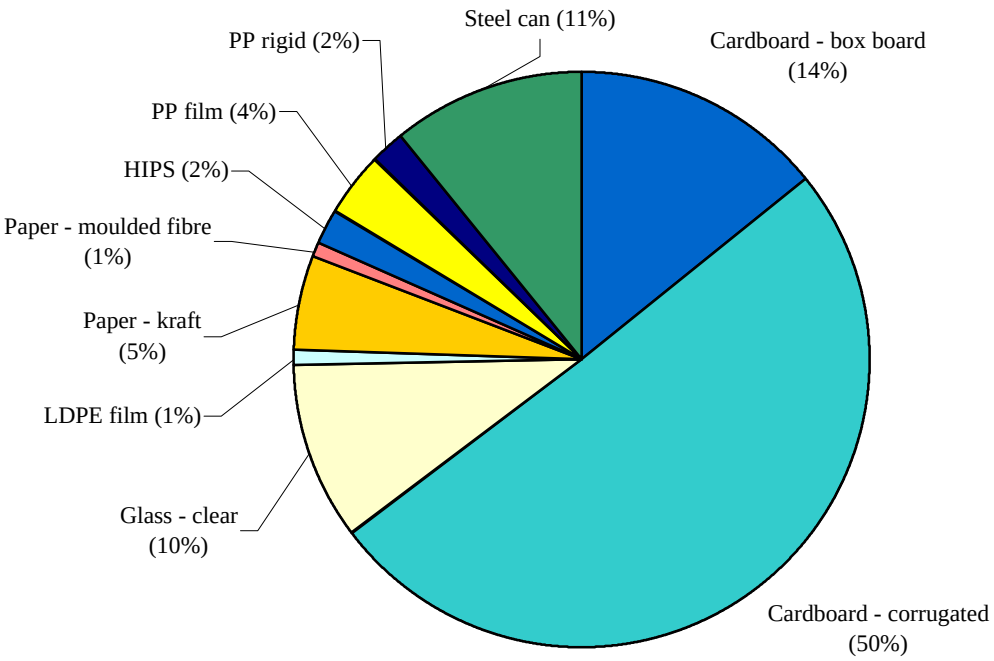
Packaging Types		Consumption (tonnes)	Market Trend
1	ABS	250	Significant decrease
2	Aluminium - semi-rigid sheet	N/A	Stable
3	Cardboard - box board	13 550	Stable
4	Cardboard - corrugated board	48 700	Stable
5	Cellulose acetate film	N/A	Significant decrease
6	Glass - clear	9 820	Stable
7	HDPE - multi-layer/barrier rigid	N/A	Stable
8	HDPE film	230	Stable
9	HDPE homopolymer - coloured rigid	10	Stable
10	LDPE - multi-layer/barrier film	50	Stable
11	LDPE - multi-layer/barrier rigid	N/A	Significant increase
12	LDPE film	660	Stable
13	LLDPE - multi-layer/barrier film	N/A	Stable
14	LPB - foil lined (aseptic) duplex pulp	90	Stable
15	LPB – solid bleached kraft pulp	140	Moderate increase
16	Paper - coated	N/A	Moderate increase
17	Paper - greaseproof	N/A	Moderate decrease
18	Paper - kraft	5 070	Stable
19	Paper - moulded fibre	850	Stable
20	Polycarbonate	60	Moderate increase
21	PET - clear rigid	30	Moderate increase
22	PET - film	150	Stable

Packaging Types		Consumption (tonnes)	Market Trend
23	PET - multi-layer/barrier rigid	N/A	Moderate increase
24	Polystyrene - expanded (EPS)	120	Moderate increase
25	Polystyrene - foamed sheet	390	Moderate decrease
26	Polystyrene - high impact (HIPS)	1 940	Stable
27	Polystyrene (PS)	90	Stable
28	PP - clear rigid	430	Stable
29	PP - coloured rigid	100	Stable
30	PP - film	40	Stable
31	PP - metallised film (BOPP)	N/A	Moderate increase
32	PP - multi-layer/barrier film	3 540	Stable
33	PP - multi-layer/barrier rigid	1 730	Stable
34	PVC - clear rigid	40	Moderate decrease
35	PVC - multi-layer/barrier film	N/A	Moderate increase
36	PVC - multi-layer/barrier rigid	N/A	Stable
37	Steel - tinplate can sheet	10 500	Stable
Total		**98 580**	**Stable**

Key Materials

The graph below shows the relative consumption of the major packaging materials in the food sector. Materials with a consumption of greater than 500 tonnes/year are presented.

Figure 29.1: Relative Consumption (by weight) of Packaging Materials in SA (2002)



Sales Trends

The overall weight of food packaging grows each year. This is the result of a range of factors:

- increased security and tamper resistant packaging;
- a trend towards smaller single serve pack types;
- introduction of layers for presentation purposes; and
- a higher proportion of processed food being purchased relative to fresh produce.

Table 29.1 above shows the sales trends for each of the materials.

Life Expectancy

Most food packaging is of a short-term nature. It is assumed that all food packaging travels through the cycle from manufacture to retail sale, consumption and disposal/recovery within a year. The only exception is a very small volume of food packaging that is littered and retained in the environment.

Stockpiling, Landfill Disposal, Reuse, and Recycling

The dominant packaging medium for food is paper and cardboard in a range of forms. This material is readily recyclable and is currently recycled through kerbside recycling collections at high rates. The same applies to glass packaging for food. In both cases the potential for food residue limits the recycling activity of householders (consumers are less likely to wash and recycle a jam jar than they are a wine bottle). Food containers also differ from beverage packaging in not having a container deposit applied.

This is a range of flexible plastics used for food packaging (LDPE, HDPE, PP and PET). The recovery of these is minimal. Overall the level of food packaging recycling is likely to be around 50%.

The remaining food packaging is almost all entering landfill via kerbside garbage. This is a small fraction from the food industry sector.

A small but growing volume of food packaging relates to take away food and much of this is consumed away from home. It is in this sector that littering of food packaging is likely to occur. It is likely to included not only take away meals but also confectionery and ice cream wrappers.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for food packaging are:

- some consumers see recycling activity being limited to beverage rigid packaging and therefore do not actually recycle food packaging;
- some food packaging has food residues and rather than washing containers, some of this material is sent to waste;
- there is no recycling opportunities for some plastics particularly flexible plastics; and
- there are limited recycling opportunities for food waste generated in commercial premises and at public venues.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of food packaging may include:

- encouraging the use of recyclable forms of food packaging through the NPC action plan process;
- educating consumers to the need to recycle food packaging at the same levels as beverage packaging;
- work with PACIA on the inclusion of all rigid plastics in kerbside and on investigation into flexible plastics recycling viability; and
- work with local government to expand the range of materials collected through kerbside collections.

Chapter 30 - Freight Packaging Pallets

Consumption

A common form of tertiary or freight packaging is freight pallets. These are used to allow stacked goods or packaging to be easily loaded and unloaded off delivery vehicles and to be stacked and carried by fork lifts at both manufacturers and retail outlets.

Most Australian pallets are of a consistent dimension of 1 165 mm by 1 165 mm. These pallets are reusable allowing their hire and use in a common national pool.

In South Australia there is an estimated 1.75 million pallets in circulation. Each year a proportion of these are damaged, lost or sent to landfill. As a result, an estimated 175 000 new pallets are introduced into the system annually in South Australia, with an equal number of pallets disposed of.

At an average weight of 37.5 kg this is a total of 6 600 tonnes of new pallets each year.

Key Materials

Most pallets are wooden and made from Australian hardwood, with some imported timber material used. A growing amount of non-reusable pallets and skids, which are made from softwood materials, are also appearing in the market.

The timber pallets are used in a wide variety of applications, from transporting building materials to manufactured goods. As the pallets move within the common pool, they can be exchanged between different applications. This represents a health concern for pallet use with food products. As a result of this concern and the difficulty in washing timber, an increasing number of plastic pallets are used in food industry applications.

These plastic pallets are manufactured from high density polyethylene (HDPE) plastic. They are often made from recycled content plastic sourced from milk bottle material.

There are many food and beverage manufacturers such as Cadbury Schweppes who have switched all of their pallet use to plastic.

Sales Trends

The volume of pallets in circulation has remained fairly constant over the past decade.

There are some non-reusable pallets and skids. These are of a non-standard size or without the base platform. There is also a proportion of materials coming from overseas. This material is treated for pest control, potentially impacting upon its recyclability. This is due to the chemical residue and its incompatibility with uses such as garden mulches, playground soft fall or as a fuel source.

Life Expectancy

The average pallet is used 20-30 times before it reaches end of life. The average life expectancy is ten years. This includes repair of pallets within this period.

The life expectancy of plastic pallets is expected to be longer than for timber due to the more robust one piece construction. Countered against this is the likelihood that pallet users in the food sector will have a more rigorous quality requirement and may choose to replace pallets before the point of failure.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Much of the timber from pallets is recovered as their replacement is controlled by companies such as Brambles; manufacturers of CHEP pallets.

A high proportion of the pallets lost to the system are sent to landfill after disposal at building or manufacturing sites, or retail outlets.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for freight packaging pallets are:

- imported pallets are often treated for pest control with chemicals impregnated into the timber. This makes them unsuitable for recycling into mulch and compost applications or for use as a fuel source.
- pallets lost out of the reuse pool. This can occur when goods are delivered to a destination from which there is no regular delivery and pick-up arrangement. In these cases a small volume of pallets can be left for extended periods in wet weather and with other unwanted materials. These pallets are more likely to go to landfill. Residential building sites are a common point at which pallets can be sent to waste.
- damaged pallets are also often disposed rather than returned and repaired.
- many receivers of goods on pallets are unaware of the ownership status of the pallets and this can reduce their level of return.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of freight packaging pallets may include:

- co-ordination with the pallet manufacturing industry to identify areas of pallet loss;
- extending the National Packaging Covenant coverage to tertiary (or freight) packaging;
- co-ordinating the recovery of pallets at waste disposal sites prior to their landfilling;
- consideration of a ban on disposal of pallets to landfill; and
- increasing community awareness of the ownership and recovery route for pallets.

Chapter 31 - Other Grocery Packaging

Consumption

Grocery packaging comes in many different forms. Excluding food and beverage sales, key grocery sales include cleaning products, health and beauty, homewares and pet food. In total mass of packaging is estimated at 12 900 tonnes/yr. This is across 30 different packaging material types. This compares with an estimated annual consumption of food packaging of 100 000 tonnes and beverage packaging of 70 000 tonnes.

Key Materials

Unlike beverage packaging this sector has a high proportion of flexible plastics and multi layer packaging. The following are the key packaging types:

Glass

Most glass in non beverage applications is clear glass. It is used in products such as health supplements, garden products, perfume and analgesics. The total volume of glass packaging used in 2003 was 3 300 tonnes or 25% of this sector.

Boxboard

Flat cardboard sheet is used for packaging boxes across dry pet food, laundry powder, cigarettes, facial tissues and feminine hygiene. A total of 1 200 tonnes is used in this sector.

Steel-tin plate

Steel-tin plate cans are used extensively for pet food. In addition to this steel aerosols are used for household cleaning, fabric softener, deodorants and garden products. The total amount of packaging is 4 800 tonnes. This represents over 35% of non food and beverage packaging and 30% of steel can applications.

LDPE

LDPE low density polyethylene is used in both rigid and flexible forms. A total of 320 tonne goes to film packaging of toilet tissue, nappies and feminine hygiene. A further 380 tonnes go to shampoo and conditioner packaging in a rigid form (squeezable tubes).

HDPE

HDPE high density polyethylene is used in several forms but most commonly as coloured rigid packaging for hair care, household cleaning, laundry liquids, dishwashing powder and baby toiletries, together with clear rigid HDPE these are over 200 tonnes/yr.

Aluminium

Aluminium cans are used for deodorant (aerosol) and for some pet food applications. This accounts for 160 tonnes.

Polypropylene

Polypropylene rigid plastic is used in both a clear and coloured form. Together the total quantity of polypropylene used is 270 tonnes. This goes into household cleaner, hair care and garden plant pots.

A similar quantity, 350 tonnes, goes into polypropylene film packaging. This is used for pet food, pet accessories and treats, showering needs and a range of smaller uses.

Liquid paperboard

Liquid paperboard is used for fabric softeners and laundry liquids. The total quantity (by weight) is 140 tonne/yr.

Sales Trends

The packaging quantity generally reflects the growth in these grocery products. Over the past decade, this sector has consistently had moderate annual increases. There is some shift in packaging materials from one material to another and some light weighting of individual packs through improved packaging manufacture or design.

Life Expectancy

The life expectancy of the grocery packaging is short term, consistant with the life of the packaged product.

Stockpiling, Landfill Disposal, Reuse, and Recycling

For materials such as boxboard, tinplate steel, glass and clear DHPE there are recycling opportunities through kerbside collections and these items are regularly recovered. While there is no technical impediment to other materials being recycled, the recycling rates for aluminium aerosols, polypropylene, LDPE rigid containers and LPB remain low. This is due to a combination of the following factors:

- product residue in packaging;
- consumers unclear about recyclability; and
- materials not designated by local council for recycling.

It is anticipated that almost all flexible plastics packaging including multi-layer materials will be going to landfill.

As almost all of this grocery packaging is consumed at a household, it is unlikely that any of these forms of packaging will be found in the litter stream in any volume.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for other grocery packaging are:

- plastic such as polypropylene, PVC and LDPE are not designated for recycling in many areas;
- a lower level of consumer awareness about recycling non-beverage packaging through kerbside collection; and
- some issues with product residue that can be a problem in either sorting or reprocessing. This can relate to pet food residues, soaps or detergent.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of other grocery packaging may include:

- investigating the extension of kerbside collections to include all forms of rigid plastic packaging;
- promoting to householders that non-beverage packaging is equally recyclable and important; and
- seek research through the PVPC into the recyclability of new and emerging flexible plastics.

Chapter 32 - Retail Carry Bags

Plastic retail carry bags are the most common form of retail packaging in South Australia with over 600 million used in 2003.

The profile of retail carry bags is high due to their wide spread use, a perception that they are unnecessary and their existence in litter streams. Half of the retail carry bags used are from supermarkets.

The ratio between low weight 'singlet' style bags as used in supermarkets and heavier 'boutique' style bas is 85:15.

Sales Trend

Throughout the past decade, retail carry bag consumption has grown rapidly. Following widespread conservation from consumers and community/environmental organisations. The State and Federal Governments announced a range of targets for achievement by the end of 2004 and 2005.

The retail industry has produced a code of practice that is to be implemented by leading retailers. It is hoped that his introduction will lead to the major reductions in bag consumption and disposal outlined in the Government targets. Early reports from some retailers indicate substantial falls in bag use, reversing the long term growth trend, but not at levels sought by government. Some individual retailers have removed bags or placed a charge on them thereby achieving a reduction of over 85% in a short period.

Key Materials

All retail carry bags are made of polyethylene. The singlet style bags are high density polyethylene (HDPE), while the boutique bags are low density polyethylene (LDPE). In total, the weight of polyethylene used in carry bags in South Australia is about 2 800 tonnes in 2003.

Life Expectancy

All bags are short life, going from sales to disposal in a timeframe of less than 3 months. There is a high level of reuse of bags within households for wrapping rubbish. There is a small percentage 1-2% of bags that enter the litter stream. Most of these are in the urban landscape and are recovered in a short period of time. Some are littered on roadsides and other ground based litter destinations. These bags are recovered or disintegrate in a period of less than 6 months.

A small proportion enters the aquatic environment where they can become an aesthetic problem or hazard to wildlife.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Reuse rates within households are estimated at 60%. Around 3-5% of bags are brought back to point of sale for recycling. PGS in Adelaide is the primary recycling destination for Australian carry bags. The vast majority of bags (95%) go to landfill.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for retail carry bags are:

- the disbursed spread of bags across all households;
- the light weight per bag making recycling relatively expensive compared with the cost of manufacturing new bags from virgin material;
- the resistance of retailers to charge for bag use;
- the practice of some retail staff to provide a bag for one or two items; and
- the unplanned nature of shopping habits restricting the use of durable reusable bags.

Potential for Reduced Waste Disposal

The potential activities to increase the lifespan, reuse and recycling of retail carry bags may include:

- retailers could charge for bags leading to a dramatic reduction in usage;
- training of retail staff could result in more efficient usage of bags and more no bag transactions;
- consumers can be encouraged to switch to reusable alternatives;
- consumers could be encouraged to return unused bags to point of sale for recycling; and
- government at a State/Federal level could review compliance with targets, and if not met introduce a levy or a ban.

SECTION F - AUTOMOTIVE PRODUCTS

Chapter 33 - Automotive Batteries

Consumption

Automotive battery sales for 2003 in South Australia were 379 000. This included both car and truck batteries with car batteries accounting for 83% of sales units. The weight of automotive batteries varies, with car batteries averaging 13 kg each. Truck batteries are a 24V battery and weigh 20 kg on average.

The annual weight of all batteries sold into the South Australian market was 5 400 tonnes in 2003.

Key Materials

Batteries have three key material components. The outer casing is usually made from polypropylene plastic, although sometimes synthetic rubbers are used. The battery contains a quantity of sulphuric acid (15%), metallic lead (25%), lead sulphate and lead oxide (50%), plastics (5%) and other (5%). The lead based plates account for 75% of the battery weight.

Sales Trends

The market for automotive batteries is linked to the number of vehicle registrations. With a surge in new car sales in 2003 overall battery sales increased by over 10%. On average over the past decade, the annual sales increase has averaged 4% /year. This means battery sales have doubled in the past twenty years. Another factor influencing sales is the progressive increase in the distance travelled by vehicles on an annual basis.

Life Expectancy

The life of a battery is closely linked to age and kilometres travelled. It is also influenced by battery product quality and maintenance. Industry sources put the average life expectancy of a truck battery at 1.5 years and life of a car battery at 3.25 years

Stockpiling, Landfill Disposal, Reuse, and Recycling

As the value of lead is high the recovery and recycling of automotive batteries is very high. It is estimated that 80% (4 300 tonnes) of automotive batteries is recycled in South Australia in 2003. As a result, the quantity of auto batteries being sent to landfill is low. In the process of recovering the lead component of batteries the other key materials – acid solution and polypropylene - are also recycled. Batteries are transferred to Melbourne for recycling.

The small volume of batteries going to landfill is probably limited to remote areas where recycling infrastructure is not developed. There is also an issue of the awareness of consumers about where to take batteries for recovery. Usually the battery is recovered as part of a changeover either at a retail outlet or through roadside assistance.

There is a higher proportion of batteries being purchased through chain stores and the recovery of end of life batteries at these sites is much lower than for those purchased at a garage or roadside.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for automotive batteries are:

- remote locations for some batteries particularly in the northern part of the state;
- the lack of a return system through chain store retail outlets; and
- the lack of awareness amongst consumers about the correct recovery path.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of automotive batteries may include:

- obtaining a product stewardship commitment from the two major Australian manufacturers;
- increasing awareness about drop-off facilities; and
- extending the drop off facility network through CDL sites, rural disposal sites and to all retail outlets.

Chapter 34 - Cars

Consumption

Australia has one of the highest car ownership rates in the world. The total number of passengers cars registered in South Australia in 2003 was 980 000. During 2003 some 49 200 new car registrations occurred, and there were 27 200 registrations not renewed. It is assumed that this non-renewal represents an accurate picture of vehicles coming out of the state car market.

There are, in addition to these passenger cars, also registration non-renewal of 11 700 motorcycles, heavy vehicles, caravans and trailers. Australians hold their cars longer than in most other developed countries indicating that we have a strong used car market operating.

Key Materials

The key material used in car manufacture continues to be steel. This is in the form of chassis, engine and drive components, and in body panels. There is, over time, an increase in the volume of plastic in passenger cars. This is in bumper bars, dashboard, petrol tanks and interior lining. Other key materials are:

- aluminium – engine components;
- rubber – tyres;
- textiles – seats, flooring, interior lining; and
- glass – windows, windscreens.

Sales Trends

In the past year, registrations in South Australia have risen by 22 000 or 2.3%. This continues a growth trend of many years.

The proportion of the South Australian population that is of driving age continues to rise. The ratio of cars per capita is also increasing. Trends within the car market are as follows:

- increased sales of large 4WD vehicles;
- reduced market share for large sedans;
- increase in small car sales; and
- increase in budget brand car sales.

Life Expectancy

There is a well established pathway for automotive waste recovery in South Australia. Many vehicles are decommissioned due to collision damage. Others reach end of life due to engine or general mechanical failure. Others reach a point where they are old, unreliable and their value is not seen as worth retaining. A small number of cars are retired due to the retirement of their owners as drivers.

Most vehicles through their life will have been transferred through a number of owners. The majority of new car purchases are corporate or government sales. These are generally transferred to private ownership within 2-5 years. The average life expectancy of passenger vehicles is approximately 15 years. Some vehicles reach end of life due to collision damage in a short period. For other vehicles, a period of 10-25 years is usual.

The profile of cars being decommissioned is therefore those manufactured in the late seventies to early nineties. These vehicles had a higher proportion of steel than current new vehicles and a lower proportion of plastics.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Many vehicles are scrapped through car wreckers (automotive recyclers). These companies take both body parts and mechanical parts for use in other cars. When available parts have been stripped or are not in demand, the remaining vehicle is scrapped.

There is a well established network of scrap metal agents who trade scrapped cars to metal reprocessors such as Simsmetal and Smorgon Steel. These two companies also receive scrapped cars from owners. They also operate recovery of vehicles form rural and provincial sites through the use of mobile car crushing equipment. These are servicing a range of transfer stations, landfills, auto recyclers, panel beaters and farms.

Cars are shredded and the metals (steel, aluminium, and alloys) are recovered and recycled. Tyres are removed and a small proportion recycled. Some plastic components (primarily bumper bars and petrol tanks) are recycled. There is no recovery of textiles including the flock lining of interiors.

It is estimated that over 90% of vehicles are sent to shredders for metal recovery of metals and some plastics. This results in a total materials recovery rate of 80%.

Therefore the estimated recovery of materials from cars is probably around 75%.

The major residue of automotive recycling is a shredded mix of textiles, plastics and residues of glass and metals.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for cars are:

- the disposal of many vehicles is in rural locations and the capture of these is a challenge;
- some consumers have no knowledge of how or where to take vehicles for reuse or recycling;
- some materials (such as rubber and foam) are difficult to remove from cars and have limited or no market outlets;
- a trend for vehicles to contain a higher proportion of less valuable or less recyclable materials;
- a labour component in preparing cars for shredding (removal of fuel and other fluids, removal of tyres) that impacts on the value of end of life cars; and
- contaminant materials present in cars at the end of life (such as fluids, asbestos, gas tanks and gas bottles).

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of cars may include:

- encouraging the stockpiling of end of life cars at rural disposal sites and coordinating their recycling through mobile crushers;
- working with the automotive, plastics and scrap industries to expand the range of materials recovered during end of life reprocessing;
- giving consideration to a restriction on the landfilling of cars where recycling opportunities exist; and
- identifying market outlets for shredded textile waste from cars.

Chapter 35 - Tyres

Consumption

In 2003 an estimated 2.0 million passenger vehicle tyres were purchased in South Australia as replacements for worn tyres. An additional 200 000 tyres were supplied on new vehicles sold into the market.

The sale of tyres is also closely linked to car sales, car registrations and kilometres travelled. The average passenger tyre weight is 7.5 kg meaning that total volume of tyres into the market is 16 500 tonnes.

In addition to passenger vehicle tyres, approximately 400 000 tyres for heavy vehicles and other vehicles (caravans, trailers, motor cycles and aircraft) were purchased in 2003 with a weight of 9 600 tonnes.

Key Materials

Tyres are made predominately from synthetically compounded rubber. In addition, there are layers of textile and steel mesh. The quality of the rubber used in heavy vehicle tyres is superior to that used in passenger vehicle tyres. The recycling industry prefers a higher quality rubber with less textile content.

Sales Trends

Tyre sales are increasing in line with car sales. The increase in sales over the past five years has been 11%, and is in part due to increased annual travel distances per vehicle.

Life Expectancy

The life of a tyre is most closely related to distance travelled and tyre quality. The average passenger vehicle tyre is estimated to last between 2 and 3 years.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is a small market of reconditioning tyres for reuse through retreading.

Tyre recycling takes several forms. Facilities crumb rubber and then utilise this material in a range of applications. These include paving, sound insulation and workplace flooring. Some truck tyres are now being recycled in Oakbank through Biofloat, a company that makes truck body liners and dam covers from rubber material.

In addition to this mechanical recycling, tyres are used in some states as a fuel for cement kilns. They offer a clean, high calorific value and constant fuel source. In Victoria over 15 000 tonnes per annum are used in cement kilns. In South Australia there is currently no fuel source outlet being used. Some material is being sent to Victoria for crumbing. Most tyres enter the waste stream at landfills. They can become a potential fire hazard if stored in large quantities. Unless shredded, tyres are a difficult material when buried as they can prevent sound compaction.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for tyres are:

- the absence of the option to use scrap tyres as a fuel source. With a cement kiln in Adelaide that is utilising timber for fuel, it may be possible to overcome this major market barrier;
- the absence of a tyre crumbing facility in South Australia makes it more difficult to achieve high recycling rates. The additional cost of freighting tyres to Victorian markets makes it hard to compete against Victorian scrap tyres that are in plentiful supply;
- market perception of retreads; and
- cheap imports competing with retreads.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of tyres may include:

- undertaking an investigation with Adelaide Brighton Cement into the possibility of using tyres as a fuel source;
- establishing a dialogue with TyreCycle, Australia's largest tyre recyclers, about the efficient interstate freighting of tyres; and
- use in road-making.

SECTION G - BUILDING MATERIALS

Chapter 36 - Asphalt Road Materials

Consumption

The total quantity of asphalt road materials being produced in South Australia in 2003 was 4 500 tonnes. This was 5% bitumen by weight and 95% aggregate by weight.

Key Materials

Asphalt is a construction material, commonly used for paving roads and parking areas. It consists of asphalt and mineral aggregate mixed together, laid down and compacted.

Asphalt is a highly viscous liquid that occurs naturally in most crude petroleum. Asphalt paving is produced by either a hot or cold mix method.

Hot mix paving involves heating the asphalt to 60^0 C to increase viscosity prior to compaction. This is commonly used for highly trafficked pavements. Cold mix paving is produced by emulsifying the asphalt in water with soap. This method is commonly used for patching and for lower level service roads.

Sometimes 4-5% imported rubber is included in asphalt paving to reduce cracking and wheel track deformation.

Recycled asphalt paving can now be incorporated back into asphalt production using both hot and cold mix methods.

Sales Trends

There has been a steady increase in asphalt use over the past decade. This has been closely linked to major road upgrades. It also reflects the level of activity in re-surfacing and upgrading the highways and secondary road network.

Life Expectancy

The life of asphalt pavement can vary enormously in line with traffic volumes. Industry sources suggest that the average life across all product uses is 20 years.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There has been a longstanding practice in asphalt production to blend up to 10% of recycled asphalt back into hot mix batches. There is now a growing practice of incorporating asphalt back into cold mix batches. This can be done at a much higher ratio than into hot mix batches.

In 2003 100 000 tonnes of asphalt was removed during road rehabilitation and returned for recycling. This is done through construction and demolition recycling facilities, which crush and screen material before sale to asphalt paving producers.

A proportion of asphalt paving is dug up and disposed of to landfill. A 2004 landfill audit conducted for Zero Waste South Australia by Waste Audit and Consulting Services showed that an estimated 4 300 tonnes of asphalt was entering metropolitan landfill in 2004. (Based upon 66.2 tonne disposed of in one week to 5 landfills. It also assumes that these five landfills receive 80% of South Australian waste that is disposed of to landfill).

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for asphalt road materials are:

- the level of traffic wear caused particularly by heavy freight vehicles; and
- the generation of asphalt waste from rural roads in parts of the state well away from construction and demolition recyclers.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of asphalt road materials may include:

- development of a product stewardship commitment from asphalt producers to work to increase asphalt recovery;
- expansion of asphalt sorting and crushing activity including in areas outside of Adelaide;
- pursuing a commitment to maximise the recycled asphalt content in both cold and hot mix methods; and
- a government agency commitment to seek increased recycling asphalt content when tendering for road projects.

Chapter 37 - Bricks

Consumption

Bricks have been a dominant building medium for housing and commercial building for 150 years.

Key Materials

The majority of bricks in the South Australian market are fired clay bricks. There are also concrete based bricks. The South Australian market has a higher proportion of concrete based bricks than other states.

Sales Trends

The building industry in South Australia has grown by nearly 50% over the past ten years, or annual growth of over 3%. Sales of brick have been assumed to have risen at a similar rate. There is a growing trend towards pre-fabricated concrete walls in much commercial and high density housing.

Life Expectancy

Bricks are long life products with some buildings of over 100 years still remaining in good condition. Most bricks enter the waste stream due to building demolition rather than product failure.

Most housing stock has a life expectancy of over 40 years and therefore the existence of brick in the waste stream bears most relevance to current demolition rates rather than current production and consumption rates.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is no specific data in South Australia for disposal and recycling of bricks and it is aggregated with stone.

The 2004 extrapolated landfill audit undertaken in Adelaide shows disposal of brick and stone to landfill at a level of 41 000 tonne.

Most of the bricks come from demolition of housing or commercial buildings.

The current volume of brick and stone recovered for recycling in South Australia is 327 000 tonnes/year. This covers all brick and stone sent for crushing into aggregate. The end use of this material is for road base or in concrete manufacture.

It does not include brick cleaning and re-use which could account for a further 5 000 tonnes/year.

The overall diversion rate for brick cannot be estimated as the recording of disposal and recycling data is not specific to bricks.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for bricks are:

- old bricks are low value products. There is not a high motivation for recycling the material for waste generators. The major reason for material being presented for recovery is to avoid land fill charges.
- while the recovery of brick is widespread, the material going to landfill is often in mixed loads where other wastes are dominant. There are no present restrictions on the landfilling of bricks.
- much of the brick material from before the 1950s utilised lime mortar which is easier to clean off for brick re-use. More recent mortars are cement based and this makes brick cleaning a less practical option.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of bricks may include:

- increased landfill charges making recovery more attractive;
- increased distances to landfill making local reprocessing options preferable;
- bans or restrictions on land filling requiring loads to be sent to reprocessing facilities; and
- expansion of crushing infrastructure to smaller population centres.

Chapter 38 - Cables

Consumption

A large volume of cable is used in South Australian homes and industry for electrical and electronic applications.

The total estimated volume of sales in 2003 was 8 800 tonnes. The largest proportion of this is electrical cable with a plastic insulating sheath.

Key Materials

The three key materials in cable manufacture are copper, plastic and aluminium. Most cable has a copper core. The diameter of this copper varies with each application but larger cables have a higher proportion of copper core material.

It is estimated that copper makes up 57% of the total mass of cables or 5 000 tonnes/yr.

Plastic insulation is usually PVC but can also be HDPE. The total quantity of plastics in cable is 34% of total cable mass or 3 800 tonnes. Aluminium makes up most of the remaining 9 or 10% of cable mass.

Sales Trends

Sales of cable are increasing at an average rate of 3% per year over the past decade. Sales are linked to new home construction. Electronic applications such as pay television and cable internet connections also account for significant sales growth.

Sales of cable are expected to continue to increase over the next five years.

Life Expectancy

Cables when installed are usually retained for the life of the building or until building refit. This is most commonly on a 30 - 50 year time line.

There is a higher degree of cable replacement on older housing stock where cable and insulation quality from more than 30 years ago is considered sub-standard.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Most cable remains in buildings for a long period and therefore the disposal levels relate more to consumption levels of the past. Based on historic sales trends and life expectancy, it is estimated that the quantity of cable being disposed each year is 3 100 tonnes.

Due to the high value of copper (at $3 500/tonne) as a scrap metal, a large proportion of cable is recovered and sorted for recycling.

In the past the stripping of cables to recover the copper has usually occurred locally. There is now a growing trend, subject to export regulations, for cabling shredding and stripping to occur in countries with lower labour costs than Australia. The PVC material is also generally recovered when stripped from the copper.

The aluminium is used in overhead wiring external to housing and commercial buildings. There is a high level of recovery of this material.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for cables are:

- labour cost of stripping cable is increasing and for small diameter cable this can be uneconomic; and
- generation of waste cable off-cuts in building construction is usually not in amounts worthwhile collecting for recovery.

Potential for Reduced Waste Disposal

The potential activities to increase the lifespan, reuse and recycling of cables may include:

- separation from mixed demolition waste;
- encouragement of export market for used cable; and
- introduction of automated machinery capable of stripping wire rather than relying on labour.

Chapter 39 - Carpet

Consumption

Sales of carpet in Australia is measured in square metres. The total market for South Australia in 2003 was 4.2 million square metres. At an average weight estimated at 2 kg/square metre, this equates to annual sales of 8 500 tonnes. Sales are both for carpet replacement and also for new buildings or replacing other floor coverings. The total amount of carpet in South Australian buildings is estimated at 40 000 tonnes.

Key Materials

The carpet market is split into wool- based carpets and polyester blends. Carpet underlay is made from polyurethane.

Sales Trends

The market for carpet is linked closely to building activity. Despite a one year downturn in 2001, the market rebounded in 2002 and increased again in 2003 by 3%. Over the past decade the sales growth has been almost 20%.

Life Expectancy

Carpet life is linked to building type, level of wear, maintenance, product quality and changes in décor. The overall life span average for carpet is 12 years. Some commercial carpets will have a much shorter life span.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is a small level of carpet re-use activity. Some commercial carpets are recovered and re-laid in either a commercial or domestic setting. This is a minor activity.

There is very minimal activity in recycling carpets in Australia. In some overseas markets, carpets are recovered and the pile is shaved and recycled. This is particularly the case for polyester carpets. This activity is not currently a feature in South Australia. The vast majority of carpet is sent to landfill. The flexible nature of carpet makes it a difficult material to handle in a landfill or transfer station.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for carpet are:

- the lack of a co-ordinated system of recovery of carpet;
- the difficulty in storing and matching carpet availability and needs;
- the technical difficulties in recycling a blend of synthetics and natural materials in carpet, carpet backing and adhesive; and
- the lack of any product stewardship commitment from the carpet manufacturing or importing industry.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of carpet may include:

- co-ordinate a product stewardship commitment from the carpet industry in co-operation with other states;
- identify and promote carpet re-use initiatives;
- investigate the viability of carpet recycling in Australia including pile shaving; and
- exploring the potential for charities to link waste commercial carpets and low-income householders.

Chapter 40 - Concrete Paving & Construction

Consumption

The quantity of concrete produced and utilised across South Australia each year is not known. It is estimated to be in excess of 1.92 million tonnes per year.

Concrete goes into a range of applications such as:

- residential construction;
- buildings;
- other civic construction;
- pipes;
- footpaths; and
- other paving.

The survey of reprocessing activity shows that 875 000 tonnes of concrete was recycled in 2003/04. A landfill audit in Adelaide showed an annual disposal to landfill of 59 000 tonnes. Using the landfill disposal data, total concrete disposed is estimated at 934 000 tonnes with a diversion rate of 94%.

Key Materials

The key materials going into concrete construction are:

- aggregate stone;
- cement; and
- reinforcing steel.

There is also a small but increasing amount of recycled concrete aggregate going into concrete construction.

Sales Trends

The volume of concrete into the market is growing each year. This increase is heavily linked to building activity levels that have been very high in the past couple of years. There is also an increased use of concrete in building construction in the commercial and residential markets.

Life Expectancy

Concrete goes into a range of long-term applications. In road and footpath applications the expected life span is 20 to 30 years. For building construction applications, a life span of 50 years is assumed. This assumption has been confirmed by concrete industry representatives.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Most waste concrete is generated from demolition of commercial buildings. Smaller volumes also come for paving replacement, residential demolition and road and drainage projects.

Adelaide has some of the most well positioned and professionally operated concrete recycling facilities in Australia. Most contractors in the demolition, building construction and road making sectors would be aware of the recycling outlets available to them. Projected increase in landfill disposal costs will favour the increased recycling of concrete.

There are multiple market outlets for crushed concrete. Specifications have been developed to utilise concrete aggregate in road base and sub base applications.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for concrete paving and construction are:

- recycled aggregate is not used in most structural concrete applications;
- resistance to utilise recycled aggregate by some companies; and
- generation of waste concrete in small quantities can result in the material going to landfill as part of a mixed load. Primarily there are smaller volumes generated in rural locations. Some of this material is stockpiled and crushed by mobile equipment. It is likely that overall the recovery levels outside of Adelaide is lower.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of concrete paving and construction may include:

- encouraging rural disposal sites to stockpile concrete for processing by mobile crushing equipment;
- considering a ban on the landfilling of concrete in areas where recycling outlets exist;
- encouraging government agencies and authorities to specify recycled aggregate in major construction projects;
- working with the waste collection industry to ensure concrete recycling skips are available for smaller construction and demolition sites; and
- industry training (i.e. TAFE) on waste diversion.

Chapter 41 - Wire Fencing

Consumption

Wire fencing is used is a range of agricultural, horticultural and commercial/residential applications. The fencing wire material is manufactured by One Steel in Whyalla and is sold into the market by Smorgon Steel.

In 2003 the size of the market for fencing wire was 10 010 tonnes. Major users were broad acre farming and the grape/wine growing industry.

Key Materials

The wire used in fencing is a steel product. It contains a rust inhibiting treatment. In order to function at high stretching pressure for long periods, wire is made from a high tensile steel. There is a small volume of galvanised wire used mostly in garden applications.

Sales Trends

Wire fencing sales are linked to economic activity and the strength of different agricultural sectors. The strong growth in the grape growing sector offsets lower levels of growth in other broad acre farming over the past ten years. The overall estimated annual sales increase is 10.7%

Life Expectancy

Wire is a long life product. The estimated average life expectancy of today's wire is over 20 years. There is very little reuse of wire and therefore much wire is disposed of when the fencing is removed. This is more likely in commercial applications and in relation to some crops. At the other end of the spectrum, some wire exists in the field for over 50 years before failure.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Wire is difficult to handle when removed from use. It can be bulky and difficult to contain. Despite this there is a high degree of recycling of this material. This can occur, at the site of waste generation or at the point of disposal; e.g. transfer station/landfill.

Based on expansion of the market applications for wire, it is estimated that the volume of wire recycled and disposed of to landfill each year is 1 400 tonnes. There is a large amount of wire in current use across many applications. This stockpile of material is estimated to be approximately 70 000 tonnes.

The existence of fencing wire in landfill can cause entanglement with heavy machinery.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for wire fencing are:

- the dispersal of the material across the whole state;
- the high level of use in areas remote from reprocessing outlets;
- the difficulty in handling wire efficiently to ensure practical storage, transport and reprocessing; and
- some wire disposal is triggered by fire damage and often replacement and clean up are done quickly.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of wire fencing may include:

- ensuring wire is included as a recyclable material at landfills;
- ensuring wire is included as a recyclable material at transfer stations;
- ensuring all users are aware of disposal routes for unwanted wire;
- ensuring wire is recycled at construction and demolition waste recycling facilities; and
- provision of compaction equipment at recovery sites to aid handling.

Chapter 42 - Insulation

Consumption

Insulation in a range of forms is used in residential and commercial buildings. The level of insulation has increased in recent years with heightened community awareness about energy conservation. There are now building efficiency requirements that are resulting in all new housing being fitted with insulation.

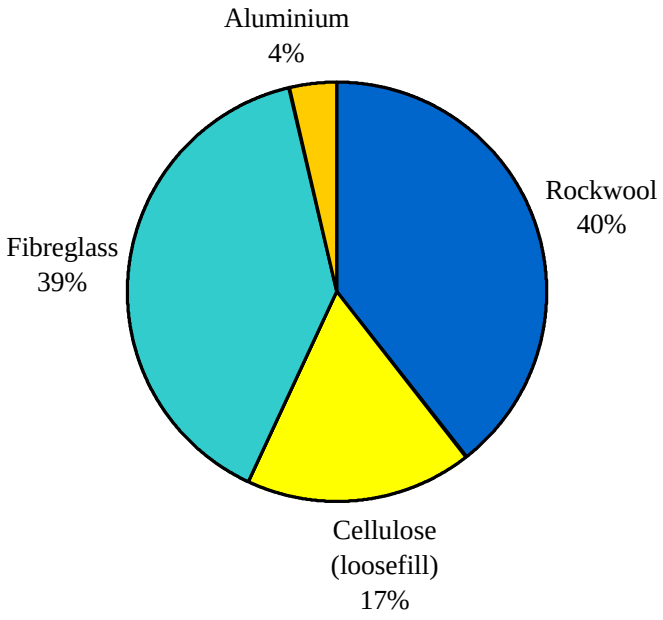
The total market size for insulation in South Australia was 20 000 tonnes in 2003.

Key Materials

The major materials for insulation are fibreglass and rock wool. Smaller quantities of cellulose (paper), aluminium and wool are also used.

The market share for insulation is presented in Figure 42.1.

Figure 42.1: Market Share of Insulation Types in Terms of Sales



Sales Trends

The growth in the insulation market over the last decade have averaged approximately 3% annually. The growth is expected to be maintained at this level (or higher) for the foreseeable future. Sales growth is a result of building industry growth, increased levels of insulation in each building and a retro-fitting of insulation to older buildings.

Life Expectancy

The average life expectancy of insulation is estimated to be 30 years. The useful life of insulation is determined by renovation and refit rates rather than by failure of the product. Some insulation is replaced due to inadequate insulative performance.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is no reuse currently of insulation materials.

There is no recycling currently of insulation materials.

Insulation is disposed during building demolition. There is no co-ordinated recovery of insulation by the building demolition industry. Nor is there any recovery of insulation at building waste sorting facilities.

The level of disposal of insulation is much lower than current sales levels.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for insulation are:

- the difficulty in removing insulation either prior to, or at the time of demolition;
- the diversity of materials in insulation;
- the lack of any identifiable recycling outlets; and
- the poor condition of removed insulation.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of insulation may include:

- analysis of the value of recovered insulation; and
- exploring with demolition contractors the practicality and cost of insulation removal and recycling.

Chapter 43 - Office Fittings

Consumption

The fit-out of offices accounts for significant consumption of timber, plastics and metals.

These fittings are used in new commercial buildings and also in the refurbishment of existing buildings. It is difficult to be precise about the exact volume of office fittings.

Industry experts in the office fittings sector have estimated quantities of each of the key materials and the overall total quantity. This is estimated at 1 200 tonnes for the year 2003.

Key Materials

The major materials used in office fittings (according to industry sources) are outlined in Table 43.1.

Particle board is primarily used for furniture such as workstations, and plasterboard is used in partitions.

Table 43.1: South Australian Material Consumption into Office Fittings

Material	SA Consumption in 2003	
	(tonnes/yr)	(%)
Particleboard	162	13.3
Plasterboard	185	15.2
Steel	488	40.0
Aluminium	377	31.0
Nylon	3	0.2
ABS/PC	2	0.2
ABS	1	0.1
Other plastics	0.3	0.0
TOTAL	1 218	100

Sales Trends

The volume of office fittings is closely linked to the commercial building cycle. It is estimated that annual sales growth averaged 1.5% over the past decade.

An estimated 95% of office fittings are upgrades of existing office fit-outs. It is these that generate the largest volumes of office fittings waste. However, while the ratio of new building fitouts to upgrade fitouts is 1:20, new building fitouts account for 20% of the office fittings market in terms of value.

Life Expectancy

Industry sources estimate the average period between office fitouts to be between 5 – 8 years. This is significantly shorter than the potential lifespan of most office fittings. It is estimated that metal fittings can have a lifespan of 40 years on average, and particleboard based fittings a lifespan of approximately 15 years on average.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is little reuse of office fittings. There is some removal of partitions and other fittings for resale with office furniture.

There are some attempts to recover fittings with a high aluminium or steel content.

There is no co-ordinated effort to recover most office fittings. Most fittings are disposed to landfill through skips. Some of this material may go to sites where building industry waste is being sorted for recycling.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for office fittings are:

- the low value of some key materials – plasterboard, plastics. textiles;
- the lack of secondary markets – particleboard;
- office fittings removal is usually done rapidly to facilitate the installation of new material fittings in a short time frame; and
- there is often no business committed to positive recycling / reuse outcomes.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of office fittings may include:

- promotion of waste recovery options and infrastructure to the office fit-out sector;
- all fittings to be sent to sorting facilities prior to going to landfill; and
- encouraging corporations to consider refurbishment rather than complete replacement.

Chapter 44 - Paint & Paint Packaging

Consumption

In 2003 it is estimated that 16 400 kilolitres of paint was sold into the South Australian market. Assuming an average density of paint across water and solvent based types of approximately 1.2 kg/L, this equates to a total of 19 500 tonnes of paint.

This covers both retail, trade and industrial sales. Retail sales account for 29% of consumption, trade sales 33% and industrial sales the remaining 38% For retail consumption it is known that 88% of sales are water-based paints, with the remainder being solvent based.

Most retail paint is sold in steel packaging with a small proportion being sold in HDPE plastic.

Based on industry data, the total mass of retail paint packaging is estimated at 470 tonnes. This packaging ranges in size from less than one litre through to 20 litres in the following proportions.

Table 44.1: Retail Paint Sales by Package Volume

Can Size (L)	Retail Cans Sold	
	Units ('000s)	%
1	589	53
2	27	2
4	280	25
6	14	1
10	129	11
15	3	0
20	76	7
Total	1 117	100

Key Materials

The proportion of paint packaged in steel remains above 95%. There is a small volume of HDPE packaged paint mainly in bulk sizes and generally for lower grade paints and fence paints.

Sales Trends

Paint sales in South Australia are increasing at an annual rate of 2.8%. The total growth in paint consumption by volume since 1996 is 21%.

The long-term sales trend is from solvent based to water based paint.

Paint sold in 20L containers is progressively being transferred to 15L sizes due to OH&S concerns about the lifting of containers.

Life Expectancy

Recent studies both in Australia and overseas indicates the following domestic use patterns.

Of paint sold in 2003 an estimated 89% is used upon purchase. A further 6% is stored, with the remaining 5% going to disposal.

This storage estimate is the approximate net increase in storage, as there is material being added to storage and volumes coming out of storage into disposal.

The amount of paint material stockpiled in total in South Australian homes is estimated at 6 800 tonnes, 75% of this is unused paint and the remainder is paint packaging.

This equates to a household stockpile of nearly 12kg. The annual growth in stockpiled paint is 0.7kg / household. By 2020 this stockpile is predicted to be at 26kg / household.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Steel paint packaging can be recycled, however often pathways for the recycling of this material are not clear to householders.

There is a range of factors that trigger paint disposal. These include:

- finish of paint job;
- annual clean-up of site; and
- clean-up of household prior to moving.

The destination of discarded paint and paint packaging is complex with paint disposal occurring through kerbside garbage, kerbside recycling, skips, hard waste, self-haul to disposal sites, household chemical collection programs (HCCP) and directly to land, sewer or stormwater.

A recent study determined the volumes through each of these routes. This national data is presented in Table 44.2. No specific data for South Australia are available.

Table 44.2: National Domestic Paint and Paint Packaging Disposal Routes

Disposal Stream	Total Product (t)	% of Total	Paint Cans (t)	Paint Residue (t)	Type of Paint Residue (t)		State of Paint Residue (t)	
					Solvent	Water	Dry	Liquid
Garbage	4 402	66.4	3 522	880	80	800	880	0
Recycling	368	5.6	295	74	18	55	74	0
HCCP	558	8.4	167	391	191	200	42	349
Liquid Treatment	300	4.5	90	210	126	84	23	188
Self Haul	412	6.2	195	217	74	142	49	168
Skips	65	1.0	31	34	12	22	8	26
Hardwaste	380	5.7	304	76	9	67	76	0
Sewer	148	2.2%	0	148	13	134	0	148
Total	6 632	100%	4 603	2 029	524	1 505	1 151	878

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Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for paint and paint packaging are:

- changing fashions in paint colour;
- householders view stored paint as a product rather than a waste and do not expect to pay for disposal;
- lack of a firm product stewardship commitment from the paint or retail industry sectors;
- no established return route for paint and paint packaging;
- lack of data on the size of the stockpiled paint in South Australian households; and
- low value of the recovered paint and paint packaging relative to the cost of collection and reprocessing.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of paint and paint packaging may include:

- encouraging the paint manufacturing and retail industries to adopt a product stewardship commitment to paint and paint packaging;
- identifying a financial and viable return route for paint that is convenient for consumers;
- assisting consumers to purchase paint quantities more accurately resulting in less excess paint volumes; and
- encouraging local government to recover empty paint packaging through kerbside recycling, hardwaste collections and drop off facilities.

Chapter 45 - Piping

Consumption

Plastic piping is used for both sewerage and storm water applications as well as water supply and agricultural uses. The total volume of material going into plastic piping is estimated at 19 600 tonnes for 2003. The piping comes in a broad range of sizes from 20 mm diameter through to over 250 mm in diameter. The most common piping is 100 mm diameter sewer pipe and 90 mm storm water pipe.

Key Materials

Most plastic piping is made from PVC. This is one of the largest market applications for PVC. There is also a significant volume of HDPE plastic pipe. The market share of HDPE pipe is growing in mining and agricultural applications. This is partly due to price, but also to an environmental preference by some to reduce PVC use. Polypropylene is also used in some agricultural applications.

Sales Trends

Most pipe applications are linked to building activity and therefore sales growth closely follows building construction growth. This was estimated at 3.1% for the year 2003. Over the past decade sales growth has been 40%.

Life Expectancy

Plastic piping is a long life product. Pipes buried in 2003 would expect to be still functional in 40 years.

Pipes are rarely recovered from below ground. Above ground applications such as agriculture, downpipes, etc. are more prone to UV deterioration and could be expected to have a life span of about 10 years. As the widespread use of plastic piping has been limited to the past 20-30 years, there is a large volume of material that has not yet reached the end of its life.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Most pipe is utilised in underground applications where removal is impractical. Generally the pipe remains in the ground during site re-development. There is some collection and recycling of off-cuts and of spec/damaged pipe. This goes into pipe or pipe fittings manufacture.

As most pipe remains in the ground it is assumed that disposal to landfill will be low. As demolition covers housing stock with a high usage of plastic pipe (both above and below ground) then the disposal levels may increase.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for piping are:

- the major use of the pipe being underground and the surface contaminant materials that would need to be removed during the recycling process. There is also a likelihood that the plastic would have absorbed product residues during use.
- no co-ordinated collection / recycling route for piping including building site off-cut waste.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of piping may include:

- recovering pre-consumer piping from building sites and pipe manufacturers/ distributors in larger quantities;
- investigating recycling in agricultural applications where piping is used above ground in water carrying uses and offers a more practical post-consumer pipe recovery option; and
- undertaking a review of specifications that may enable a lighter gauge piping in some low pressure applications

Chapter 46 - Roofing Iron

Consumption

Corrugated iron roofing is an icon of the Australian market. Iron itself has not been used since the beginning of the last century, mild steel is used in the manufacture of roofing 'iron'.

Annual sales of all forms of roofing iron for 2003 was 34 000 tonnes in South Australia.

Based on historical use levels and sales growth it is estimated that the amount of roofing iron in use in South Australia is over 300 000 tonnes.

In 2003/04 an estimated 9 780 homes were constructed in South Australia. Of these, 59% had iron roofs.

The average weight of iron in this type of roof is 1.5 tonnes.

Key Materials

The product is essentially steel.

The newer coatings (such as Colorbond) consist of approximately equal quantities of aluminium and zinc, and small quantities of silicon. There is a zinc component of approximately 10-15% in most non-coloured iron for rust prevention.

Sales Trends

The market for roofing iron is growing strongly at 5% /year.

In 1997 the market share for roofing iron, compared with other forms of roofing, was 44%. This has grown to 59% in 2003/04

Sales increases reflect a growth in the number of homes combined with increased market share and increases in the size of housing.

Life Expectancy

Roofing iron is a long life product, however traditional galvanised iron has been steadily replaced by colourbonded steel or new zinc coated steel.

The average life expectancy of the iron is estimated at 40 years. Some iron is reused before disposal. Corrugated iron is also used extensively for fencing applications.

Stockpiling, Landfill Disposal, Reuse, and Recycling

Disposal of roofing iron is usually triggered by one of two mechanisms:

1. Demolition of the building.
2. Failure of the roofing iron due to rust corrosion.

There are small quantities of roofing iron replacement for other materials such as tiles.

Industry sources estimate that between 60–70% of roofing iron is eventually recycled rather than sent to landfill.

Annual disposal to landfill is therefore likely to be less than 5 000 tonnes reflecting recovery levels and the amount of material reaching its 40 year life.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for roofing iron are:

- some demolition or renovation generates smaller volumes of iron which are disposed of in mixed loads to landfill;
- the life expectancy of housing is dropping and therefore the level of disposal before product failure will increase; and
- some of the roofing iron is in remote areas where collection and transport costs need to be accounted for.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of roofing iron may include:

- greater infrastructure for recycling at disposal sites;
- restrictions or bans on disposal to landfill;
- greater community awareness of recyclability and recovery routes; and
- increasing awareness of lighter gauge iron amongst builders/architects leading to reduction in use.

Chapter 47 - Roofing Tiles

Consumption

Tiles are a common form of roofing for South Australian homes. It is estimated that tiles have 40% of the overall roofing market. The two key manufacturers are Boral and Monier with 60% and 20% market shares respectively. Other roof tile manufacturers are Prime Roof Tiles and BGC.

The total number of tiles sold into the South Australian market in 2003 is estimated to be 8.5 million. The average weight of a tile is 4.8kg. This means the total annual sales for 2003 was 40 800 tonnes.

Key Materials

The roof tile market is split between terracotta based tiles and concrete based tiles. The market share of these is 20% and 80% respectively. Historically terracotta tiles entered the market earlier and have traditionally held a higher market share than they do today. For this reason, the tiles being removed due to poor condition or building demolition are more likely to be terracotta tiles than the current market share would suggest.

Sales Trends

The trend in roofing tile sales is estimated to match the long-term growth in the building industry of 3.1%. Most sales are into new housing so the sales growth follows new housing construction trends more than commercial building or renovation trends.

Life Expectancy

The life of a roofing tile will vary according to the fate of the building. As an indicator, most tiles are guaranteed for a period of 50 years.

Based on the current patterns of building demolition and these product life estimates, it is estimated that 2% of the current volume of tiles in use reach end of life in any given year.

Stockpiling, Landfill Disposal, Reuse, and Recycling

During building demolition projects there is often a recovery of roof tiles for reuse on other houses. This is particularly the case in relation to tiles from historically significant building styles. Often tiles are removed from houses set for demolition and delivered directly to sites where they will be used. In some cases collected tiles are stored at salvage yards.

In addition to re-use, there is now a growing volume of roof tiles crushed for recycling with either concrete or bricks. This is particularly the case for brick houses.

An unknown volume of roof tiles is sent to landfill across South Australia each year. The overall disposal to either waste or recycling is estimated at 2% of the current volume of tiles in use. Based on current sales and historic trends, the total volume of tiles in use is estimated at 765 000 tonnes. Therefore 2% disposal is estimated at 15 000 tonnes/year. It is expected that re-use and recycling make up more than half of this disposal. Therefore the volume to landfill is estimated to be less than 7 500 tonnes/year.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for roofing tiles are:

- the task of removing tiles for re-use is often not pursued as the trend in the building industry is to demolish housing in a short time-frame;
- the tiles are easily broken as they can become brittle with age; and
- separation of tiles on timber housing during demolition is less likely and the material will more often go to landfill.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of roofing tiles may include:

- consideration of the restriction of roof tiles from direct disposal to landfill; and
- assistance in the state-wide development of construction and demolition recycling facilities.

Chapter 48 - Structural Timber

Consumption

Solid timber used in building construction is a primary building material and appears as a significant component of the waste stream.

Data on South Australian consumption of structural timber indicates a total of 323 000 cubic metres was used in 2003. This timber had an average density of 626 kg/cubic metre. This gives a mass of structural timber of 202 000 tonnes/year.

Most timber goes into long-term applications. This includes housing frames, flooring, furniture manufacture and commercial building projects.

Key Materials

Structural timbers are a mix of hardwoods and softwoods. The majority of the structural timber used is softwood grown in the south east of the State and New Zealand. This is predominantly pinus radiata and is grown in plantations for timber and paper production. A smaller quantity of timber is native hardwood species. Most of this comes from native forests in other states. There are also much smaller volumes of material imported from South East Asia. Some of this is hardwood used in specific applications where timber is prone to rotting – window sills, decking etc. A proportion of the softwood used is treated prior to use in outdoor applications (see Chapter 49).

Sales Trends

The market for structural timber is influenced by the cycle of building activity. It is also competing with other products in different applications – steel (house framing) and particle board (flooring).

Sales rates are roughly equivalent to those of 10 years ago.

Life Expectancy

With most structural timber going into long term applications, the disposal volume will bear little resemblance to the consumption level.

In most building applications, timber will be utilised for over 40 years before becoming available for re-use or disposal.

Stockpiling, Landfill Disposal, Reuse, and Recycling

During building demolition, contractors usually recover a high proportion of the structural timber. This includes flooring and larger diameter frame timber. Lighter gauge timber such as skirting, architrave and cupboards are not usually recovered for re-use. There is a significant and increasing market in second-hand high quality timbers through salvage yards.

During 2003/04 116 000 tonnes of timber was recycled. The majority of this went into a fuel for Adelaide Brighton Cement kilns. A smaller amount went into composts and mulches.

In 2004 an estimated 60 000 tonnes of timber was disposed of to landfill (2004 Landfill Audit). It is not clear how much of this was structural timber. It is impossible to identify structural timber from other forms of timber.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for structural timber are:

- the relatively cheap cost of new timber;
- the lack of infrastructure to store and resell most timber for re-use;
- the dispersed nature of much of the timber and the difficulty in aggregating this;
- limited high value market outlets;
- residues such as paint, nails and glues; and
- insect attack

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of structural timber may include:

- creating a product stewardship commitment from the timber and building industries to help facilitate higher recovery, re-use or recycling;
- liaising with the demolition industry on opportunities for market development;
- working with the frame and furniture manufacturing sectors to recycle higher levels of pre-consumer waste timber; and
- as alternative market outlets exist, restrict the ability to dispose of timber to landfill.

Chapter 49 - Treated Timber

Consumption

In 2003, an estimated 92 400 m^3 of treated timber was sold into the South Australian market. At an average density of 620 kg/m^3, this equates to a mass of treated timber of approximately 57 000 tonnes. Of this, an estimated half, or 28 500 tonnes, was utilised in vineyards.

The other major uses are in external applications, such as; posts, decking, railing, trellis and fencing. A proportion goes into other agricultural applications such as stock yards.

Key Materials

80% of treated timber is softwood sourced. The remaining 20% or 12 000 tonnes is hardwood sourced.

Sales Trends

In 2003, the total market for treated timber was down 3.4% on 2002. This follows a 5.4% drop the previous year.

The market has been fluctuating over the past 10 years, following the fortunes of the wine and building industries.

Sales in 2003 are comparable to levels of a decade ago. With a slowing in the expansion of vineyards, the market is likely to remain flat in coming years. World-wide concerns about some treatment compounds may inhibit Australian sales.

Life Expectancy

While treated timber goes into a wide range of applications, the average life expectancy is 10 years in vineyards and 25 years in less demanding applications. The level of breakage is higher in vineyards with mechanical harvesting. The life span for lighter gauge applications is lower on average, as is timber used in applications where moisture is high, e.g. wetland board walks and horse floats.

Some dryland agricultural applications will exceed average life expectancy.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There are some limited applications to re-use treated timber, however as it is utilised in outdoor applications where it is exposed to environmental impacts it is often replaced due to degradation of quality/structure. There is usually little prospect to re-use this material.

The ability to recycle treated timber is heavily restricted as it is treated with a range of chemicals which are impregnated into the timber. There is no ability to utilise treated timber in compost or mulch applications.

There is a preference for the material going into the cement kilns as fuel to be untreated timber

The total annual disposal to landfill is estimated at 37 000 tonnes.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for treated timber are:

- the chemicals impregnated in treated timbers make it difficult to recycle; and
- there is no coordinated collection of treated timbers and therefore low levels of re-use.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of treated timber may include:

- investigating high temperature burning applications with Adelaide Brighton Cement.

Chapter 50 - Window Glass

Consumption

Sheet glass is used for windows across the residential and commercial building industry and the automotive industry. This glass is produced in a range of forms including standard window glass, toughened glass and laminated glass.

The estimated South Australian 2003 annual sales of window glass in all forms is 13 100 tonnes.

Key Materials

Window glass or float glass is a silica based product. It also includes soda ash, which is found at only a limited number of sites world-wide, and other minor materials.

Laminated glass has a plastic film sandwiched between two glass layers. This protects the glass from shattering. Toughened glass has additives that produce a stronger product.

Sales Trends

The sales of window glass reflect the sales trend of the building sector. Over the past decade growth has been 30%, with a growth rate of 3.1% in 2003.

Life Expectancy

Window glass is a long life product. In automotive applications it has a 10 to 20 year life span. In building applications the average life span is 20 to 40 years.

Stockpiling, Landfill Disposal, Reuse, and Recycling

There is no reuse of window or automotive glass at this time.

There is some recycling of automotive glass through the screen replacement industry. This material is processed into tiny beads of well under 1 mm in diameter for use in road-making paint. This aids the reflective properties of the paint.

The 2004 landfill audit identified 1 890 tonnes of glass going to landfill each year. It is not known how much of this is window glass.

Barriers to Increasing Lifespan, Reuse and Recycling

The barriers to increasing the lifespan, reuse and recycling for window glass are:

- waste glass from individual broken windows is dispersed and difficult to recover;
- the value of the glass is insufficient to drive recovery during demolition;
- there is only a limited collection infrastructure for recovery of window glass; and
- the cost of removal works against window removal during car crushing.

Potential for Increasing Lifespan, Reuse and Recycling

The potential activities to increase the lifespan, reuse and recycling of window glass may include:

- ensure adequacy of market outlets for collected glass;
- work with car recycling sector to encourage window recovery;
- work with building demolition sector to facilitate window glass recovery; and
- establish window glass drop off skips at transfer stations.

SECTION H - PRIORITISATION OF PRODUCTS FOR RECYCLING

The are several approaches that can be applied to prioritise products for increased recycling and reuse activity. The approach adopted has been to develop scores against key criteria., then to weight the criteria on the basis of Nolan-ITU's qualitative assessment of important. Weighted scores for each criteria are then added and normalised to obtain an overall product "priority" score.

Assessment Criteria

The assessment criteria and their definitions are as follows

- **Consumption** - total annual quantity consumed in 2003
- **Disposal Level** - total quantity reused, recycled, and disposed of to landfill in 2003
- **Level of Recycling or Reuse** - proportion of total "disposal" which is recycled and reused.
- **Toxicity** - the potential for adverse human health and environmental impacts from inappropriate disposal.
- **Product Stewardship Arrangements** - whether there is a formal national and/or state industry agreement with government to develop and implement recycling and reuse initiatives across the industry.
- **Ease of Collection/Material Separation** - ease of collecting, separating and sorting products for recycling (i.e. it is generally more difficult with products that have multiple materials).
- **Recyclability & Market Availability** - ease of reprocessing, and the existence of existing commercial markets for the reprocessed products.

The relative weightings of the assessment criteria (in brackets) are:

1. Consumption Rating (5%)
2. Disposal Level Rating (20%)
3. Level of Recycling or Reuse (15%)
4. Toxicity (30%)
5. Product Stewardship Arrangements (5%)
6. Ease of Collection/Material Separation (10%)
7. Recyclability & Market Availability (15%)

Assessment Criteria Scoring System

The adopted assessment criteria scoring system for each parameter is given in Table H1 below.

Table H1: Rating Key for Product Impact Ranking

Variable	Very Low	Low	Medium	High	Very High
	(VL)	(L)	(M)	(H)	(VH)
Consumption (tonnes)	0-100	100-1 000	1 000-10 000	10 000-100 000	100 000+
Disposal Level (tonnes)	0-100	100-1 000	1 000-10 000	10 000-100 000	100 000+
Level of Recycling/Reuse	80%+	80-50%	50-10%	10-0%	0%
Toxicity	Very Low	Low	Medium	High	Very High
Product Stewardship Arrangements	Very Good	Good	Medium	Poor	Very Poor
Ease of Collection /Material Separation	Very Poor	Poor	Medium	Good	Very Good
Recyclability & Market Availability	Very Poor	Poor	Medium	Good	Very Good

For the fifty product categories there are priority actions suggested in the potential for waste reduction segment of each product section.

It is acknowledged that sales trends and stockpile levels could result in significant changes in waste levels and priorities in the coming years. It needs to be emphasised that priority actions may be across community education, regulatory action, infrastructure support or other aspects. There are also possible short and longer initiatives, some of which are more within the control of Zero Waste SA to influence than others. Some will be more effectively handled at a national level.

The overall priority for increased recycling and reuse activity across all products is presented in Table H2.

The overall priority for increased recycling and reuse activity across products, within product categories, is presented in Table H3.

For recycling activity, a low current recycling level will result in a high priority rating and visa versa. For example, newspapers, with a high recycling rate will have a low priority rating. Similarly, personal batteries, with a very low current recycling level, have a very high priority rating.

Table H2: Priority Rating of Products by Overall Rank

Product Number	Product	Annual Consumption (tonnes)	Annual Disposal (tonnes) incl. recycling	Consumption Rating	Disposal Level Rating	Level of Recycling or Reuse	Toxicity	Product Stewardship Arrangements	Ease of collection /material separation	Recyclability & Market Availability	Overall Priority Ranking
22	NiCad Batteries	142	159	L	L	H	VH	H	VL	M	VH
49	Treated Timber	47 740	30 869	H	H	VH	M	VH	L	VL	VH
7	Televisions	7 926	1 379	M	M	H	M	M	M	M	VH
33	Automotive Batteries	5 372	4 832	M	M	VL	M	VH	H	VH	VH
20	Computers	4 328	1 748	M	M	H	M	H	L	M	VH
40	Concrete Paving	1 920 000	710 000	VH	VH	VL	VL	VH	H	VH	VH
8	Whitegoods	18 602	17 138	H	H	L	L	VH	M	H	VH
36	Asphalt Road Mat.	450 000	60 000	VH	H	VL	L	VH	H	H	VH
34	Cars	93 146	41 146	H	H	VL	L	VH	H	H	VH
24	Printer & Computer Peripherals	3 362	2 375	M	M	H	M	VH	L	L	VH
35	Tyres	14 668	14 094	H	H	M	L	M	M	M	H
28	Food Packaging	98 594	98 594	H	H	M	VL	H	H	H	H
3	Hot Water Systems	3 729	3 227	M	M	M	L	VH	M	H	H
2	Heaters	3 915	2 774	M	M	M	L	VH	M	H	H
44	Paint & Paint Pkg.	19 517	511	H	L	H	M	H	L	M	H
46	Roofing Iron	34 000	12 509	H	H	M	VL	M	M	VH	H
21	Fluorescent Tubes	770	724	L	L	H	H	VH	VL	L	H
37	Bricks & Brick Rubble	120 000	30 000	VH	H	L	VL	VH	H	H	H
47	Roofing Tiles	40 800	15 290	H	H	M	VL	VH	M	H	H
11	Clothing	14 011	12 600	H	H	L	VL	VH	H	H	H
31	Other Grocery Pkg.	12 590	12 590	H	H	M	VL	H	M	H	H
14	Gas Cylinders	628	356	L	L	M	M	VH	M	M	H
16	Newspapers	48 300	48 300	H	H	VL	VL	L	VH	VH	M
42	Insulation	20 243	11 496	H	H	VH	VL	VH	L	L	M
27	Beverage Packaging	70 131	70 131	H	H	VL	VL	L	VH	VH	M
26	Video & Stereo Elect. Peripherals	1 390	607	M	L	H	M	VH	L	L	M
6	Small Appliances	1 045	593	M	L	M	L	VH	M	H	M
5	Power Tools	1 073	522	M	L	H	L	VH	M	M	M
32	Retail Carry Bags	2 863	2 863	M	M	H	VL	M	M	H	L
48	Structural Timber	202 421	59 089	VH	H	M	VL	VH	L	M	L
43	Office Fittings	1 218	1 158	M	M	H	L	VH	L	L	L
18	Toys	1 991	1 560	M	M	H	L	VH	L	L	L
25	Smoke Detectors	9	4	VL	VL	H	M	M	L	L	L
29	Freight Pkg – Film	8 072	8 072	M	M	M	VL	VH	M	H	L
41	Wire Fencing	10 010	1 420	H	M	M	VL	H	M	H	L
23	Personal Batteries	440	440	L	L	VH	M	VH	VL	VL	L
38	Cables	8 846	3 103	M	M	M	VL	H	M	H	L
10	CD Media	856	245	L	L	VH	L	VH	L	L	L
19	Video Cassettes	989	736	L	L	VH	L	VH	L	L	L
50	Window Glass	13 138	7 461	H	M	H	VL	VH	L	M	L
45	Piping	19 635	1 713	H	M	H	VL	VH	L	M	L
15	Mattresses	5 243	2 719	M	M	VH	VL	VH	L	L	L
17	Phone Books	2 850	1 304	M	M	L	VL	L	H	H	VL
39	Carpet	8 532	7 735	M	M	H	VL	VH	L	L	VL
12	DVD Media	680	55	L	VL	VH	L	VH	L	L	VL
9	Books	1 547	90	M	VL	L	VL	VH	H	VH	VL
1	Fixed Line Phones	59	53	VL	VL	H	L	VH	L	M	VL
13	Footwear	4 410	4 332	M	M	VH	VL	VH	VL	VL	VL
4	Mobile Phones	48	58	VL	VL	M	L	L	M	H	VL
30	Freight Pkg - Pallets	6 563	6 563	M	M	L	VL	M	M	M	VL

Table H3: Priority Rating of Products Ranked Within Product Types

Product Number	Product	Annual Consumption (tonnes)	Annual Disposal (tonnes) incl. recycling	Consumption Rating	Disposal Level Rating	Level of Recycling or Reuse	Toxicity	Product Stewardship Arrangements	Ease of collection /material separation	Recyclability & Market Availability	Overall Priority Ranking
APPLIANCES											
7	Televisions	7 926	1 379	M	M	H	M	M	M	M	VH
8	Whitegoods	18 602	17 138	H	H	L	L	VH	M	H	VH
2	Heaters	3 915	2 774	M	M	M	L	VH	M	H	H
3	Hot Water Systems	3 729	3 227	M	M	M	L	VH	M	H	H
6	Small Appliances	1 045	593	M	L	M	L	VH	M	H	M
5	Power Tools	1 073	522	M	L	H	L	VH	M	M	M
1	Fixed Line Phones	59	53	VL	VL	H	L	VH	L	M	VL
4	Mobile Phones	48	58	VL	VL	M	L	L	M	H	VL
CONSUMER PRODUCTS											
11	Clothing	14 011	11 209	H	H	L	VL	VH	H	H	H
14	Gas Cylinders	628	356	L	L	M	M	VH	M	M	H
16	Newspapers	48 300	48 300	H	H	VL	VL	L	VH	VH	M
18	Toys	1 991	1 560	M	M	H	L	VH	L	L	L
10	CD Media	856	245	L	L	VH	L	VH	L	L	L
19	Video Cassettes	989	736	L	L	VH	L	VH	L	L	L
15	Mattresses	5 243	2 719	M	M	VH	VL	VH	L	L	L
17	Phone Books	2 850	1 304	M	M	L	VL	L	H	H	VL
12	DVD Media	680	55	L	VL	VH	L	VH	L	L	VL
9	Books	1 547	90	M	VL	L	VL	VH	H	VH	VL
13	Footwear	4 410	4 332	M	M	VH	VL	VH	VL	VL	VL
ELECTRICAL & ELECTRONIC EQUIPMENT											
22	NiCad Batteries	142	159	L	L	H	VH	H	VL	M	VH
20	Computers	4 328	1 748	M	M	H	M	H	L	M	VH
24	Printer & Computer Peripherals	3 362	2 375	M	M	H	M	VH	L	L	VH
21	Fluorescent Tubes	770	724	L	L	H	H	VH	VL	L	H
26	Video & Stereo Electronic Peripherals	1 390	607	M	L	H	M	VH	L	L	M
25	Smoke Detectors	9	4	VL	VL	H	M	M	L	L	L
23	Personal Batteries	440	440	L	L	VH	M	VH	VL	VL	L
PACKAGING											
28	Food Pkg.	98 594	98 594	H	H	M	VL	H	H	H	H
31	Other Grocery Pkg.	12 590	12 590	H	H	M	VL	H	M	H	H
27	Beverage Pkg.	70 131	70 131	H	H	VL	VL	L	VH	VH	M
32	Retail Carry Bags	2 863	2 863	M	M	H	VL	M	M	H	L
29	Freight Pkg. - Film	8 072	8 072	M	M	M	VL	VH	M	H	L
30	Freight Pkg. - Pallets	6 563	6 563	M	M	L	VL	M	M	M	VL
AUTOMOTIVE											
33	Automotive Batteries	5 372	4 832	M	M	VL	M	VH	H	VH	VH
34	Cars	93 146	41 146	H	H	VL	L	VH	H	H	VH
35	Tyres	14 668	14 094	H	H	M	L	M	M	M	H
BUILDING MATERIALS											
49	Treated Timber	47 740	30 869	H	H	VH	M	VH	L	VL	VH
40	Concrete Paving & Construction	1 920 000	710 000	VH	VH	VL	VL	VH	H	VH	VH
36	Asphalt Road Mat.	450 000	60 000	VH	H	VL	L	VH	H	H	VH
44	Paint & Paint Pkg.	19 517	511	H	L	H	M	H	L	M	H
46	Roofing Iron	34 000	12 509	H	H	M	VL	M	M	VH	H
37	Bricks & Br. Rubble	120 000	30 000	VH	H	L	VL	VH	H	H	H
47	Roofing Tiles	40 800	15 290	H	H	M	VL	VH	M	H	H
42	Insulation	20 243	11 496	H	H	VH	VL	VH	L	L	M
43	Office Fittings	1 218	1 158	M	M	H	L	VH	L	L	L
48	Structural Timber	202 421	59 089	VH	H	M	VL	VH	L	M	L
41	Wire Fencing	10 010	1 420	H	M	M	VL	H	M	H	L
38	Cables	8 846	3 103	M	M	M	VL	H	M	H	L
45	Piping	19 635	1 713	H	M	H	VL	VH	L	M	L
50	Window Glass	13 138	7 461	H	M	H	VL	VH	L	M	L
39	Carpet	8 532	7 735	M	M	H	VL	VH	L	L	VL