



# AVOIDING, REUSING AND RECYCLING PACKAGING – M10

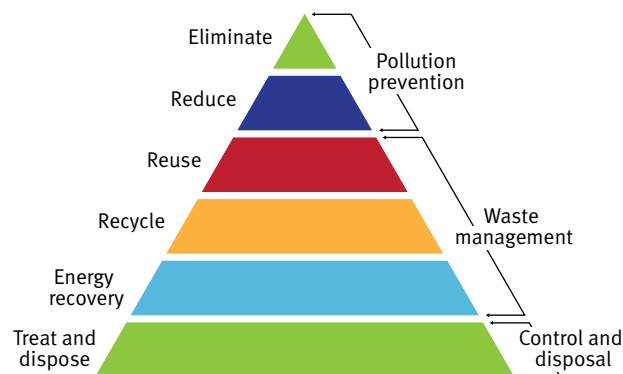
Eco-efficiency opportunities for Queensland manufacturers

## Make the most of your packaging

*Packaging is often criticised as being a waste and creating extra landfill. Therefore, manufacturers should avoid/reduce, reuse and recycle packaging in accordance with the waste hierarchy.<sup>1</sup> It is important that the waste hierarchy be applied across the whole supply chain.*

### Waste management hierarchy

The waste management hierarchy approach can be used to identify and prioritise packaging efficiency opportunities.



The three main categories commonly used for packaging are:

- primary packaging that is used around the product at the point of sale e.g. bottle
- secondary packaging that groups the product until it is sold e.g. boxes
- tertiary packaging that enables the product to be handled and transported e.g. pallets, pallet wrap and strapping.

### Avoid/reduce packaging

Opportunities to eliminate packaging include changing packaging design, delivering in bulk and alternative handling and distribution techniques.

Design changes may be achieved, for example, by eliminating unnecessary layers, labelling, adhesives and tertiary packaging. Bulk delivery in reusable bulk containers can avoid the need for tertiary packaging, and packaging may be totally avoided by changing handling or distribution systems.

<sup>1</sup> The National Packaging Covenant, 15 July 2005 to 30 June 2010, [www.environment.gov.au/settlements/publications/waste/covenant/pubs/covenant.pdf](http://www.environment.gov.au/settlements/publications/waste/covenant/pubs/covenant.pdf)



## BOXES WITHOUT BOXES<sup>2</sup>

Weis (ice-cream processor) eliminated the need for an outer master carton (excess secondary packaging) by using the inner wrappers as the retail pack (primary packaging) and not having boxes in boxes. Weis also reduced the film thickness of the product wrap saving 12.5% of the total packaging used in the product range.

## BULK DELIVERIES IN REUSABLE CONTAINERS<sup>3</sup>

At Kellogg's Australia (cereal producer), deliveries between manufacturing or packaging facilities now uses reusable bulk containers. Additionally bulk delivery of raw materials such as flour, sugar and grains, is undertaken in tanker loads with intermediate storage in silos and hoppers to avoid packaging.

If the packaging cannot be eliminated, other opportunities should be considered. Examples include:

- light-weighting
- reducing the use of adhesives
- optimising packaging operations
- efficient receiving, handling and storage
- complementary packaging design
- reducing waste from conversion processes.

### Light-weighting

Light-weighting can reduce material usage (e.g. plastic, cardboard) and transport costs. This can be achieved by:

- reducing material thickness
- using lighter but stronger materials
- replacing cardboard with shrink wrap or alternatives
- optimising packaging design to make it more efficient.

## DESIGN MODIFICATION OF PACKAGING WITH LESS MATERIAL USAGE<sup>4</sup>

In 2008, Unilever Australasia (home and personal care goods, and food manufacturer) received a 'Packaging Council of Australia (PCA) Best of Show Award' for a laundry detergent. The company downsized the detergent container which resulted in:

- 50% less plastic than the original pack
- a 32 tonne reduction in cardboard use per annum
- 62% fewer trucks to transport the same number of washes to store per annum.

### Reduce the use of adhesives

Reducing the use of adhesives can not only reduce packaging costs but also increase the ability to recycle as some adhesives can contaminate the recycling process. Methods to reduce adhesives include:

- optimising tape width
- use of kraft paper tape rather than plastic tape to assist recycling
- improving box rigidity
- spot gluing
- PET strapping.

<sup>2</sup> Weis Australia Pty Ltd, 2005, National Packaging Covenant Five year action plan July 2005 – June 2010, [www.packagingcovenant.org.au/documents/File/ap\\_Weis\\_Frozen\\_Foods\\_05\\_10.pdf](http://www.packagingcovenant.org.au/documents/File/ap_Weis_Frozen_Foods_05_10.pdf).

<sup>3</sup> Kellogg's Australia, [www.kelloggs.com.au/Home/Company/Community/Environment/Packaging/tabid/112/Default.aspx](http://www.kelloggs.com.au/Home/Company/Community/Environment/Packaging/tabid/112/Default.aspx).

<sup>4</sup> Packing Council of Australia (PCA), [pca.org.au/resultso8/apa/page.php?page=bestofshow](http://pca.org.au/resultso8/apa/page.php?page=bestofshow).



## SPOT SEALING SAVES<sup>5</sup>

Nerada (tea supplier) changed the glue mechanism on their machines to a spot sealing system and now saves 1200 kg of glue annually.

### Optimise packing operations

Packing lines are typically made up of a number of different machines that may be connected together by manual handling processes or, more often, by a conveyor belt. Poor line efficiencies can lead to bottlenecks that waste not only packaging but also product and time. Optimising or adjusting the speed of packaging lines can prevent downstream bottlenecks that can damage the product or result in the need for repacking.

## Reuse packaging

There may be many opportunities to reuse packaging by suppliers, within the plant itself, or by other businesses and community groups. Although hygiene requirements and safety must be considered for primary packaging, it is important that manufacturers design packaging to encourage reuse wherever possible.

### Reuse by suppliers

Returning packaging to suppliers can reduce material and disposal costs. The opportunity to reduce waste is particularly viable for sites where suppliers are back hauling.

Some examples of packaging that can be reused include pallets, drums, intermediate bulk containers (IBC), plastic containers, crates, cardboard boxes, bulk bags, padding and inflatable bags.

Savings are often made over the life-cycle of the packaging as Table 1 illustrates.

**Table 1 – Value of recyclable containers<sup>6</sup>**

Type of container	Weight (kg)	Initial cost (\$AUS)	Estimated life (no. of trips)	Average cost per trip
Corrugated one way	0.7	0.8	1	0.8
Corrugated reusable	1	1.62	5	0.32
Plastic reusable	2.5	16.82	250	0.07

In some cases the value of reusable packaging is a trade off between saving on packaging costs and the energy, water and chemical costs to clean and transport packaging.

## Reuse in the plant

There may be opportunities to reuse packaging internally for storage or to transfer materials around the plant.

### Reuse by other customers, businesses or community groups

In many European countries, the use of refillable bottles (e.g. milk, beer and soft-drink bottles) and containers has been viable under certain distribution systems, while still meeting hygiene and safety requirements for primary packaging of food and drinks.

Packaging could be also used beyond the plant, for example, by another business, or donated to schools or other organisations. Similarly, the packaging waste of one company could be useful in another, for example, incoming cardboard could be used as outgoing padding.

<sup>5</sup> Nerada Tea Pty Ltd, 2002, National Packaging Covenant July 2002 Action Plan.

<sup>6</sup> Buckhorn Inc, 1991, How to Select Shipping Containers, Milford, OH: data from Best Practice Database.



### Design to encourage packaging reuse

There are a number of ways to improve the reusability of packaging:

- Ensure packaging will be long-lasting for multiple uses e.g. reinforced edging and corners on crates.
- Design packaging for not only easy cleaning but also de-inking or relabelling, restoration of the sealing/closure area e.g. no inaccessible dead spaces.
- Use liners that are cheaper to dispose of than the packaging itself.

### Avoiding damage to promote reuse

Damage to packaging and materials can be avoided by ensuring staff use correct handling procedures, for example lifting drums at base or centre not the rim. Similarly, using proper handling equipment, such as that fitted with rubber covering, will also avoid damage to packaging and reduce waste.

## Recycling packaging

Recycling differs from reuse in that it involves breaking down the item into raw materials and then using them to produce new items. All materials used for packaging such as paper, cardboard, plastics, aluminium, steel and glass are potentially recyclable. Recycling these materials reduces the volume of waste directly going to landfill and conserves raw materials.

The Australian National Packaging Covenant (NPC) developed overarching targets for 2010. All signatories (709 current signatories as of January 2009) to the Covenant are working towards:

1. A national recycling rate of 65 per cent for post-consumer packaging.
2. A recycling rate of 25 per cent for packaging materials that are either not currently recycled or are recycled at very low rates.
3. No further increase in the amount of packaging waste disposed to landfill.<sup>7</sup>

For more information visit NPC website – [www.packagingcovenant.org.au](http://www.packagingcovenant.org.au)

### Maximising recycle of packaging materials

To maximise the recycling possibilities for packaging, manufacturers should try to:

- Avoid composite packaging that has a number of different materials. If composite packaging is necessary, design packaging to allow separation of individual parts for recycling.
- Choose materials that do not interfere with the recycling process e.g. labels, inks, colouring, adhesives, seals, handles, inserts, liners, laminates and closures.
- Work with packaging companies to design packaging to maximise its recyclability.

### Key factors for successful recycling

Successful recycling depends on reliable collection and sorting systems. It requires clear signage and training or education to help consumers not only separate recyclable materials but also make informed purchasing choices. Therefore, putting recycling logos and classification codes with instructions are very important.

Schemes such as Green Procurement and eco-labelling can promote use and purchase of recycled goods and help consumers to identify products that have superior environmental attributes. The recycled content of the packaging are important indicators for these systems.

Successful recycling also requires monitoring and space. If large volumes are collected consider a compactor to minimise storage requirements.

<sup>7</sup> National Packaging Covenant, A commitment to the Sustainable Manufacture, Use and Recovery of Packaging, [www.packagingcovenant.org.au/documents/File/National\\_Packaging\\_Covenant.pdf](http://www.packagingcovenant.org.au/documents/File/National_Packaging_Covenant.pdf)

## Application of recycled materials

### Paper and board

Paper can be recycled by reducing it to pulp, and mixing it with virgin pulp only if the quality of paper or board is to be maintained. Around 83% of waste paper recycled in Australia is used to make packaging and industrial paper. The remainder is used to make printing and writing paper, tissues and newsprint.<sup>8</sup> Lower grade uses include insulation, cat litter and egg cartons. It is estimated that one tonne of recycled paper or cardboard saves approximately 13 trees, 2.5 barrels of oil, 4100 kWh of electricity, 4 m<sup>3</sup> of landfill and 31.7 kL of water.<sup>9</sup>

## INTRODUCING RECYCLED MATERIALS FOR PACKAGING<sup>10</sup>






Kimberly-Clark Australia (KCA) has a target of “no solid waste to landfill” and has managed to divert 95% of their waste from six manufacturing sites from landfill. The Ingleburn Infant Care mill site in NSW which produces nappies, uses packaging with an 89% recycled content, recycling 10,863 tonnes of packaging so far.

### Plastic

Plastic recycling reprocesses waste plastics into new products. Recycling plastic is more difficult than other types of materials due to the many different types of plastics. Packaging carries identification codes by plastic manufacturers to indicate the type of plastic that the product is made from.

Plastics made from recycled materials use only 30% of the energy required to manufacture plastic products from fossil fuels.<sup>11</sup> According to the Packaging Council of Australia, the use of plastic contributes to reduced packaging weights by as much as 400%, potentially halving production and transport energy costs and reducing material wastage by 150%.<sup>12</sup>

Table 2 – Types of Plastics<sup>13</sup>

Plastic Identification Code	Type of plastic	Plastic waste	Recycled plastic products
	Polyethylene Terephthalate (PET/PETE)	Soft drink, juice and water bottles, plastic jars.	Soft drink bottles, detergent bottles, clear film for packaging, carpet fibres, fleecy jacket.
	High Density Polyethylene (HDPE)	Milk bottles, juice bottles, cream containers, bottles for shampoo and cleaners, shopping bags.	Wheelie bins, detergent bottles, agricultural pipes, compost bins, crates, pallets.
	Unplasticised Polyvinyl Chloride (UPVC)	Cordial and juice bottles, detergent, shampoo and cordial bottles.	Pipes, tiles, plumbing pipes, fittings.
	Plasticised Polyvinyl Chloride (PPVC)	Shoe soles and garden hoses.	Hose cores, industrial flooring.
	Low Density Polyethylene (LDPE)	Ice cream lids, garbage bags, garbage bins, recycle bins.	Freezer bags, plastic packaging.
	Polypropylene (PP)	Ice cream containers, crisp packets, straws, microwave ware, plastic-hinged lunch boxes.	Compost bins, worm farms.

<sup>8</sup> Packaging Council of Australia (PCA), 2005, Packaging the Statistics [www.pca.org.au/uploads/00207.pdf](http://www.pca.org.au/uploads/00207.pdf)

<sup>9</sup> PCA, 2005, Packaging the Statistics (as per 8).

<sup>10</sup> Kimberly-Clark HP, 14 September, 2007 'Kimberly-Clark wins major packaging awards' [kcprofessional.com.au/news/packagingawards.asp](http://kcprofessional.com.au/news/packagingawards.asp)

<sup>11</sup> PCA, 2005, Packaging the Statistics (as per 8).



<sup>12</sup> PCA, 2005, Packaging the Statistics (as per 8).

<sup>13</sup> Cleanup Australia, Plastics fact sheet, [www.cleanup.com.au/PDF/au/cua-plastic-recycling-fact-sheet.pdf](http://www.cleanup.com.au/PDF/au/cua-plastic-recycling-fact-sheet.pdf)

Cleanaway. Plastics fact sheet, [www.cleanaway.com.au/clwywr/lib51004/plastic.pdf](http://www.cleanaway.com.au/clwywr/lib51004/plastic.pdf)

Raptis Pax, Recycle Fact Sheet, [www.raptispax.com.au/?page=9](http://www.raptispax.com.au/?page=9)



Plastic Identification Code	Type of plastic	Plastic waste	Recycled plastic products
	Polystyrene (PS)	Yoghurt pots, plastic cutlery, foam hot drink cups.	Cloths pegs, coat hangers, office accessories, spool, rulers, video/CD boxes.
	Expanded Polystyrene (EPS)	Hot drink cups, take-away containers.	--
	All other plastics	Includes acrylic and nylon.	Imitation timber and concrete products.

## PACKAGING FROM RECYCLED AND RECYCLABLE PET<sup>14</sup>

SIGNUM produces a wide range of deli, bakery and food service packaging from recycled and bio-plastic materials. Recyclable PET packaging contains a minimum of 35% post consumer recycled PET, and the products are used by major retail and food companies.

## RECYCLABLE COMPOSITE PACKAGING<sup>15</sup>

Tetrapak carton-based packaging is composed of a laminate of paper (plastic for water proofing and paper for stiffness), polyethylene (clean contact surface for food) and, for aseptic packages, aluminium foil (to block out light and oxygen). Despite the many layers, up to 90% of the fibres can be recovered using a hydro-pulper that agitates water and the packaging to separate the fibres from the polyethylene (the aluminium foil remains inside the layers of polyethylene).

## INTRODUCTION OF RECYCLED MATERIAL<sup>16</sup>

GM Holden (vehicle and automotive engine manufacturer) has introduced several recycled packaging materials including, Low Density Polyethylene (LDPE) for bags and tubing, corrugated fibreboard for cardboard cartons, PET strapping, stretch wrapping and PP bubble plastic.

### Glass

In 2002, around 320,000 tonnes of glass jars and bottles were recycled in Australia, which resulted in diverting 1.2 million bottles from landfill.<sup>17</sup> After being sorted into colour categories, the collected glass cullet is crushed and added a raw material mix in a melting furnace. New bottles may be made with up to 100% cullet but currently 40% to 80% content is used to make a new bottle. With a feed of 80% recycled glass (cullet) and 20% raw materials, a glass furnace can provide a 20% energy saving.<sup>18</sup>

### Ferrous metals (iron and steel)

Iron and steel can be separated magnetically, scrapped and remelted in a furnace. Steel can be recycled repeatedly without reducing the quality of the end product.

One tonne of recycled steel saves 1.5 tonnes of iron ore, 0.5 tonne of coke, 40% of the water<sup>19</sup> and one quarter the energy.<sup>20</sup>

<sup>14</sup> SIGNUM, [www.signum.com.au](http://www.signum.com.au), National Packaging Covenant Council, Annual Report, June 2004, [www.packagingcovenant.org.au/documents/File/NPC\\_June\\_2004\\_report.pdf](http://www.packagingcovenant.org.au/documents/File/NPC_June_2004_report.pdf)

<sup>15</sup> Tetra Pak, 2008, Recycling [www.tetrapak.com](http://www.tetrapak.com)

<sup>16</sup> GM Holden Limited, National Packaging Covenant Action Plan 2008 -2011 June 2008, [www.packagingcovenant.org.au/documents/File/GM\\_Holden\\_AP\\_o8\\_11.pdf](http://www.packagingcovenant.org.au/documents/File/GM_Holden_AP_o8_11.pdf)

<sup>17</sup> Packaging Council of Australia (PCA), 2005, Packaging the Statistics.

<sup>18</sup> Lazon, C. and Wood,G., 1995, Environmentally Responsible Packing, Pira International, UK.

<sup>19</sup> Lazon, C. and Wood,G., 1995, Environmentally Responsible Packing, Pira International, UK.

<sup>20</sup> EcoRecycle Victoria/Gould League of Australia, 1999, Waste Stopper sheet 8: Steel Can Recycling.



### Non-ferrous metals (aluminium)

Aluminium can also be continuously recycled without any loss of quality. Used aluminium cans can be recycled to produce new cans, while aluminium foil can be used to make cast components for the automotive industry such as cylinder heads and engine blocks.<sup>21</sup> The cans are shredded and grounded into small pieces or crushed into bales and then melted in a furnace.

Producing an aluminium can from the raw materials requires high temperatures and large amounts of energy. Making aluminium cans from recycled aluminium uses only 5% of the energy needed to make the cans from the raw materials.<sup>22</sup>

## DEVELOPING RE-USE AND RECYCLING SOLUTIONS<sup>23</sup>

Dulux Australia (manufacturer of paint products) at Rocklea halved the amount of non-hazardous waste between 1991 (6% of production) and 2003 (3%) by mainly recycling packaging, and diverts 600 tonnes of packaging from landfill annually. Examples include the recycle of plastic film on site (50%), the transfer of waste steel containers and 1000 L plastic containers to an external recycling processes, the reuse of single trip pallets in another industry and reuse of cardboard on site (90%). The company is still in the process of developing solutions to recycle paint packaging as, under environmental regulations, contaminated containers are not permitted to be returned to the steel can recycling loop. Dulux conducted a lifecycle analysis on various paint packaging options and participated in the Paintback™ trial program (ended in June 2007) that attempted to separate useable liquid paint components and empty packaging for recycling, unusable and flammable paints for energy recovery and minimise the remainder sent to landfill.

## ON-SITE RECYCLING SYSTEM<sup>24</sup>

Capilano (honey processor) established a separate recycling stream for packaging waste produced on-site including bottles, plastic film and cardboard, and providing packaging cartons to a third party for reuse in 2003. It has resulted in diverting over 100 tonne of material from landfill between 2003 and 2006. Recycled material tonnage has decreased by 80%, and cardboard recycled tonnage has decreased by 40% due to more efficient packaging operations.

This series of fact sheets provides examples and suggestions to the modern manufacturer on how to achieve both economic and environmental benefits from eco-efficiency. Visit the project website [www.ecoefficiency.com.au](http://www.ecoefficiency.com.au) for more ideas and case studies.

<sup>21</sup> Lazon, C. and Wood, G., 1995, Environmentally Responsible Packing, Pira International, UK.

<sup>22</sup> PCA, 2005, Packaging the Statistics.

<sup>23</sup> Dulux Australia, National Packaging Covenant Dulux Action Plan Years 1 to 3, 2005 – 2008, [www.packagingcovenant.org.au/documents/File/ap\\_Dulux\\_Australia\\_AP.pdf](http://www.packagingcovenant.org.au/documents/File/ap_Dulux_Australia_AP.pdf)

<sup>24</sup> Capilano Honey Limited, National Packaging Covenant 3YR Action Plan, August 2006 to July 2009 [www.packagingcovenant.org.au/documents/File/AP\\_Capilano\\_Honey\\_o6\\_o9.pdf](http://www.packagingcovenant.org.au/documents/File/AP_Capilano_Honey_o6_o9.pdf).